

Original Article

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Spatiotemporal analysis of managerial institution locations and their role in intensifying spatial segregation in Tehran (1993-2021)

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Abstract

Tehran faces a historical spatial segregation and a pronounced north–south polarization. This research proceeds from the assumption that the locational pattern of state managerial institutions can influence the persistence or intensification of this inequality. It examines the spatial co-location of these institutions with indicators of the spatial gap over the last three decades (1993–2021). The research method is quantitative and spatial-analytical, using data including the locations of 21 managerial and state institutions, average land price, number of demolition and renovation permits, and the area of worn-out fabric across Tehran's 22 districts. The analyses were performed in ArcGIS, employing two techniques: median center analysis (to identify the pattern and trend of institutional spatial shifts) and spatial overlay (to measure the association between institution locations and inequality indicators). The findings reveal that the spatial distribution pattern of the studied institutions is centralized and unbalanced. The median center of these institutions has been located in the north of Enqelab Avenue axis, with a clear shifting trend over time toward the northern and more elevated districts of the city. The overlay analysis also shows a notable spatial co-location between the clusters of managerial institutions and areas with high land prices, high density of renovation permits, and negligible area of worn-out fabric. This spatial linkage suggests that, rather than playing a moderating role, the locational pattern of state institutions in Tehran has aligned with the cores of capital and power concentration, potentially contributing to a vicious cycle that intensifies spatial segregation.

Keywords

public and governmental institutions
spatial location
spatial segregation
Tehran urban governance

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1. Introduction

Rapid urbanization, as one of the most pivotal transformations of the contemporary world, has generated complex spatial and social challenges in cities (Brenner & Schmid, 2015). In many global metropolises, these developments have resulted in the emergence of a spatial divide and socio-physical segregation (Massey, 2007; Harvey, 2012). Under such conditions, the city transforms into an arena where various social groups compete for access to valuable spaces and desirable amenities (Soja, 2010).

The metropolis of Tehran, as Iran's capital, is no exception to this pattern, with the north-south spatial divide having become one of its most salient structural features. Numerous assessments indicate that this divide has not diminished in recent decades but has, in fact, deepened in terms of economic, physical, and urban service accessibility dimensions (Statistical Center of Iran, 2020; Tehran Municipality, 2021).

While multiple approaches, embodied in various urban development plans and programs, have been employed to mitigate this inequality, one underexplored factor is the role of the locational patterning of management and government institutions in either reproducing or exacerbating this divide. From a theoretical perspective, public institutions function as key actors in the spatial organization of the city, and their siting can produce extensive spatial repercussions (Lefebvre, 1991; Fainstein, 2010). This, however, raises a central question: Has the locational selection of these institutions in Tehran adhered to a fair and balanced pattern? Or has it instead become a factor in reinforcing existing inequalities?

The primary objective of this research is to analyze the spatial relationship between the placement of state management centers and indicators of spatial division in Tehran over the past three decades (1993–2021). This study seeks to answer three key questions: First, what has been the spatial distribution pattern and displacement trajectory of the examined government institutions in Tehran? Second, does a significant spatial correlation exist between the locations of these institutions and key indicators of spatial divide—such as land prices, building renovation permits, and the extent of deteriorated urban fabric? Third, how can this pattern be interpreted within the theoretical frameworks of spatial justice and the political economy of space?

To address these questions, the methodology employs spatial analysis (GIS), utilizing two specific

techniques: median center analysis and spatial overlay analysis. The dataset for this analysis comprises the geographic coordinates of 21 management and government institutions, along with three key indicators of spatial divide across Tehran's 22 districts.

2. Theoretical background

Numerous studies have examined spatial inequality at various scales and through diverse methodologies. For instance, in a metropolitan-scale study titled "A Cartographic Examination of Spatial Justice in Tehran," Kheyroddin and Mostafavi Esfahani (2025), by defining composite indices, clearly demonstrated the socio-spatial rift between the central and southern districts and the northern districts of Tehran. At a more micro scale, Mostafavi Esfahani et al. (2025), in an article titled "Analyzing the Appropriation of Space as a Consequence of Urban Street Commercialization," employed a qualitative approach to analyze exclusionary mechanisms such as "subjective and objective access" and "luxury consumption spaces," which lead to the appropriation of public space for the benefit of specific groups.

On the other hand, some research has delved into the structural roots of these inequalities. Pourahmad et al. (2021), in "Analyzing the Spatial Inequality of Formal and Informal Settlements in the Neighborhoods of District 2, Tehran," using quantitative methods (factor analysis and spatial statistics in GIS), revealed the contrast between "the production of affluence-based space" and "the production of poverty-based space," and the role of capital and power in exacerbating this divide. Similarly, in the city of Yazd, Esmailpoor and Shakibamanesh (2019), by employing advanced statistical indices such as the Williamson Index, Shannon Entropy, and TOPSIS, demonstrated the unjust distribution of urban services and their tendency toward concentration and polarization.

In addition to socio-economic analyses, physical-spatial approaches significantly contribute to understanding patterns of inequality. Azhdari et al. (2018), in "Spatio-Temporal Analysis of Shiraz Metropolitan Area Expansion," utilizing remote sensing and landscape metrics, quantified patterns of urban sprawl and unbalanced growth in different parts of the metropolis. Finally, in a study in Tabriz using a comparative-inductive method, Kheyroddin et al. (2013) concluded that the dual policies of urban management can intensify inequality between the central and newly developed urban fabrics.

This selection of studies indicates that the phenomenon

of spatial inequality can be explored from various perspectives (macro/micro, social/physical, quantitative/qualitative) and with diverse indicators (composite, statistical, landscape metrics), each emphasizing a specific aspect of this complex issue. Considering the previous studies that have examined spatial inequality from different angles, the present research distinguishes itself and introduces innovation in two main aspects. First, while most studies (such as Kheyroddin and Mostafavi Esfahani, 2025; Pourahmad et al., 2021; Esmailpoor & Shakibamanesh, 2019) have focused on the consequences of inequality or the analysis of general socio-economic factors, this research specifically probes the active and influential role of the locational pattern of state management institutions as an institutional factor in the perpetuation or intensification of the spatial divide. Second, methodologically, compared to general spatial analysis approaches (like Azhdari et al., 2018) or descriptive-analytical methods (like Kheyroddin et al., 2013), this research employs advanced quantitative-spatial techniques (median center analysis and spatial overlay) and utilizes precise, long-term spatial data (1993-2021) to objectively measure the spatial correlation between the epicenters of governance institutions and key inequality indicators (land price, renovation, and deteriorated fabric). Therefore, this study seeks to fill a gap in the literature by answering the question of whether the locational pattern of state institutions in Tehran, instead of playing a moderating role, has aligned itself with market and power mechanisms, thereby contributing to the formation of a vicious cycle of spatial segregation.

The following section reviews theoretical literature on spatial justice, urban segregation, and actors as determining elements in the spatial organization of cities. The importance of analyzing these discussions lies in understanding the impact of actors on urban spaces and the role of the city as a capital commodity that can deviate from spatial justice—causing spatial rift—or converge toward it.

2.1 Spatial justice

Spatial justice, as a branch of multidimensional justice, focuses on the equitable distribution of resources and opportunities within the geographical realm (Soja, 2008). This concept does not replace economic or social justice but rather provides a spatial and critical framework for achieving justice (Soja, 2010) and is simultaneously considered both an 'outcome' and a

'process' (Soja, 2008). In the urban context, justice interweaves social and spatial dimensions, and urban space, while reflecting and shaping social dynamics (Alrobaee, 2021), is the stage upon which socio-spatial inequalities manifest. Although a certain degree of spatial disparity in cities is inevitable (Em & Sheludkov, 2024), identifying patterns of injustice enables urban management to reduce inequality and enhance quality of life and sustainability through the targeted distribution of services (Martinez, 2009). Any change in spatial organization impacts socio-economic relations, and planning plays a decisive role in realizing justice (Marsousi, 2004). For example, mega-urban projects can affect land and housing prices in their vicinity, which can be mitigated through strategies such as monitoring price trends, preventing land speculation, providing financial compensation for price depreciation in neighboring areas, and improving public transport access (Kheyroddin & Bahreman, 2017).

Urban planning, as an inherently political activity, is rooted in cultural contexts (Jodi Gollor & Sharifzadegan, 2018). The theory of social justice, with its roots in political science and sociology, examines the experience of human rights in everyday life (Jian et al., 2020). In Rawls's liberal-egalitarian approach, justice is based on two principles of basic liberties and equal opportunity, such that social and economic positions should be to the greatest benefit of the least advantaged (Achmani et al., 2020). In the urban domain, Fainstein, with her theory of the 'just city,' deems the infusion of principles of equality, diversity, and democracy into planning as essential for achieving spatial justice (Fainstein, 2010; Alrobaee, 2021). Urban planning, from this viewpoint, is considered a key instrument for attaining spatial justice and, consequently, social justice (Mabin, 2013). In contrast, communitarian and Marxist approaches define justice based on collective rights. David Harvey, critiquing the concentration of advantages in affluent areas, challenges the problematic production of deprived areas. Henri Lefebvre, by formulating the 'right to the city,' posits universal citizen access to urban resources and the possibility of a quality and diverse life as a fundamental right (Schmid & Lefebvre, 2012). Therefore, justice in the city can be analyzed along two main axes: liberal approaches centered on prioritizing low-income groups, and communitarian approaches emphasizing the 'right to the city' and universal access.

2.2 Spatial inequality and urban segregation

One of the most significant concerns for urban and regional planners is the equitable allocation of space for various activities. The intervention of multiple factors leads to efforts aimed at complex planning to establish a balance between demands and resources (Hedayatifard & Kheyroddin, 2017a). Spatial inequality and urban segregation, as fundamental challenges of the urban spatial organization, are rooted in the concentration of economic growth and the underdevelopment of peripheral areas, and are particularly exacerbated in metropolises (Andalib, 2009; Qader Hajat, 2021). Achieving spatial justice necessitates functional and institutional integration to prevent fragmentation in policymaking (Asadie & BarakPour, 2021). Space is an arena for competition among dominant groups who, relying on power resources (economic, political, symbolic), advance their own objectives, leading to spatial segregation (Douding, 2021). This concept encompasses two dimensions: sociological segregation (lack of social relations) and geographical segregation (physical distancing), which are highly correlated and primarily stem from socio-economic factors such as rising housing prices (Watts, 2007). Its structural origin lies in the three realms of economy, politics, and social life (Afrough, 1998). The development of green infrastructure can play a role in moderating this phenomenon (Shirgir et al, 2019). Furthermore, these

spatial inequalities can also affect the quality of social interactions; due to the various changes occurring in cities across different dimensions—physical, spatial, functional, and developmental—the quality of civic interactions receives less attention (Khorsand et al, 2024).

From the perspective of capitalist space production, there is an inherent conflict between the use value (fulfilling needs) and the exchange value (profitability) of space (Lefebvre, 1995). This conflict fuels class division, segregation, and inequality in the distribution of services. In this system, the reproduction of space is heavily influenced by political and economic forces, and spatial changes predominantly serve affluent classes (Alessandri et al., 2017). The dominance of exchange value commodifies space and reinforces socio-spatial hierarchies. A speculative economy drives landowners to change land use for economic gain (Zoghi et al., 2013), while land should be considered beyond the logic of profit (Hubacek & Vazquez, 2002). Even public spaces are subject to appropriation and decline by capitalist logic (Langstraat & Van Melik, 2013). Modern cities are also defined more than anything by their consumption amenities, which have led to extensive transformations in the urban landscape (Shokouhbidhendi & Mostafavi Esfahani, 2025). The factors causing this segregation from the perspectives of various theorists are presented in Table 1.

Table 1. Theorists' perspectives on factors causing segregation based on Mokhtarzadeh, et al. (2019)

Theorist	Factors causing segregation	Dimensions
Karl Marx & Friedrich Engels	Economic classes, status, power, parties, and capital	Economic-political
Max Weber	Power, status, education, social system classes, lack of free competition, and social closure	Economic-political-social-cultural
Ray Paul	Unfair distribution of scarce urban resources	Economic-social-cultural
Anthony Giddens	Class and social distinctions (spatial division and segregation in a class society)	Social
David Harvey	Access to scarce resources to capture market capacity, social structure, and social relations	Economic-social
Sako Musterd	Deprivation, unemployment issues, and the government's political approach	Economic-political-cultural
Henri Lefebvre	Global economy, social relations, capital and land, real estate	Economic-social

Cities, as material outcomes of capitalism, are directly commodified and transformed into hubs for the circulation, production, and consumption of goods (Serin et al., 2020; Alya & Fuad, 2020). The cycle of capital is intensified through profitable investment

and rapid construction aimed at generating surplus value (Jauhiainen, 2006). Consequently, urban spaces are capitalized and designed for profit production (Edel, 2001), even though these same spaces significantly impact the quality of social life (Moayedi

et al., 2019). For example, in 24-hour cities, proponents argue that such spaces enhance urban presence and safety, while opponents believe they lead to energy waste and a decline in social cohesion (Khorsand et al., 2020). Thus, urban spaces can also be produced solely for branding and profit generation. On the other hand, projects like megaprojects may create desolate and unsafe edges that fundamentally lack any relationship to citizen presence. In contrast, these urban spaces could have been opportunities to strengthen the social aspects of spatial attractiveness (Kheyroddin et al., 2025). Therefore, a capitalistic view of urban spaces and cities in general can lead to changes whose negative consequences may sometimes be substantial. Overall, land market mechanisms make price a function of supply, demand, and macroeconomic developments (Hengstermann & Götze, 2023; Gwamna et al., 2015). Land-use decisions are influenced by three factors: physical/biological conditions, actors, and economic forces (Hubacek & Vazquez, 2002). In this context, economic factors and speculation can drive land-use changes in favor of specific groups (Kheyroddin & Mostafavi Esfahani, 2024). For instance, neglecting regulations in guiding and controlling land during land-use change processes allows informal relations to exert influence. It leads to the illegal production of exclusive space within environmental land contexts (Kheyroddin & Hedayatifard, 2017b). The question arises: why in Iran's metropolises does the management of spatial transformations tend more toward speculative pathways than balancing programs (Kheyroddin et al., 2013)? Ultimately, in the capitalist system, the city is transformed into a commercial commodity where exchange value dominates. This process, alongside land market mechanisms and the three influential factors, reproduces a continuous cycle of profitability and spatial inequality.

2.3 Actors as determinant elements of urban spatial organization

Cities are reflections of multiple processes, and the urban environment is a manifestation of power relations within society (Azhdari et al., 2018). In this context, political power, through its instruments, regulates the actions of actors from the public, private, and civic sectors and guides the spatial organization (Ershadsarabi et al., 2020). These actors, who often operate through hidden processes (Hillier, 2009), seek to maximize their utilization of space. This competition has led to the formation of unsustainable spaces, imbalanced metropolitan growth, and the unequal accumulation of capital (Foster, 2013). Under such conditions, urban spaces transform into instruments for capital circulation and the reinforcement of monopolistic power, rather than responding to public needs. The conflict between individual and collective interests creates a fundamental challenge, wherein the leadership of the mayor and constructive interaction with other actors are vital (Galevand & Sharafi, 2025). The prioritization of organizational over public interests—often rooted in economic motives (Kheyroddin & Hedayatifard, 2017a)—highlights the necessity of improving cooperation among the numerous actors within Iran's urban management system (Razpour, 2021).

The spatial organization of a metropolis is the outcome of the interplay and contention among four key forces: the state, the economy, political institutions, and civil society (Ershadsarabi et al., 2020). This complex organization extends beyond physical arrangement to encompass dynamic flows of communication, economy, and information (Kheyroddin et al., 2022). The competition among actors, centered on capital accumulation, intensifies regional inequalities and calls for integrative leadership.

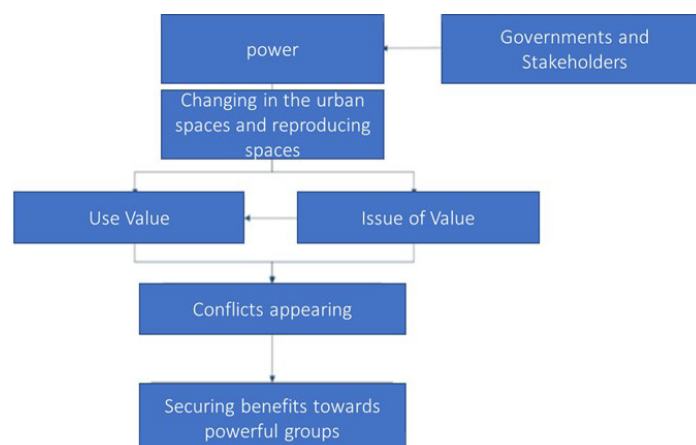


Figure 1. Views related to power in space and planning

Some actors view urban space as an economic and commercial resource, while others regard it as a cultural and social resource. These conflicts cause urban space to be considered an important political arena where participation, negotiation, conflict, and agreement among actors take place (Farabi Asl et al., 2023). In their article, Kheyroddin and Mostafavi Esfahani (2025) identified the economic factor as the second most important driver of land-use changes from a speculative perspective, as examined in their

case study of Tehran's Gisha neighborhood. This highlights the crucial importance of identifying (stakeholder) actors (Kheyroddin & Mostafavi Esfahani, 2025). Table 2 presents a summary of definitions related to actors, displayed in chronological order by decade. The earliest definition is often drawn from notes prepared in 1963 by the Stanford Research Institute: "those groups without whose support the organization or related entity would cease to exist." (Freeman, 1984: 31 as cited in Miles, 2017).

Table 2. The Evolution of conceptual definitions of stakeholders (1990-2000), based on (Miles, 2017)

Sources	Definitions
Freeman & Evan (1990).	Contractual partner
Low (1991: 336), Miller and Lewis (1991: 55)	Low: All those who have an interest or stake in the survival and organization. Miller & Lewis: Stakeholders are those who can cause harm or damage, or advance and assist companies and organizations.
Hill and Jones (1992: 133)	Constituents who have legitimate claims on an institution or organization. They supply the firm or organization with critical resources and, in exchange, expect their interests to be satisfied.
Brenner (1993: 205)	Those who have legal and legitimate, or indeterminate, relationships with organizations.
Clarkson (1994: 5)	Those who bear some form of risk as a result of having invested some form of capital (human and financial).
Langtry (1994: 433)	Stakeholders whose claims are of a morally and legally binding nature on the firm.
Schlossberger (1994)	Investors who provide specific capital or create a major opportunity for a business.
Brenner (1995: 76)	[Those who] can affect or are affected by the firm or organization.
Clarkson (1995: 106)	Have a claim of ownership in the firm (organization) and its interests.
Jones (1995: 407)	Groups and individuals with (a) the power to affect firm performance and/or (b) a stake in firm performance.
Carroll and Näsi (1997: 46)	A group that is affected by or can affect the organization, its actions, activities, and performance.
Mitchell, Agle, and Wood adopted by: Agle, Mitchell, and Sonnenfeld (1999), Phillips (1997: 63–4)	Stakeholders are those with urgent legal and rightful claims on the firm, or those who possess the power to influence it.
Argandoña (1998: 1099)	Those with interests in the organization, such that the organization also has an interest in satisfying their demands.
Frederick (1998: 361)	Anyone in communities and associations who has a share in what the company does.
Clarkson Center for Business Ethics (1999: 257), adopted by: Whysall (1998)	Parties with a stake in the company: they have something at risk and therefore something to gain or lose.
Reed (2000)	Those with interests accompanied by valid, fundamental, and legitimate claims for their advancement.
Scott and Lane (2000: 53)	Have a direct impact on the organization's performance and survival.

Based on the above-mentioned definitions, numerous groups are affected by an organization's objectives, yet no one would imagine that their support is essential for the organization's survival. Among these, various power groups, including governments and governing

bodies themselves, wield their authority in ways that increase conflicts among different societal groups, ultimately reproducing space to benefit those in power. In other words, the predominance of the dynamics of power and political economy over space

drives the state and other custodial groups—whether intentionally or not—to act in ways that secure the interests of powerful groups.

2.4 Conceptual model of the research

Based on the theoretical foundations outlined and the research objective, the conceptual model of this study is depicted in Figure 2. This model illustrates the causal relationships between key concepts: The existing spatial divide in Tehran, influenced by structural economic, political, and managerial factors, has directed the locational pattern of institutions responsible for development and spatial justice toward affluent districts. This unjust spatial pattern itself,

through mechanisms such as capital attraction and unbalanced resource allocation, has led to a further intensification of that initial spatial divide, thereby reinforcing a vicious cycle of injustice. The present research, by focusing on analyzing the geographic locations of 21 management and government institutions (the key independent variable) and examining their spatial overlay with indicators of the spatial divide (land price, building permits, and deteriorated fabric), seeks to analyze part of this cycle. This aims to clarify the tangible role of “institutional actors” in either perpetuating or intensifying the north-south spatial segregation in Tehran.

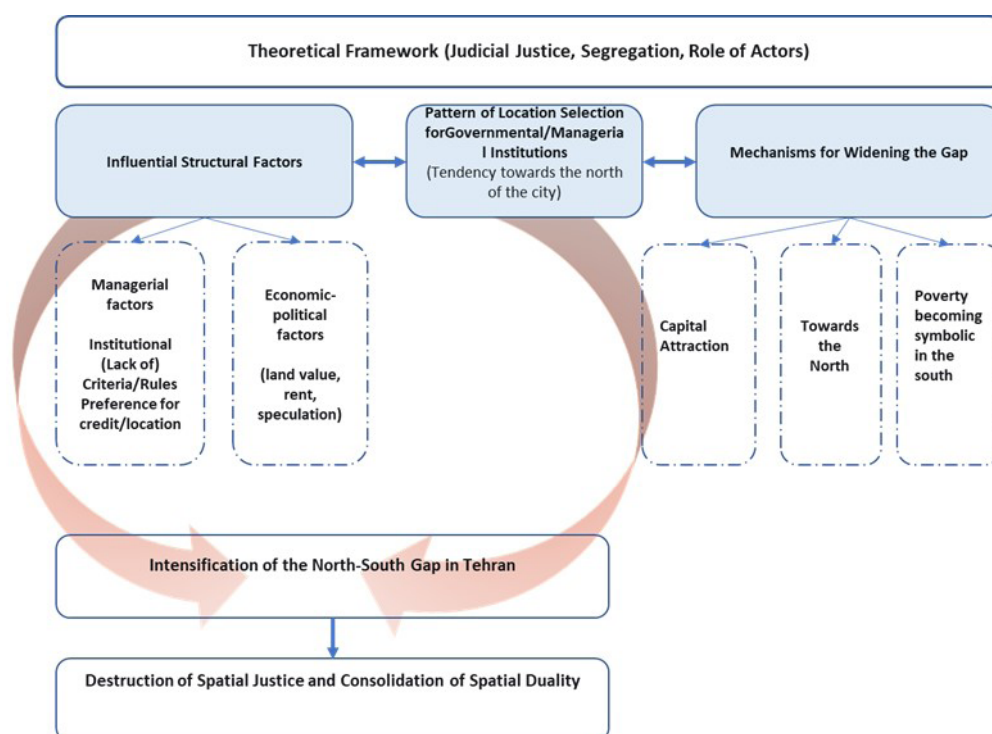


Figure 2. Conceptual model of the study: the relationship between locational placement of management institutions and the intensification of spatial divide in Tehran.

3. Materials and methods

This research employs a spatial-analytical method and a quantitative approach at the scale of the Tehran metropolis and its districts. Its methodological framework was designed and implemented in three main stages.

In the first stage, data related to the spatial divide from 1993 to 2021 were compiled under three objective indicators—including average land price (as a capital-based inequality indicator), the number of issued demolition and renovation permits (as an indicator of physical investment dynamism), and the area of

deteriorated fabric (as a deprivation indicator)—extracted from official statistical yearbooks. These were spatially zoned for Tehran’s 22 districts in the ArcGIS software environment. The goal of this phase was to create spatially enabled information layers for an objective visualization of the dimensions of spatial inequality.

In the second stage, by extracting the precise locations of 21 management and government institutions and entering them as a point layer in GIS, the spatial pattern of these institutions was analyzed. To uncover the macro distribution pattern and the trend of their

spatial centralization over three decades, the median center analysis tool was applied. This analysis reveals the central tendency and spatial displacement of the institutions' locations.

In the third stage, and to test the main hypothesis of the research, the spatial correlation between the institutions and the epicenters of inequality was measured by applying the spatial overlay method. In this phase, the spatial layer of management institutions was overlaid onto the layers of spatial divide indicators to quantitatively and visually assess the spatial convergence or divergence between them.

In summary, the methodological logic of this research integrates median center analysis (to identify patterns) and overlay analysis (to test relationships). This approach charts a clear path from identifying the spatial pattern of institutions to measuring their association with inequality indicators, directly serving the primary research question regarding the role of institutional siting in the spatial dynamics of the Tehran metropolis.

3.1 Study area examination

In examining the study area, the analysis first addresses Tehran from the perspective of its spatial rupture, its managerial crises, and the actions taken by urban management to reduce these divides. Finally, it introduces the specific study area within Tehran.

Spatial segregation in Tehran

The issue of spatial segregation in Tehran, particularly between north and south, is linked to the quality of space and its impact on land prices, which can justify economically driven land-use changes. This divide stems from Tehran's historical development process, as the northern parts of the city benefited from relative advantages in physical quality, climate, and topography. The quality of the urban fabric reflects this spatial segregation, where an unfair distribution of resources has created a gap between northern districts (with high spatial quality) and southern districts (with low spatial quality). Unfortunately, despite regeneration and revitalization plans, the spatial segregation between northern and southern areas has intensified due to the inequitable distribution of resources, such that deteriorated structures in the south stand in contrast to luxury commercial and residential towers in the north (Kheyroddin et al., 2014). Some policies and actions by urban management actors have not only failed to moderate this process

but have contributed to its intensification.

A study on the spatial convergence of Tehran between 1966 and 2006 showed that fluctuations impacted the morphological structure and spatial division of labor in the metropolitan region. Tehran, as the dominant metropolis of the region, experienced intense 'spatial convergence' during 1966–2006, but the pace of convergence slowed between 2006 and 2011, which could lead to 'spatial divergence'. A cartographic analysis of Tehran's spatial structure also confirms socio-economic differentiation in some areas, indicating that extensive spatial transformations over the last two decades have resulted in spatial fragmentation rather than spatial integration (Kheyroddin, 2014). This highlights the necessity of revising strategic options in urban development policies.

In the early 1990s, Tehran Municipality, through an official scheme aimed at reducing economic inequalities, allocated funds received from construction projects in northern districts to improve infrastructure in southern districts. Regardless of the controversial aspects of this action, one can discern the oversimplified approach of urban authorities towards creating balance. The results of these profit-driven considerations are evident today in the intensified and more complex spatial polarization of Tehran (Kheyroddin, 2010). The programs of the main urban management institution over the last two decades have also been formulated with the claim of integrating the spatial segregation of north and south (Kheyroddin & Mostafavi Esfahani, 2025). However, the concentration of state institutions in Tehran has created a kind of incongruity in metropolitan management (Khatam et al., 2023). According to some researchers, Tehran, which was a hub for industries and services from the 1960s to the 1990s, has in recent decades transformed into an inefficient center of commerce and speculation (Palizban et al., 2012). District 1 of Tehran epitomizes this transformation: significant spatial changes have led to the formation of a heterogeneous urban landscape marked by the expansion of commercial-financial spaces and shopping centers (Kheyroddin et al., 2021). These changes have resulted in land rent, transforming urban space into a commodity for a rentier economy. The consequences of this trend include the emergence of affluent enclaves, social ghettoization, class discrimination, excessive consumerism, and a consumption-oriented culture of flânerie.

Spatial divide and urban management crisis in Tehran

Tehran, given its favorable location at the foot of the Alborz Mountain range and its unique natural characteristics, has consistently been subject to physical growth and development. This growth has continued from the Safavid era to the present, mainly without formal planning. With the population increase, various social groups settled in different parts of the city, particularly in its peripheral lands. This phenomenon, alongside Tehran's natural features—from the northern highlands to the southern plains—led to the spatial separation of different parts of the city based on their geographical and natural characteristics. This north-south spatial division was such that one of the main strategies of Tehran's first comprehensive plan (Farmānfarmā'ī Plan) was defined as moderating the north-south gap through east-west expansion.

However, the disparity between different urban areas during the pre-Islamic revolution period not only failed to moderate but became entrenched as two distinct social and economic poles—the affluent north and the middle-class and poor south. Tehran, with its highly polarized and imbalanced areas (affluent north and poor south), had a serious need for redevelopment and rebalancing. Accordingly, Tehran's redevelopment was initiated as a primary objective of the urban development framework from the early 1990s (Kheyroddin, 2010). The roots of pursuing this goal can also be traced to the revision of Tehran's comprehensive plan in the 1980s and the preparation of the City Organization Plan, which was approved in 1991. However, decades after the preparation of the Organization Plan and despite the approval of a new comprehensive plan for Tehran in 2007, present-day Tehran is a bipolar city (north and south) with a deeper divide than before, explained by various indicators. The city's physical appearance also changes when moving from south to north, and the difference between these two poles is clearly observable.

Sale of building density for the rapid redevelopment of Tehran (urban management action to reduce the spatial divide from the late 1360s Shamsi)

Alongside the issue of financial independence for municipalities, this idea led to the establishment of a new procedure in municipal revenue generation known as the "sale of building density." This practice quickly became the principal revenue source for

municipalities across various periods of urban management.

The conceptual rationale for selling building density can be understood from an official statement by Tehran Municipality; as the municipality declared: "We take money from the wealthy (in the north) and spend it on the poor (in the south)" (Kheyroddin, 2010). Contrary to expectations, however, a review of records indicates that this practice not only proved ineffective but also exacerbated the divide between south and north, such that the pace of development and construction in northern Tehran accelerated. This issue has had a direct correlation with land and housing prices in the city, as the incline in land and housing prices in the northern half of Tehran has been significantly sharper than in the southern areas.

Study query introduction

From the vast number of states, semi-states, and quasi-states in Tehran, 21 of the most influential and frequently visited public institutions with analyzable data have been selected. These centers are:

- Tehran Municipality Beautification Organization
- Tehran Urban Studies & Planning Center
- Ministry of Roads and Urban Development
- Urban Regeneration Corporation
- Islamic Revolution Housing Foundation
- Tehran Provincial Governorate
- Mostazafan Foundation
- Tehran Provincial Management and Planning Organization
- Islamic Consultative Assembly (Majlis) Research Center
- Islamic Republic of Iran Railways
- Iran Railways Headquarters Building
- Ministry of Health and Medical Education
- Tehran Stock Exchange Building
- Expediency Discernment Council Research Center
- Administrative Justice Court
- Urban Development Revitalization Administration
- National Disaster Management Organization
- Ministry of Science, Research and Technology
- Ports and Maritime Organization
- Maritime Affairs Administration (affiliated with the same organization)

The current locations of these centers, as well as their previous locations, are visible in the related maps. Based on these maps, it can be observed that the spatial tendency of these institutions over the past three decades has been from the central half towards the northern half of Tehran.

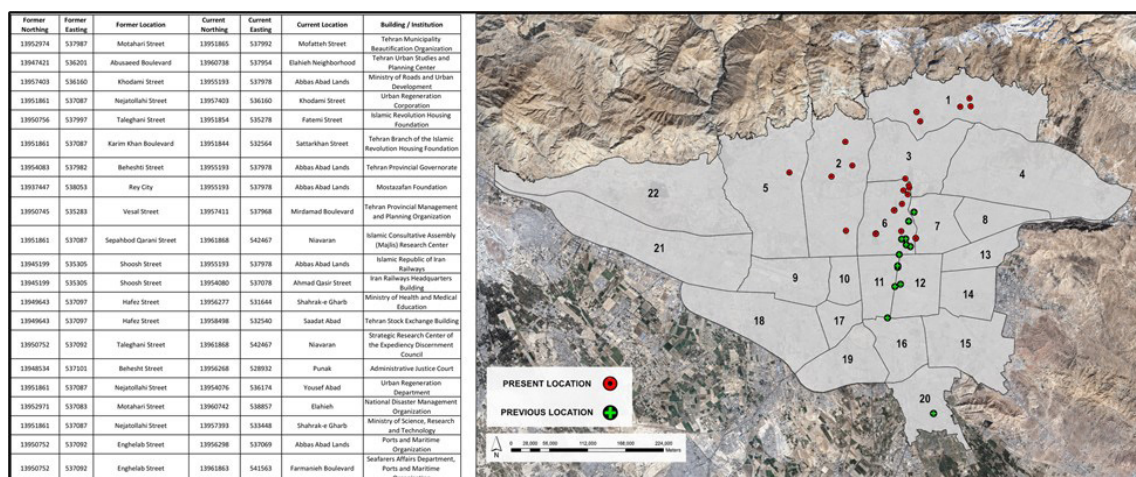


Figure 3. Geographic comparison of the present and previous sites of the examined institutional buildings.
As can be observed, all these centers are currently located in the northern districts of Tehran, specifically Districts 1, 2, 3, 5, and 6

4. Research findings

4.1 Quantitative analysis of Tehran urban management actions in the city's development process in the northern and southern halves

Total and average area of building permits for large-scale constructions in northern Tehran

To quantitatively analyze the actions of Tehran's urban management in the city's development process across its northern and southern halves, the total area of building permits has been examined as one of the most influential components. These analyses, conducted over the 28 years from 1993 to 2021, indicate that the largest share of construction area in Tehran belongs to Districts 1 to 5—considered affluent districts with high economic potential. The share of the issued permit area drops significantly after Districts 1 to 5. This suggests that urban management exhibits

a tendency and priority for more construction in the northern half, thereby generating more revenue. Furthermore, this has led to an inclination for investment in northern districts, while other areas of the city, particularly the central and southern districts, lack attractiveness for investment.

The chart and map below show that the largest permit areas belong to Districts 1 to 5 of Tehran; approximately 48% of the total building permit area is allocated to these districts, with the remaining 52% concentrated in other areas. This is while the smallest total area of building permits precisely belongs to the districts most in need of redevelopment. In contrast, the largest area is allocated to the northern and affluent districts. As evident in the following map, Districts 1, 2, 4, and 5 have witnessed the largest area of building permits issued during the years 1993–2021.

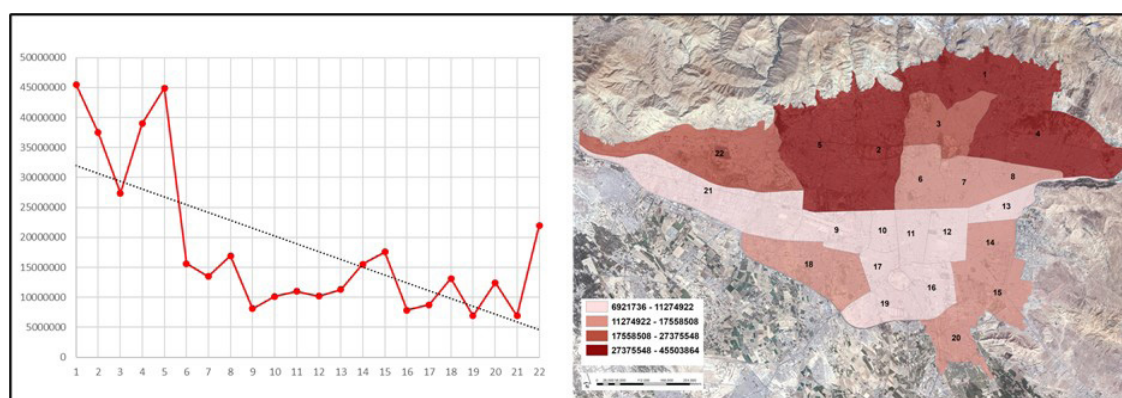


Figure 4. Spatial analysis of the total area of building permits issued during the years 1993–2021, including a chart of total permit areas by the 22 districts. (based on data from the Statistical Center of Iran, 2024).

The following map presents a spatial analysis of the mean area of building permits issued during the years 1993–2021. Calculating the mean area of these permits reveals that the northern districts of Tehran, along with District 22—which has experienced increasing construction activity—have a larger mean area compared to the southern districts. A comparison of the mean area of building permits shows that the difference between northern and southern districts reaches approximately sixfold. This indicates the small size and complexity of land parcels in Tehran’s central and southern districts, contrasted with the relative ease of construction in northern areas.

Furthermore, this pattern is not merely a statistical inequality; it is a tangible reflection of two key mechanisms for intensifying the spatial divide, as discussed in the theoretical framework of this research:

1. The economic mechanism (capital reproduction): The concentration of large-scale permits in the north signifies the predominant orientation of both private

and public capital toward the most profitable urban arenas. This confirms the logic of the political economy of space (Harvey, 2009), wherein space, as a commodity, attracts investment toward areas with higher added value (larger plots, better access, a more desirable image). The result is a vicious cycle that concentrates wealth and environmental quality in the north while depriving the south of revitalization resources.

2. The managerial mechanism (the role of institutional actors): This pattern also reflects the implicit or explicit policies of urban management. The maximal allocation of permits to northern districts may indicate a prioritization of revenue generation (through fees) and responsiveness to capitalist demand in these areas. In contrast, deteriorated districts with small, fragmented parcels are perceived as “complex” and “low-yield” by investors and implementing institutions. This exemplifies the gap between justice-oriented discourse and economically rational action in city management.

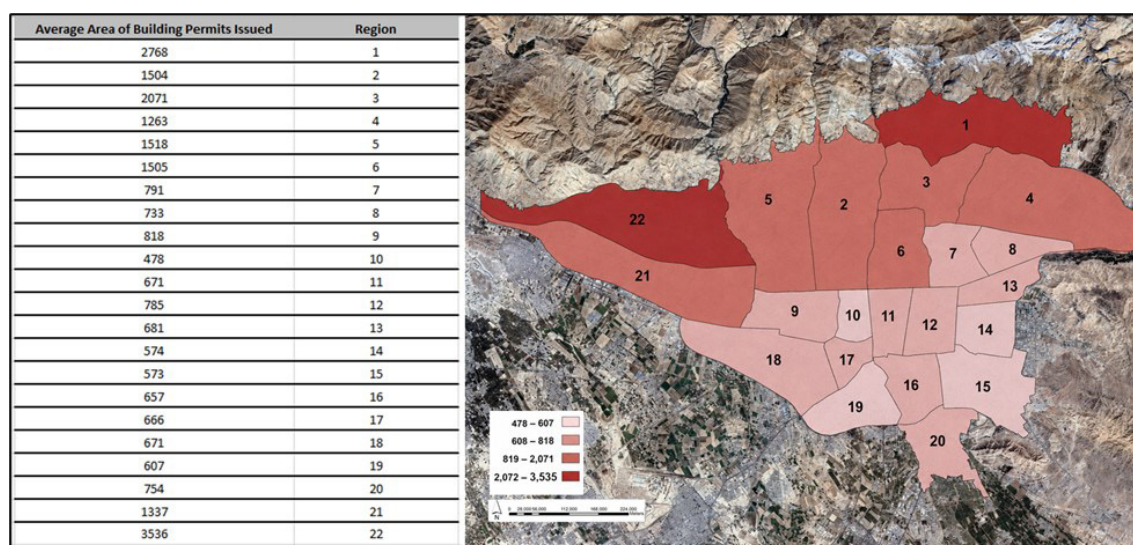


Figure 5. Spatial analysis of the average area of building permits issued during the years 1993–2021. (based on data from the Statistical Center of Iran, 2024)

Analyzing the increasing gap among districts of Tehran using the coefficient of variation of apartment prices

To analyze the price gap among districts and examine its increase or decrease over time, the average price of newly built apartments in each district has been extracted from the annual statistical reports of Tehran from 2011 to 2021. For a more accurate inference of price changes and their relationship with spatial disparity, the “coefficient of variation” index of prices

has been employed. Based on the results obtained for the annual price coefficient of variation across the 22 districts, analyzing the trend of this index indicates an increase or decrease in the gap among districts. Accordingly, by plotting the chart of this index, it can be observed that the overall trend of the coefficient of variation suggests an increasing price gap among the districts. Although in some specific years a decrease in this index may be observed, the overall outcome indicates a widening price gap between the north and

the south. Analyzing the chart of price gap changes reveals that the slope of this increase in the 2010s (1390s solar year) has been significantly steeper compared to previous years, to the extent that the average price difference between the northern and southern districts of Tehran is approximately 56

percent. Therefore, it is evident that this price gap has deepened the class divide among the residents of Tehran and has further divided the city into two halves: the “affluent north” and the “impoverished south,” to the point that today, Tehran stands as a tangible symbol of class conflict.

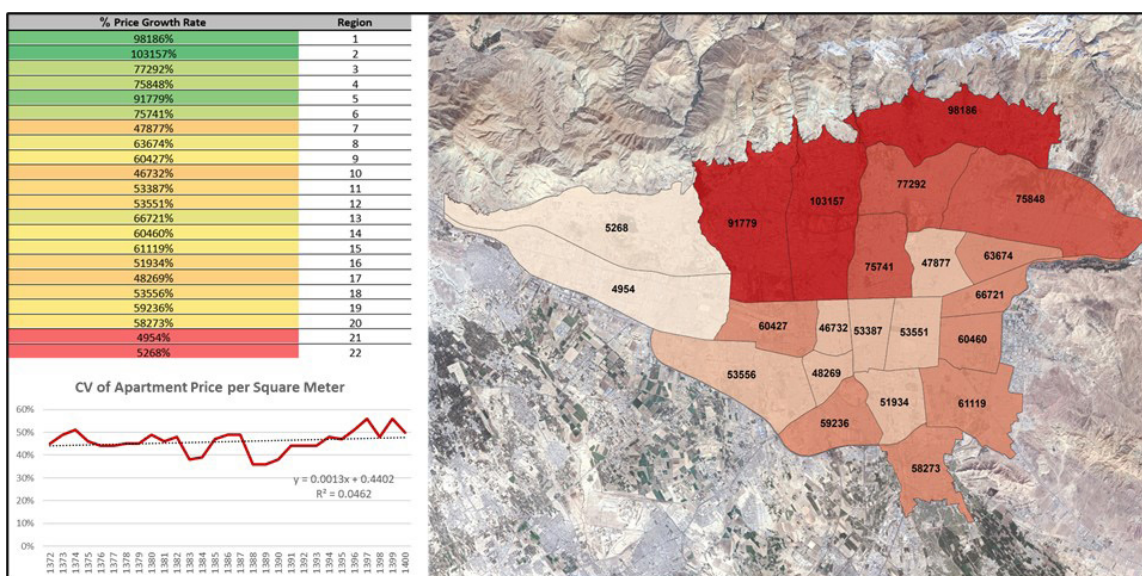


Figure 6. Spatial analysis of the total percentage growth in apartment price per square meter from 1993 to 2021 and the trend of change in the coefficient of variation over these years. (based on data from the Statistical Center of Iran, 2024)

Furthermore, explaining the construction trend in the districts of Tehran as a measure of urban management’s efforts towards city renewal, the annual housing price growth index can also reveal the tendency for greater growth in some districts compared to others. By examining the data extracted from the statistical yearbooks of Tehran from 1993 to 2021, it has been determined that the slope of the housing price increase in Districts 1 to 6 has been steeper and accompanied by a higher growth rate compared to other districts. Specifically, the highest initial price change was in District 2 with a 103,157 percent increase, followed by District 1 with a 98,186 percent increase. These findings are not merely indicative of inequality among residents; rather, they demonstrate the function of a “spatial engine” for intensifying injustice. This trend can be analyzed on two levels:

1. Macro level: the logic of rentier capitalism and the political economy of space

The astronomical and unbalanced growth in prices reflects the precedence of the logic of speculation in land and housing over the logic of habitation and social justice (Harvey, 1985). Capital (both private and public) has flowed in a self-reinforcing manner towards

districts that were already wealthier and symbolically more desirable (Districts 1 to 6). This process creates an upward price spiral in the north and stagnation or negligible growth in the south. This is precisely an instance of the spatial reproduction of inequality, wherein the housing market becomes a factor converting spatial differences into a structured class divide.

2. Management level: the role of policies and regulatory institutions

This acceleration of the gap has occurred within a context where the responsible institutions (the municipality and Ministry of Roads and Urban Development) are tasked with market regulation and equitable distribution of facilities. The data raise a critical question: Have resource allocation, permit issuance, and infrastructure development policies, instead of moderating this spiral, unintentionally or knowingly fueled it? The concentration of large-scale construction permits in the north (section 4-1-1) and the current accelerated price growth in the same areas indicate a synergy between physical investment and economic valuation, with urban management at its center.

Distribution of dilapidated and inefficient urban fabric in the city of Tehran

Considering the quantitative and spatial reading of the number of demolition and renovation permits issued across the districts of Tehran, as well as the geospatial analysis of land price changes, examining the area and number of dilapidated blocks by district can provide a suitable analytical basis for evaluating the actions of urban management in renovating Tehran. Accordingly, by spatializing the dilapidated blocks according to the

Tehran Statistical Yearbook of 2021, the highest number and largest area of dilapidated blocks are found in the districts south of the Enqelab axis. However, the number of permits issued between 2011 and 2021 indicates a high number of permits issued in the northern districts of Tehran, demonstrating a high concentration of construction activity in these areas. As shown in the map below, the northern districts of Tehran have the smallest share of dilapidated urban fabric blocks.

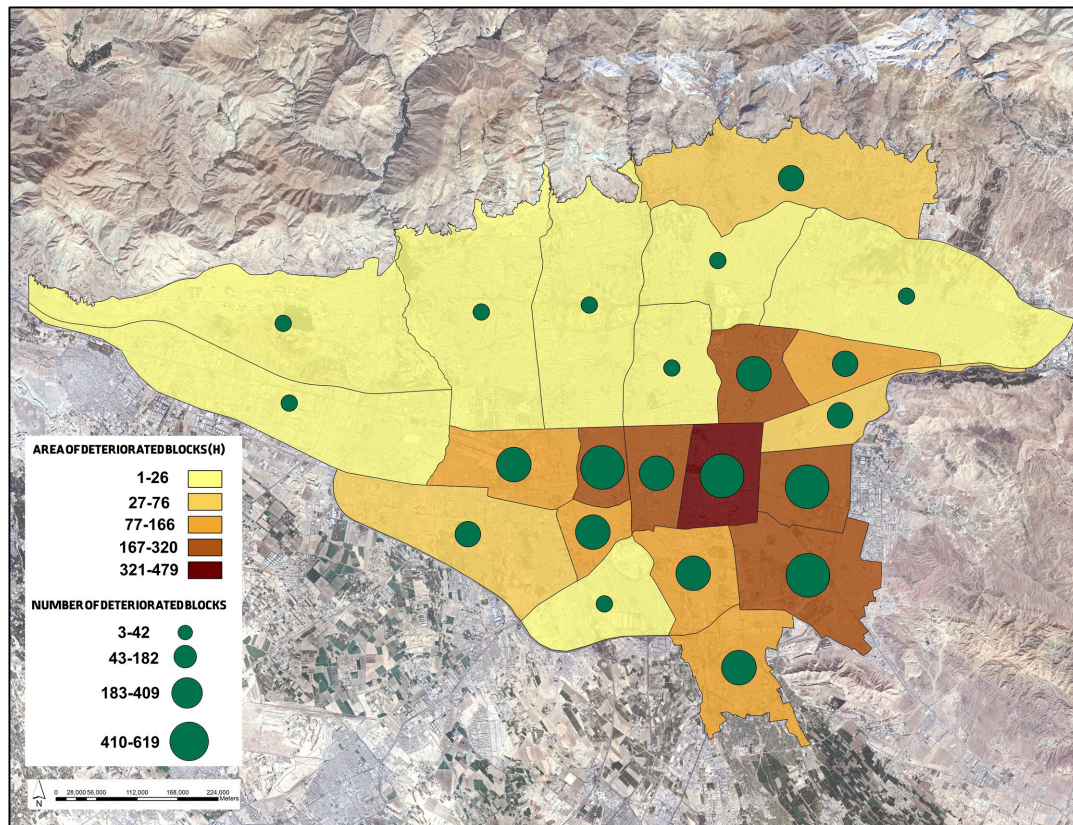


Figure 7. Spatial analysis of the area and number of deteriorated blocks in 2021 (based on data from the Statistical Center of Iran, 2024)

By comparing the extent of dilapidated urban fabrics and land price changes, it can be understood that the gap between the northern districts and those with dilapidated fabrics has not only not been moderated but has also increased. Therefore, it is clear that the urban management policies concerning dilapidated and inefficient urban fabrics have been either passive or even confrontational, exacerbating the north-south divide in Tehran.

This dual pattern (concentration of dilapidation in the south and investment in the north) cannot be considered accidental; rather, it must be interpreted as a tangible manifestation of “planned spatial

marginalization,” which can be examined from two theoretical perspectives:

Spatial justice and unjust resource allocation: From the perspective of spatial justice (Soja, 2010), the unbalanced distribution of renovation resources (permits) in favor of wealthier districts is a classic example of distributive inequality in space. This not only ignores the basic needs of residents in dilapidated areas for safe and adequate housing but also, by depriving these areas of investment, fuels the perpetuation of the cycle of spatial poverty. Dilapidation is both a cause and a consequence of this systematic deprivation.

Political economy of space and the logic of land value capture: From a political economy perspective (Harvey, 1985), this pattern follows the logic of profit maximization in the land market. Renovation in the northern districts (with large plots, concentrated ownership, and high demand) is less costly and more profitable for investors and implementing agencies. In contrast, renovation in the dilapidated fabrics of the south (with small plots, fragmented ownership, high density, and poor infrastructure) involves high transaction costs and lower profitability. By effectively adhering to this market logic, urban management has transformed from a moderating force into a facilitator of this unjust spatial selection, instead of playing a regulatory role.

The concentration of dilapidated fabric in the south and construction permits in the north provides compelling evidence of a deep spatial divide. This evidence highlights the central question of this research: Are the government institutions responsible for development and spatial justice themselves located away from this divide and dilapidation? The establishment of these institutions outside the foci of dilapidation could signify a physical and symbolic distancing from the city's most complex issues. They have their situational effects in the transformation of the main access walls of urban areas into commercial and administrative uses (Forouhar, A., & Kheyroddin, R. 2016). Meanwhile, government and public administrative centers could continue to function alongside reopened stations in abandoned central city areas, improving the quality and activity of problematic areas in the center and south of the city (Kheyroddin, R, et al. 2014). The spatial overlap analysis in the next section precisely tests this hypothesis: whether the geography of institutional power overlaps with the geography of physical deprivation. If the answer is negative, then it can be rightly argued that a functional and responsibility gap has been added to the existing spatial gap.

Dilapidated urban fabric is not merely a physical characteristic but a spatial indicator of systematic deprivation and the result of long-term unjust resource allocation policies. Its concentration in the south, coupled with the flow of capital to the north, constitutes an unjust spatial dialectic in which urban management is centrally positioned.

4.2 Analysis of the location selection of management institutions in the city of Tehran

Based on the aforementioned points, it became clear

that over the past years, the actions of urban management have not been effective in moderating the spatial gap in Tehran and have even deepened it. This research, going beyond merely examining urban management actions, investigates the location selection method of government institutions and centers, especially those that play a significant role in urban planning and issues related to justice. Accordingly, based on the conducted analyses and the spatial mapping of the relevant governmental and administrative centers, it can be observed that these centers predominantly gravitate toward the surrounding areas and zones of high economic value within Tehran. In other words, instead of remaining within the old and dilapidated urban fabrics, these centers show a strong tendency to relocate to the northern districts of the city, abandoning these fabrics just like affluent residents. This is why, even if relocation is necessary, numerous location options exist in the southern halves of Tehran as well; however, the preference and tendency of the managers of these institutions have always been to move towards northern Tehran, which also increases public costs. On the other hand, the relocation of these centers to the northern half of Tehran may have negative effects and overshadow the quality of life in those areas as well. Based on this introduction, the selection of management centers, their distribution, and an analysis of their location selection will be discussed.

Evaluation of the overlay of the location of investigated institutions with components of spatial imbalance (macro-level evaluation)

By mapping the components of land price changes, the number of issued permits, and the distribution of dilapidated urban fabrics, the gap between the northern and southern districts of Tehran is clearly evident. Accordingly, to determine the relationship between the existing gap and the location of institutions, the relevant layers have been overlaid, and their overlap has been determined. According to the map below and based on this analysis, the majority of the centers investigated in this research are located in areas that have experienced the greatest changes in housing prices and the highest number of issued construction permits. It is clearly evident that all institutions, in their current state, show a high tendency for location selection and relocation towards the northern half of Tehran, particularly to areas with the highest price changes.

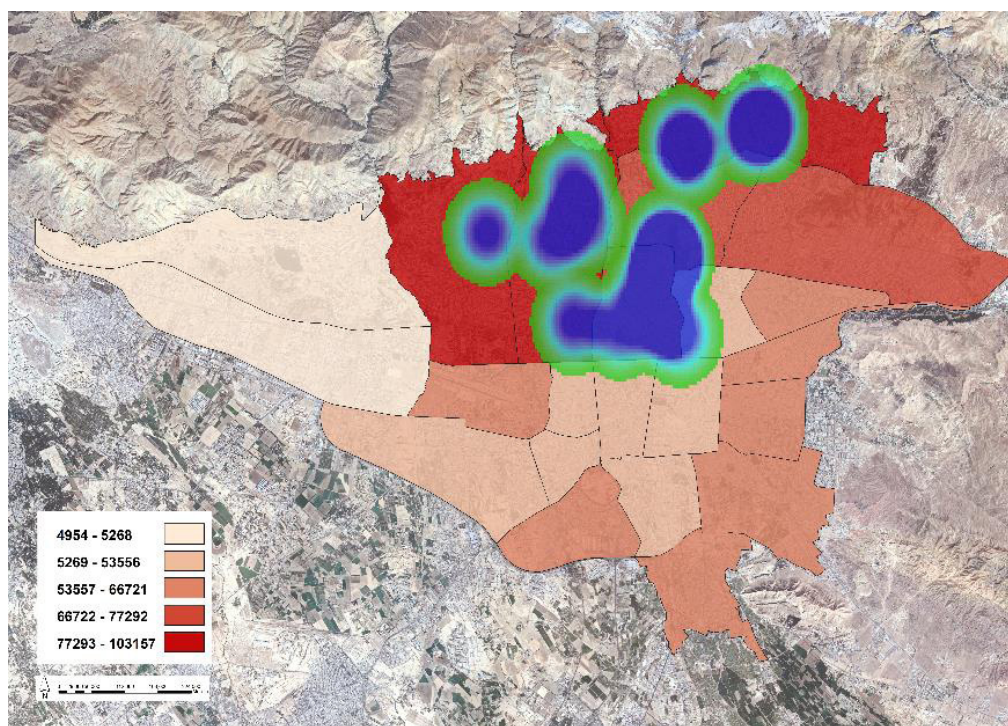


Figure 8. Cumulative analysis of the current building locations of the examined centers in relation to apartment price growth rates across districts

Quantitative analysis of the relocation trend of government and management centers

To quantify the relocation trend of the selected centers across the city of Tehran over a period of 30 years, the direction of movement for each center is determined based on its current and former coordinates (latitude and longitude). Given that this research considers the relocation of centers in the north-south and east-west directions, the difference between the former and current latitudes of the centers has been calculated; accordingly, a positive difference indicates movement towards the north, and a negative difference indicates movement towards the south. In the east-west direction, a positive difference signifies movement towards the east, and a negative difference signifies movement towards the west.

According to Figure 9, it is clearly evident that the movement of the selected institutions is towards the northern parts of the city; the net tendency of relocation towards the northern half of the city amounts to approximately 137 kilometers. Furthermore, in the east-west direction, the net

movement of the institutions is about 3.2 kilometers towards the west. It is worth noting that among the selected institutions, only the Beautification Organization, the Ministry of Roads and Urban Development, and the Housing Foundation of the Islamic Revolution of Tehran (Tehran branch) moved a small distance towards the south. This amount is negligible compared to the northward relocation of other institutions. For greater clarity, using the median center tool in ArcGIS software, the center of gravity for the current and former locations of the investigated public government institutions has been plotted. Based on this map, it is clear that in the current situation, the center of gravity of these institutions has shifted towards the northern half of Tehran, and the majority of relocations have occurred along this axis. Accordingly, the map below shows the changes in the center of gravity along with the current and former density of the locations of the selected public institutions, clearly illustrating the north-south displacement of these centers.

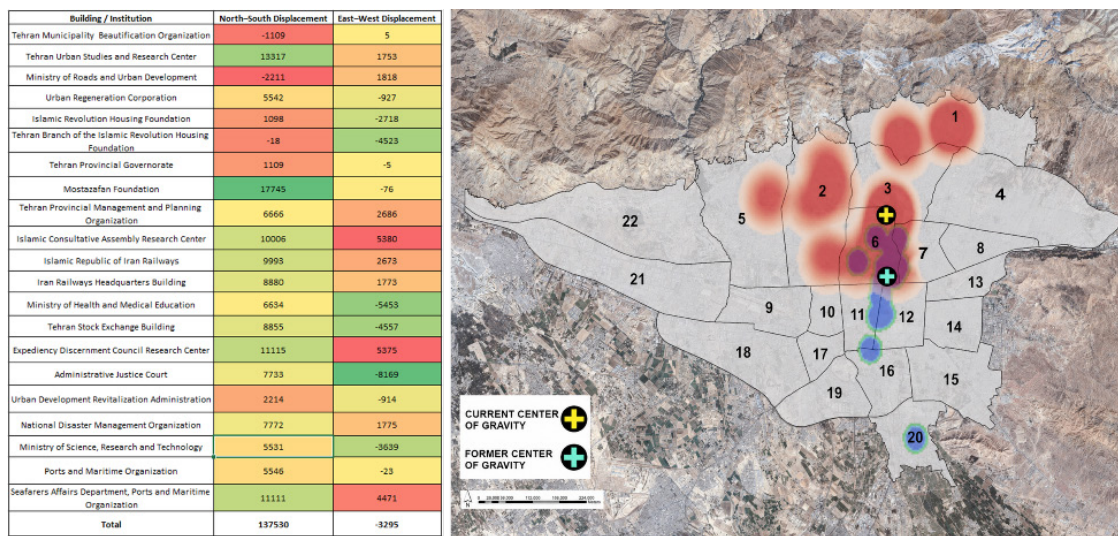


Figure 9. Center of gravity for public government institution buildings(right); magnitude of spatial displacement in geographical directions for the centers(left).

Upon closer examination, and setting aside the policies adopted regarding renovation and gap moderation in the city of Tehran, the location selection of various institutions related to the city and its people also warrants reflection. The conducted investigations show that the majority of public institutions related to urban development and quality of life are situated in the northern districts of Tehran. These are institutions that are sometimes themselves responsible for justice and reducing the spatial gap, yet in choosing the location for their units, they have gravitated towards the northern areas with high land value and predominantly recently developed fabric. This is while, in other developed countries, large administrative buildings, as important and stimulating centers, are located in the older parts of the city and, beyond their administrative function, become a magnet for people and a stimulus for their surrounding fabric. In the city of Tehran, however, management and administrative institutions show a high tendency to construct their centers in the northern half of the city, in a way considering their location as a symbol of prestige.

5. Discussion and conclusion

The spatial analyses of this research indicate that the location of the 21 management and government institutions examined in Tehran over the past three decades has not followed a random or scattered pattern, but rather has adhered to a distinct and unbalanced orientation. Findings from the median center analysis reveal a pronounced concentration of these institutions in the northern half of the city and a

gradual shift of this concentration's core towards more affluent districts. Furthermore, the results of the spatial overlay analysis uncover a significant correlation between the location of these institutions and zones characterized by the highest land prices, the greatest number of renovation permits, and the smallest area of dilapidated urban fabric. This co-location demonstrates a spatial distancing of decision-making institutions from the primary foci of urban problems and deprivation.

These findings, which go beyond being merely descriptive, reveal the role of governmental institutional actors as a key factor in reproducing the cycle of spatial injustice. From the perspective of the political economy of space, the establishment of governance symbols in the most expensive urban areas not only follows the logic of the land market but also, by granting legitimacy and institutional security to these areas, fuels the intensification of spatial polarization. This pattern stands in stark contradiction to the principles of spatial justice and the right to the city, as it institutionalizes unequal access to decision-making centers and imposes additional access costs on residents of deprived neighborhoods.

The innovative contribution of this research can be highlighted in three main aspects: First, shifting the focus of analysis from the consequences of inequality towards its institutional causes, by demonstrating that the spatial pattern of government institutions itself is part of the architecture that produces inequality. Second, providing quantitative objectification to an abstract relationship through the integration of

pattern and relationship analysis methods in GIS, offering a testable understanding of the spatial reproduction mechanism. Third, adding a symbolic dimension to the analysis of the urban divide, by showing that the north-south gap in Tehran is not merely economic or physical, but a gap in the symbolic geography of governance.

On a practical level, the findings of this research emphasize the necessity of transitioning the existing paradigm. Formulating equitable criteria based on access justice indicators for institutional spatial planning, redefining institutions as development catalyst projects in deprived cores, and transparentizing spatial decision-making processes are among the policy implications of this research. In conclusion, this study demonstrates that the spatial pattern of management institutions in Tehran is not a neutral phenomenon, but an integral part of the political geography of inequality. Therefore, incorporating the criterion of spatial justice into the heart of planning and location processes is an essential step towards breaking the vicious cycle of segregation and moving towards a more integrated and just city.

Authors' Contributions

All authors participated in the conceptualization and design of the study. Data collection and analysis were carried out by the second author and the third author, with shares of 40% and 50%, respectively. The initial draft of the article was written by the first author and revised by all authors. The first author also supervised the overall project and undertook the final editing. All authors have read and approved the final text.

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Conflict of Interest

The authors declare that they have no conflict of interest (financial or non-financial) associated with this research.

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