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Modeling and Scenario Development for Assessing the Impact of Participatory Governance on the Implementation Quality of Detailed Urban Plans: A Case Study of Tehran's District 5

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Abstract

In today's world, sustainable development and urban quality of life increasingly depend on participatory processes and stakeholder interactions. Detailed urban plans serve as critical roadmaps for urban development, shaping the future of urban areas. Effective and efficient implementation of these plans requires public understanding, acceptance, and active citizen participation. This study aims to model and develop scenarios to evaluate the impact of participatory governance on the implementation quality of detailed plans, focusing on District 5 of Tehran. Employing a mixed-methods approach, relevant indicators were extracted through document analysis, and factors influencing implementation quality were analyzed using the Mental Modeler software. Findings indicate that "participatory governance," "structures and processes," and "monitoring and evaluation" play pivotal roles, exhibiting the highest centrality and mutual influence in the governance system. These components are interdependent and critical to the success of urban plans. Conversely, "social acceptance" and "social justice and inclusivity" act as system inputs, primarily influenced by other factors. "Structures and processes" and "political commitment and leadership" exert the greatest influence on other components, while "monitoring and evaluation" and "participatory governance" are the most affected. Notably, political commitment and leadership (-0.11) represent the primary deficiency, negatively impacting other governance aspects. Socio-cultural context (-0.07) and sustainability and development (-0.05) also require greater attention. Additionally, deficiencies in infrastructure and organizations (-0.1), structures and processes (-0.06), monitoring and evaluation (-0.04), and capacity building and training (-0.05) were identified. Overall, this study highlights multiple challenges to participatory governance in Tehran's District 5, necessitating serious action to enhance the quality of detailed plans. By presenting a conceptual model of participatory governance, this research lays the groundwork for improving citizen participation and social justice in urban development processes.

Key words: *Scenario Development, Participatory Governance, Implementation Quality, Detailed Urban Plans, Urban Areas, District 5 of Tehran.*

1. Introduction

In recent decades, participatory governance has emerged as a novel approach in urban management, emphasizing active and constructive interactions among government, private

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sectors, civil society, and citizens in decision-making and implementation processes (Healey, 1997). This approach, grounded in principles of transparency, accountability, and participation, seeks to leverage diverse stakeholder capacities to enhance the quality of urban policies and programs (Booher, 2018). Citizen participation, defined as "a set of democratic opportunities provided to people to engage in decision-making" (Tassopoulou, 2012, p. 23), is a cornerstone of good governance (UNDP, 2011). Local knowledge and direct participation throughout project cycles—planning, implementation, monitoring, and evaluation—form the basis for local action (Karabulut, 2014; Lamberti et al., 2011). Various participatory models and methods can be applied in urban planning and governance (Gaventa, 2003). Participatory governance, closely tied to participation, relies on the coexistence of diverse stakeholder institutions addressing shared challenges (Vassenhoven, 2002). This model has become central to urban planning, supporting local development and defining stakeholder roles in urban transformations through distinct power relations (Brown, 2015).

Detailed urban plans, as key tools in modern urban management, significantly influence urban spatial organization, equitable resource distribution, and quality of life (Carmona, 2019). However, their implementation often faces challenges, including inefficiencies, misalignment with community needs, and stakeholder dissatisfaction (Alexander, 2009). District 5 of Tehran, with its unique demographic, economic, and physical characteristics, provides an apt case for examining the impact of participatory governance on the implementation quality of detailed plans. As a populous and developed district, it faces diverse urban challenges requiring innovative and participatory management approaches. This study evaluates the influence of participatory governance on the implementation quality of detailed plans in District 5, assessing dimensions such as stakeholder participation, process transparency, and institutional accountability, and their effects on plan outcomes, stakeholder satisfaction, and environmental sustainability. Scenarios for improving current conditions are also proposed.

2. Theoretical Framework

2.1. Participatory Governance

Participation is a multidimensional concept widely discussed in urban planning, public policy, and environmental studies (Senior et al., 2023). Arnstein (1969) defines participation as a process enabling citizens to actively engage in decision-making and influence outcomes, emphasizing power dynamics between governments and citizens. Several scholars have proposed typologies to conceptualize participation levels. Pretty (1995) introduced a ladder of citizen participation, ranging from "self-mobilized participation" to "interactive and self-initiated participation." Rowe and Frewer (2000) identified three participation levels: passive (citizens receive information without feedback),

consultative (citizens provide feedback without decision-making power), and collaborative (citizens and decision-makers co-create solutions). Ringholm et al. (2018) proposed a model where legal requirements set the context for participation levels. In urban planning, participation is increasingly recognized as essential for sustainable urban governance (Gohari et al., 2020).

Contemporary innovations in participatory governance aim to enhance public organizations' effectiveness and legitimacy through public consultation and participation (Ansell & Gash, 2007; Elstub & Escobar, 2019). Citizen participation is vital for strengthening democracy and public policy in an era of increasing uncertainties (Giovanni et al., 2021; Stoker, 1998). Participatory governance is often linked to government accountability, requiring authorities to listen, value, and act on public concerns (Baldwin, 2020; Tavares et al., 2021). Bureaucratic capacity and management of participation are critical for responsiveness (Ngo et al., 2019; Eckerd & Heidelberg, 2020).

2.2. Citizen Participation in Urban Governance

No universal standard exists for citizen participation in urban governance (Petesch et al., 2005). Civil society is often defined as a space for collective citizen action (Alamoudi, 2023). Promoting participation, transparency, capacity building, and socio-cultural accountability are key mechanisms for assessing public engagement (Narayan, 2002). Effective monitoring requires transparency to adapt to rapidly changing mandates (Knight et al., 2002). Transparency reduces information gaps, enhancing participation levels (Lee, 2019). Participatory governance includes mechanisms for dialogue, enabling public involvement in policy-making, correcting policy errors, and promoting social inclusion (O'Connor et al., 2024).

Urban planning involves multiple stakeholders (Alsterskär, 2024). Participatory governance, placing citizens at the core of planning processes, is grounded in robust theoretical frameworks and diverse empirical experiences. In developing countries, urban dynamics—marked by rapid growth, social inequalities, and informality—pose unique challenges (Horelli & Wallin, 2024). Theories like Arnstein's ladder (1969) and Lefebvre's space production (1974) highlight the importance of citizen participation, particularly for marginalized populations. Participation fosters accountability, trust, and successful policy implementation (Simonofski, 2019; Manyazewal, 2021).

3. Methodology

This study employs a mixed-methods approach to model and systematically analyze causal relationships between key variables in participatory governance and the implementation quality of detailed urban plans in Tehran's District 5.

Phase 1: Variable Identification

A comprehensive review of theoretical and empirical literature on participatory governance,

detailed plans, and implementation quality identified key variables. Documents related to District 5's detailed plans, performance reports, council approvals, and other records were analyzed to extract objectives, indicators, and challenges. Key variables included participatory governance factors (e.g., stakeholder participation, process transparency, institutional accountability, capacity building, political commitment) and implementation quality indicators (e.g., plan goal achievement, stakeholder satisfaction, environmental sustainability, social justice, economic efficiency).

Phase 2: Cognitive Modeling

The Mental Modeler software was used to develop a cognitive model to analyze relationships between variables influencing participatory governance and plan implementation. This model, a graphical network, illustrates mutual influences and causal directions (positive or negative) among variables. It identifies feedback loops, revealing how factors like political commitment or transparency interact and affect implementation quality. The model highlights leverage points—variables with significant influence on others—enabling the design of strategic scenarios, such as increasing stakeholder participation or improving transparency. Linear and multivariate models were applied to quantify relationships:

- **Linear Relationship**:
- <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><mi>Y</mi><mo>=</mo><mi>a</mi><mi>X</mi><mo>+</mo><mi>b</mi></mrow><annotation encoding="application/x-tex"> Y = aX + b </annotation></semantics></math>Y=aX+b, where <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><mi>Y</mi></mrow><annotation encoding="application/x-tex"> Y </annotation></semantics></math>Y is the outcome variable (e.g., implementation quality), <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><mi>X</mi></mrow><annotation encoding="application/x-tex"> X </annotation></semantics></math>X is the influencing variable (e.g., stakeholder participation), <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><mi>a</mi></mrow><annotation encoding="application/x-tex"> a </annotation></semantics></math>a is the impact coefficient, and <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><mi>b</mi></mrow><annotation encoding="application/x-tex"> b </annotation></semantics></math>b is a constant.
-
- **Multivariate Model**:
- <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><mi>Y</mi><mo>

=</mo><msub><mi>a</mi><mn>1</mn></msub><msub><mi>X</mi><mn>1</mn></msub><mo>+</mo><msub><mi>a</mi><mn>2</mn></msub><msub><mi>X</mi><mn>2</mn></msub><mo>+</mo><mo>⋯</mo><mo>+</mo><msub><mi>a</mi><mi>n</mi></msub><msub><mi>X</mi><mi>n</mi></msub><mo>+</mo><mi>c</mi></mrow><annotation encoding="application/x-tex"> Y = a_1X_1 + a_2X_2 + \dots + a_nX_n + c </annotation></semantics></math>Y=a1X1+a2X2+⋯+anXn+c, where <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><msub><mi>X</mi><mn>1</mn></msub><mo separator="true">,</mo><msub><mi>X</mi><mn>2</mn></msub><mo separator="true">,</mo><mo>…</mo><mo separator="true">,</mo><msub><mi>X</mi><mi>n</mi></msub></mrow><annotation encoding="application/x-tex"> X_1, X_2, \dots, X_n </annotation></semantics></math>X1,X2,…,Xn are input variables, and <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><msub><mi>a</mi><mn>1</mn></msub><mo separator="true">,</mo><msub><mi>a</mi><mn>2</mn></msub><mo separator="true">,</mo><mo>…</mo><mo separator="true">,</mo><msub><mi>a</mi><mi>n</mi></msub></mrow><annotation encoding="application/x-tex"> a_1, a_2, \dots, a_n </annotation></semantics></math>a1,a2,…,an are their weights.

- **Feedback Loops**: Defined as iterative or nonlinear equations, e.g., <math xmlns="http://www.w3.org/1998/Math/MathML"><semantics><mrow><msub><mi>Y</mi><mrow><mi>t</mi><mo>+</mo><mn>1</mn></mrow></msub><mo>=</mo><mi>f</mi><mo stretchy="false">(</mo><msub><mi>X</mi><mi>t</mi></msub><mo separator="true">,</mo><msub><mi>Y</mi><mi>t</mi></msub><mo stretchy="false">)</mo></mrow><annotation encoding="application/x-tex"> Y_{t+1} = f(X_t, Y_t) </annotation></semantics></math>Yt+1=f(Xt,Yt).

4. Findings

4.1. Key Factors and Their Impact

Table 1 outlines factors affecting participatory governance and implementation quality in District 5, Tehran. Stakeholder participation and transparency are critical for plan legitimacy and success. The table details potential impacts on governance, decision-making quality, stakeholder satisfaction, and successful plan execution.

Table 1: Factors Affecting Participatory Governance and Implementation Quality of Detailed Plans (District 5, Tehran)

Category	Factor	Potential Impact
Stakeholder Participation	Number and diversity of participating stakeholders	Enhances plan legitimacy, aligns with community needs, improves decision-making
	Level of stakeholder involvement in planning, implementation, monitoring	Increases accountability, reduces conflicts, enhances transparency
	Stakeholder satisfaction with participation	Boosts public trust, facilitates collaboration
Transparency and Access to Information	Timely access to plan-related information	Increases awareness, reduces corruption, improves decision-making
	Mechanisms for accountability and complaint handling	Enhances public trust, improves institutional performance
Capacity Building and Training	Educational programs for stakeholders	Enhances participation effectiveness, improves decision-making
	Support for NGOs and local groups	Strengthens civil society, improves municipal-citizen communication
Political Commitment and Leadership	Support from senior municipal officials	Motivates staff, allocates resources for participatory programs
	Legal and institutional frameworks	Stabilizes participatory governance, reduces legal/administrative barriers
Social Justice and Inclusivity	Inclusion of marginalized groups	Ensures equitable benefit distribution, reduces inequalities
	Addressing diverse group needs	Increases plan alignment with community needs, boosts satisfaction
Inter-Sectoral Collaboration	Coordination among governmental, local, private entities	Improves decision-making efficiency
	Interaction with NGOs	Enhances plan quality through non-governmental input
Monitoring and Evaluation	Continuous evaluation of plan implementation	Identifies and corrects implementation issues
Sustainability and Development	Integration of sustainability principles	Ensures environmental and social sustainability
	Incorporation of social and economic needs	Enhances plan inclusivity and public benefit
Social Acceptance	Assessment of plans' social impacts	Increases public acceptance
Socio-Cultural Context	Citizen literacy and awareness	Enhances informed participation, improves public oversight
	Social trust	Facilitates collaboration, reduces conflicts
	Active social groups	Mobilizes citizens, strengthens civil society
	Cultural values and norms	Shapes participation attitudes
Structures and Processes	Supportive regulations	Ensures stakeholder rights, facilitates participation
	Appropriate organizational structures	Enhances participation management
	Transparent and efficient processes	Increases trust, reduces corruption
Media and Technology	Media's role in information dissemination	Raises awareness, monitors municipal performance
	Use of modern technologies	Facilitates participation, improves process efficiency
Challenges and Barriers	Lack of official willingness	Reduces citizen motivation, weakens governance

	Lack of citizen awareness	Reduces participation effectiveness
	Conflicts of interest	Hinders collaboration, delays implementation
	Resource scarcity	Limits participatory program implementation

4.2. Cognitive Model Analysis

The cognitive model, developed using Mental Modeler, revealed 175 relationships among 15 system components, indicating a highly interconnected system with an average of 13 relationships per component. System complexity is infinite, with a density of 0.83 (66% of possible connections), necessitating multidimensional analytical approaches.

Table 2: General Model Characteristics

Feature	Value
System Complexity	Infinite
Number of Elements	15
Total Relationships	175
Density	0.83
Elements per Component	13

Table 3: Centrality and Indicator Types

Component	Input Degree	Output Degree	Centrality
Plan Quality	8.35	10.90	19.25
Participatory Governance	10.03	10.41	20.44
Challenges and Barriers	8.06	9.45	17.51
Media and Technology	5.76	7.85	13.61
Structures and Processes	8.63	11.67	20.30
Socio-Cultural Context	5.50	7.23	12.73
Social Acceptance	9.17	0.00	9.17
Sustainability and Development	7.79	8.12	15.91
Monitoring and Evaluation	10.19	9.56	19.75
Inter-Sectoral Collaboration	8.85	8.65	17.50
Social Justice and Inclusivity	6.72	0.00	6.72
Political Commitment and Leadership	6.72	11.36	18.08
Capacity Building and Training	8.61	5.65	14.26
Transparency and Access to Information	8.04	9.65	17.69
Stakeholder Participation	8.08	10.00	18.08

Participatory governance (20.44), structures and processes (20.30), and monitoring and evaluation (19.75) exhibit the highest centrality, playing pivotal roles. Social acceptance and social justice are system inputs, primarily influenced by other components. Structures and processes (11.67) and political commitment (11.36) have the greatest influence, while monitoring and evaluation (10.19) and participatory governance (10.03) are the most affected.

4.3. Scenario Development

Scenario 1: Role of Technology

Analysis indicates technology (-0.03) has the most significant negative impact, suggesting inadequate technological infrastructure or application in planning processes. Socio-cultural context (-0.02) and sustainability and development (-0.01) also show deficiencies, indicating plans may not fully

align with community values or sustainability principles. Leadership (-0.02), capacity building (-0.02), and transparency (-0.02) further highlight gaps in supporting participatory processes.

Scenario 2: Role of Political Commitment

Political commitment and leadership (-0.11) represent the primary deficiency, hindering effective governance and policy implementation. Socio-cultural context (-0.07) and sustainability and development (-0.05) indicate misalignments with community needs and long-term goals. Infrastructure and organizations (-0.03), monitoring and evaluation (-0.02), and capacity building (-0.02) also exhibit shortcomings, impacting plan effectiveness.

Scenario 3: Role of Infrastructure

Infrastructure and organizations (-0.1) pose the greatest challenge, reflecting inadequate tools for citizen participation or organizational inefficiencies. Structures and processes (-0.06), sustainability and development (-0.05), monitoring and evaluation (-0.04), and capacity building (-0.05) further highlight gaps affecting governance and plan quality.

5. Discussion and Conclusion

Participatory governance is increasingly central to urban planning, enhancing transparency, accountability, and legitimacy (Healey, 1997). This study underscores its critical role in improving the implementation quality of detailed urban plans in Tehran's District 5. Deficiencies in technology (-0.03), political commitment (-0.11), and infrastructure (-0.1) significantly hinder participatory processes. Addressing these requires enhanced technological infrastructure, stronger leadership, and improved organizational structures. Socio-cultural alignment and sustainability integration are also vital to avoid social resistance and ensure long-term benefits.

Strategic Recommendations:

1. **Enhance Participatory Governance**: Develop online platforms, simplify administrative processes, ensure transparent information access, and strengthen monitoring systems.
2. **Promote Social Acceptance and Justice**: Conduct public workshops, address diverse community needs, and foster ownership.
3. **Strengthen Political Commitment**: Train municipal leaders, clarify responsibilities, and leverage media for transparency.
4. **Improve Infrastructure and Technology**: Invest in IT infrastructure and train stakeholders in its use.
5. **Focus on Sustainability**: Integrate sustainability principles and conduct impact assessments.
6. **Foster Inter-Sectoral Collaboration**: Establish cross-sector teams and improve communication.
7. **Enhance Capacity Building**: Provide training for citizens and municipal staff.

These strategies require precise planning, adequate funding, and strong commitment from authorities and citizens, with continuous monitoring to ensure success.

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