



Review

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Participatory Budgeting in Urban Planning: A Mechanism for Prioritizing Public Space Development Projects

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Abstract. Participatory budgeting is increasingly used to involve citizens in decisions on local urban development. This study examines participatory budgeting not only as a governance mechanism, but also as a micro-urban planning tool for identifying and prioritizing public space deficits in Almaty. Drawing on project-level data from the city's official participatory budgeting platform, the research analyses 197 project proposals across eight districts. Using descriptive statistics and pattern identification, the analysis compares voting intensity, project categories, budget allocation, population shares, housing price indicators, and implementation status. The findings reveal uneven civic activation across districts, differentiated demand for neighbourhood-scale improvements, and disproportions between budget shares and demographic weight. Project typologies show that residents primarily use participatory budgeting to address everyday spatial needs, including courtyard improvements, playgrounds, greening, sports facilities, and small-scale public spaces. The study contributes by reframing participatory budgeting as an evidence base for spatial equity monitoring and more responsive micro-urban planning. This perspective helps municipalities connect citizen priorities with practical decisions on public space development.

Keywords: Micro-urban Design, Public spaces, Participatory Budgeting (PB), Citizen Participation, Urban Governance, Budget Allocation.

Introduction

Contemporary urbanization is characterized by an escalating demand for public spaces that provide essential ecosystem services, strengthen social cohesion, and facilitate the development of sustainable urban environments [1–3]. Areas of Public Space and Meeting (APSM)—encompassing parks, squares, sports facilities, and landscaping projects—have become fundamental indicators of urban life quality [4,5]. However, the provision of these spaces frequently lags behind the pace of urban growth, resulting in a persistent supply-demand imbalance and the reinforcement of socio-spatial inequalities [5–9].

An analysis of urban improvements, such as those across the districts of Almaty, reveals significant disparities in the scale and direction of infrastructure development. While some areas, such as the Zhetysu District, show a high concentration of sports facilities and architectural forms, more densely populated districts like Auezov and Almaly demonstrate limited indicators of improvement, suggesting a high risk of infrastructure deficits. These findings indicate that resource distribution does not always correlate with demographic patterns or actual social needs, highlighting the limitations of traditional "top-down" planning methods [10–12].

To address these imbalances, it is essential to transition toward participatory governance, where residents are actively engaged in decision-making processes. In order to confront the systemic socio-spatial inequalities of modern urban development, this research explores the integration of Citizen Participation as a fundamental mechanism for inclusive governance, the regulation of Project-Level Privatization to prevent the prioritization of elite interests over communal utility, and the restructuring of Budget Management to ensure that resource allocation corresponds to actual demographic needs rather than centralized "top-down" planning. Ultimately, there is a critical need to develop a methodological framework for citizen participation in APSM management to ensure more equitable resource distribution, enhance transparency, and foster a sustainable urban environment that genuinely reflects the needs of local communities [3,12,13].

The aim of this study is to examine how participatory budgeting can function as a micro-urban planning mechanism for identifying, prioritizing, and addressing local public space deficits in the districts of Almaty.

The central research question is: how do participatory budgeting projects reveal spatial priorities, infrastructural deficiencies, and budgetary disproportions in the development of neighbourhood-scale public spaces?

To answer this question, the study analyses project-level data from Almaty's participatory budgeting platform, focusing on the distribution of projects across districts, voting intensity, functional project typologies, budget allocation, population shares, and apartment price indicators. This approach makes it possible to interpret participatory budgeting not only as a form of citizen involvement, but also as a source of planning evidence for improving the spatial equity of public space development.

Taxonomy of participation and governance models. Participatory urban planning is fundamentally a socio-technical assemblage of knowledge-making [12]. A primary framework for understanding this collaboration is the Quadruple Helix model, which integrates the institutional functions of government, university, industry, and civil society to drive regional innovation. This model fosters a knowledge democracy, where the fourth helix (citizens) transitions from passive consumers to active co-creators of urban value[14].

The depth of this engagement is often categorized using the IAP2 spectrum, summarized in the table below:

Table 1. The IAP2 Framework for Public Participation

Level	Goal	Mechanism/Technique	Exemplary references
Inform	Provide objective information to assist public understanding.	Fact sheets, websites, open houses.	[13]
Consult	Obtain community feedback on analysis or decisions.	Online surveys, focus groups, public meetings.	
Involve	Work directly with the public to ensure concerns are considered.	Thematic workshops, deliberative polling.	[15]
Collaborate	Partner with the community in each aspect of decision-making.	Consensus-building, citizen advisory committees.	[14]
Empower	Place final decision-making in the hands of the community.	Citizen juries, ballots, delegated decision-making.	[1,13]

Introduction and conceptual evolution. The contemporary shift in urban and regional planning represents a departure from technocratic, top-down projections toward integrated management frameworks that prioritize the physical, social, and economic resources of a territory [6,7]. This "participatory turn" is grounded in the necessity of increasing transparency and accountability within governance while improving the quality of state decision-making [6,10]. Historically, metropolises were often constructed "brick by brick" by working classes outside formal planning circuits; however, modern frameworks institutionalize this through a "pact" between the population and its territory, aiming to redress entrenched spatial and social inequalities [7].

The role of participatory design in urban architecture. In the realm of architecture and design, participation redefines the professional as a mediator and facilitator rather than an isolated expert [15]. Key roles and impacts include:

- Relational Design (RD) and Ethics of Care: Emerging paradigms advocate for a shift from standard participatory design to relational design, which prioritizes long-term trust-building and interdependency. Using a feminist ethics of care, designers employ reflectivity and "care-full" facilitation to support those most in need, transforming planning into a repairing practice [5].
- Defining Cultural Significance: In heritage planning, participation is vital for establishing consensus on attributes (the physical resources to list) and values (the reasons they are important), preventing historians or architects from being the sole arbiters of significance [13].

- **Collective Imagination and Scenario Planning:** Methods such as participatory scenario planning move beyond technical forecasting to integrate "co-futuring" and collective imagination into the design of future mobility and infrastructure [3].
 - **Operational Roles for Planners:** In Dutch planning, professionals adopt accommodative roles as brainstormers, professional companions, or co-creators to proactively address citizen disagreement and humanize the planning process [15].
- Methodological innovations. Planners increasingly utilize quali-quantitative tools to elicit «situated knowledge»:
- **Companion Modelling (ComMod):** Uses role-playing games and multi-agent systems to facilitate social learning and dialogue regarding complex environmental trade-offs [4].
 - **Public Value Spheres:** Leveraging Natural Language Processing (NLP) and spatial clustering, researchers can identify archetypical "value conflicts" (e.g., gentrification vs. affordability) geolocated in urban space (Herzog et al., 2024).
 - **Dynamic Spatial Modelling:** Platforms like Ocelet allow stakeholders to simulate land-use trajectories, such as balancing food and electricity self-sufficiency in island contexts [16].

Challenges and theoretical tensions. The literature warns against the risks of tokenism and the reinforcement of neoliberal logics that prioritize efficiency over genuine empowerment. Digital participation platforms can create epistemic enclosures, restricting the scale and temporality of legitimate urban knowledge through majoritarianism [5,12]. Furthermore, in authoritarian contexts, "authoritarian deliberation" may be utilized by the state as a strategic policy instrument to mitigate conflict and maintain social order without fundamentally challenging hegemonic power relations [9]. Finally, scholars highlight the "local trap," the erroneous assumption that hyper-localized knowledge is inherently more democratic, which can lead to insular and exclusionary decision-making [12].

The methodology

The contribution of this study is threefold. First, it reframes participatory budgeting as a diagnostic instrument for micro-urban planning rather than only as a mechanism of citizen participation or municipal finance. Second, it links citizen-submitted projects to specific urban planning functions through the L1–L5 typology, including playgrounds, courtyard improvements, sport facilities, greening, and small public spaces. Third, it applies a budget-to-population proportionality ratio to assess whether participatory budgeting allocations correspond to the demographic weight of urban districts. In this way, the study offers a practical analytical framework for interpreting participatory budgeting data as evidence for spatial equity and neighbourhood-scale public space planning.

Research Design This study employs an exploratory quantitative design to investigate patterns of citizen activity, project prioritization, and budget allocation within participatory budgeting (PB) initiatives. This approach aligns with the "Idea Impact" phase of the participatory budgeting journey, which seeks to evaluate how citizen input translates into tangible resource allocation and policy innovation (Bartocci et al., 2023). The focus remains on identifying distributions and relationships across districts rather than testing causal effects, reflecting the comparative analysis often used to understand local governance dynamics in varying urban contexts (Sondou et al., 2025).

Unit of Analysis The unit of analysis is the individual project proposal submitted through the participatory budgeting program, representing the "tangible product" of the citizen engagement process. The dataset encompasses 197 projects distributed across 8 districts. District-level indicators were calculated through aggregation, a method used to determine the scale or area of influence for urban structural elements.

$$Y_d = \sum_{i=1}^{n_d} y_i \quad [1]$$

Where

Y_d - represents the aggregated indicator for district d .

The data for this study comes from official municipal participatory budgeting platforms. These platforms help collect and share information online on a large scale (Afzalan & Muller, 2018). The dataset includes the number of submitted projects, projects receiving more than 50 votes, allocated budgets, and district population. Additionally, the average apartment price per square meter was collected as a proxy for socio-economic status, as research suggests that the demographic and economic profile of a city significantly influences participation levels and the "digital divide" (Jiménez-Caldera et al., 2024). Only projects exceeding the 50-vote threshold were included in the prioritization and budget analysis to focus on initiatives with verified community support.

$$V_i > 50$$

Project Classification and Analysis. Following established methods for the typological characterization of urban spaces, projects were classified into five levels based on their scope and public orientation:

- L1 – Playground;
- L2 – Apartment block yard;
- L3 – Sport facilities;
- L4 – Planting of greenery;
- L5 – Alleys, small architectural forms, and parks.

Citizen activity was assessed by ranking districts based on project submission and approval levels, mirroring the "ladder of participation" by examining the intensity of community engagement (Sondou et al., 2025). Project prioritization was analyzed through frequency distribution across the L1–L5 categories to identify which spatial demands are most prevalent among users (Yu & Zhang, 2025).

Ranking formula:

$$Rank_d = rank(X_d) \quad [2]$$

Where X_d - indicator of submission or approval level for district d .

At the final stage, we examined how the budget is distributed across districts. We also checked whether this distribution is related to population size and socio-economic factors, including apartment prices per square meter. This analysis aims to highlight potential socio-spatial disparities in how public funds are directed toward community-led urban improvements (Jiménez-Caldera et al., 2024).

Findings /Discussion

1. Votes per Project Across Districts. Figure 1 illustrates the distribution of votes per project across eight districts (D0–D7), with the vertical scale ranging from 0 to 300 votes.

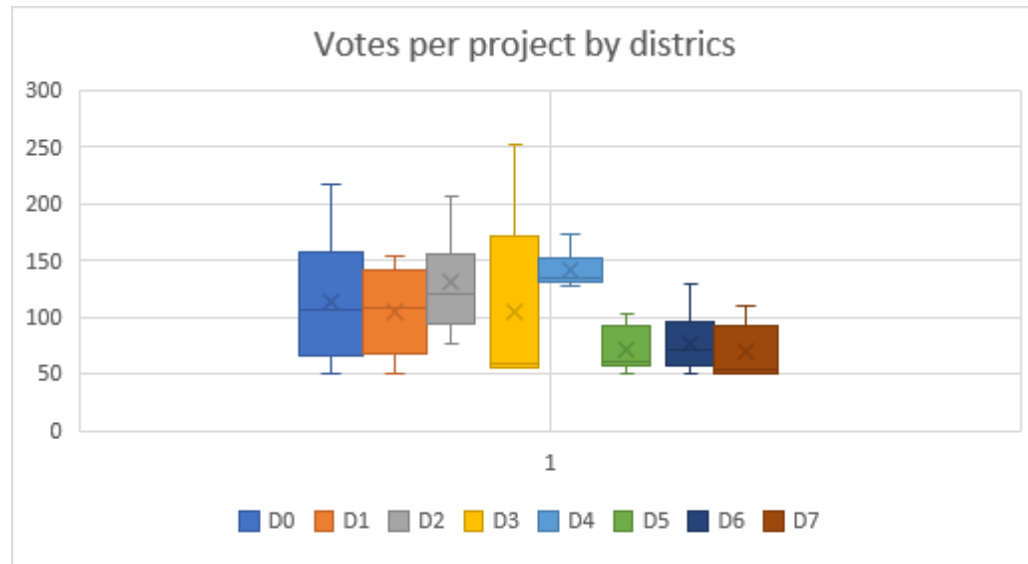


Figure 1. Distribution of submitted projects by district

From a planning perspective, differences in voting intensity indicate unequal levels of civic activation around local spatial problems.

The observed vote counts vary substantially between districts. District D3 demonstrates the widest dispersion, with projects receiving approximately 55 to 250 votes and a median of around 100–110 votes. Its interquartile range spans roughly from 60 to 170 votes, indicating considerable internal variation.

District D0 shows a range of approximately 50 to 215 votes, with a median close to 95–100 votes. Similarly, D2 ranges from about 75 to 205 votes, with a higher median near 120 votes. District D4 appears more concentrated, with vote values primarily between 125 and 170 votes and a median of around 140 votes.

By contrast, districts D5, D6, and D7 display lower and more compact distributions. Vote counts in D5 range approximately from 50 to 100, with a median near 70 votes. District D6 extends from roughly 50 to 130 votes, with a median around 75–80 votes, while D7 spans about 50 to 110 votes, with a median close to 70 votes.

Across districts, mean values (indicated in the figure) appear slightly higher than medians in several cases, reflecting the presence of higher-vote observations within the upper ranges.

Overall, project-level vote counts range from approximately 50 to 250 votes, with district medians varying between roughly 70 and 140 votes.

2. Projects reaching the 50-vote threshold by district. Figure 2 presents the number of projects in each district that exceeded the 50-vote participation threshold.

The number of projects exceeding the threshold can therefore be interpreted as an indicator of district-level capacity to formulate and mobilize support for micro-urban interventions.

Almalinsky district records the highest number of qualifying projects, with 51 initiatives surpassing the threshold. It is followed by Alatau with 32 projects and Auezovsky with 29 projects.

Zhetysusky and Nauryzbaysky demonstrate comparable levels of activity, with 25 and 24 projects, respectively.

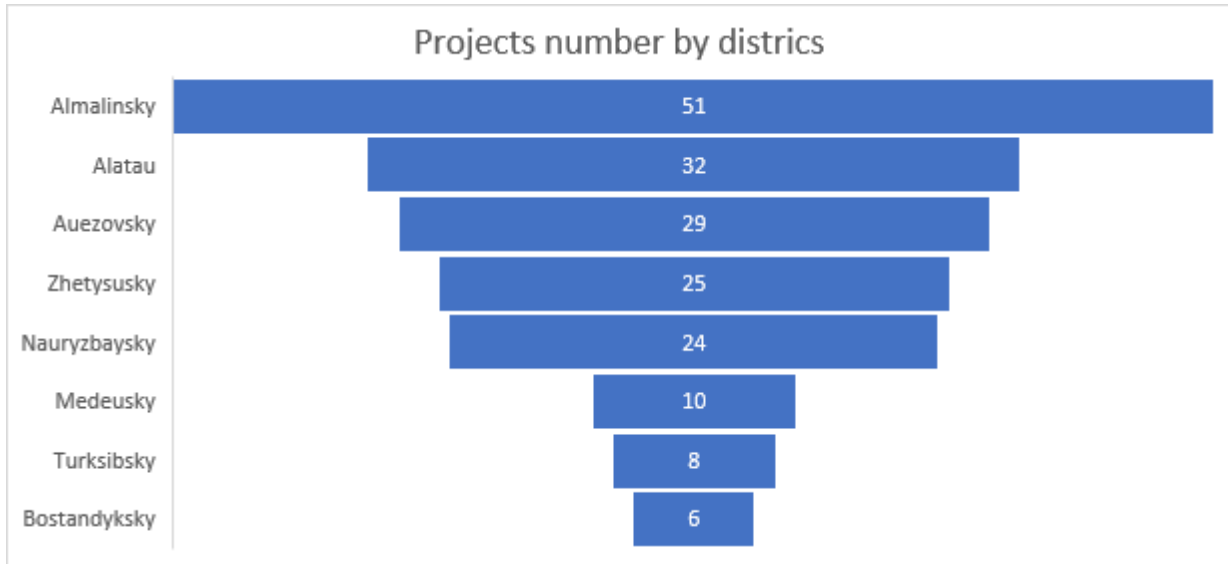


Figure 2. Share of projects exceeding 50 votes

Lower counts are observed in Medeusky (10 projects), Turksibsky (8 projects), and Bostandyksky (6 projects), the latter representing the smallest number of initiatives reaching the required voting level.

Overall, the number of projects exceeding the 50-vote threshold ranges from 6 to 51 projects across districts, indicating substantial variation in the volume of qualifying participatory initiatives.

3. Distribution of projects by functional level (L1–L5). Figure 3 presents the proportional distribution of projects by functional level (L1–L5) across districts that met the 50-vote threshold. The chart is displayed in percentage terms (0–100%), illustrating the internal composition of projects within each district.

Project categories are defined as follows:

- L1 – Playground;
- L2 – Apartment block yard;
- L3 – Sport facilities;
- L4 – Planting of greenery;
- L5 – Alleys, small architectural forms, and parks.

The composition of project levels varies across districts.

The dominance of L4 and L5 projects shows that residents primarily use participatory budgeting to address everyday public space quality, environmental comfort, and neighbourhood identity.

In Alatau, projects are distributed across all five categories, with noticeable shares in L1, L2, and L5.

Almalinsky is strongly dominated by L4 (planting of greenery), which constitutes the majority of projects, while other categories account for comparatively small proportions. In Auezovsky, L2 (apartment block yard improvements) represents the largest share, followed by L4.

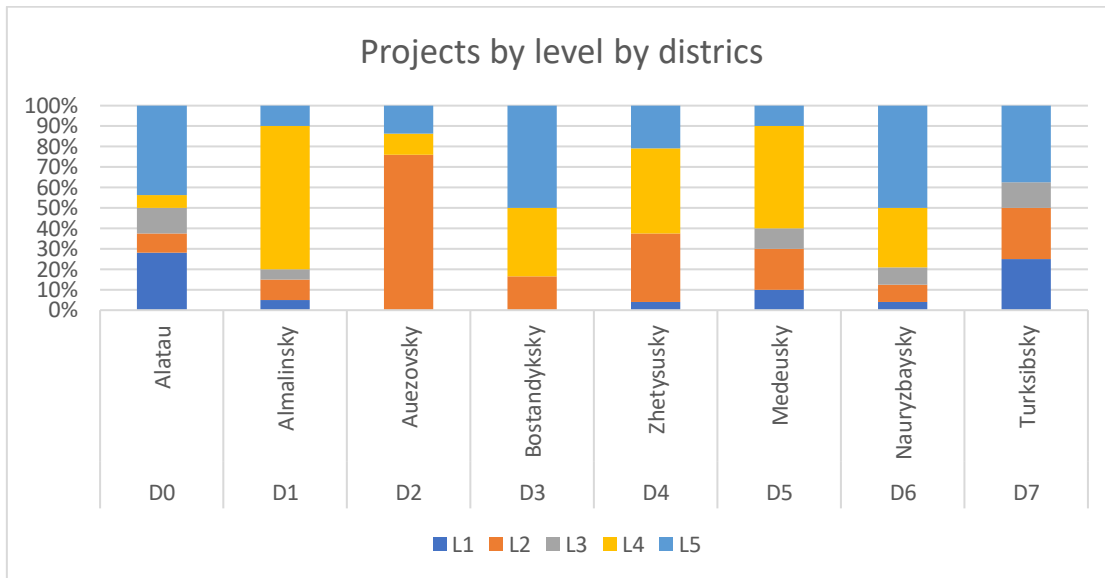


Figure 3. Distribution of projects by functional Level (L1–L5)

Bostandyksky shows a substantial proportion of L5 projects, alongside notable shares of L3 and L4.

Zhetysusky demonstrates a more balanced distribution, with visible shares in L2, L3, L4, and L5.

In Medeusky, L4 accounts for a large proportion of projects, while L1 and L2 contribute smaller shares.

Nauryzbaysky is characterised by a strong presence of L5 projects, while L1–L3 represent comparatively smaller proportions.

Finally, Turksibsky displays a mixed structure, with visible contributions from L1, L2, and L5.

Overall, the figure shows that project-level prioritisation differs across districts, with certain territories concentrating on specific functional categories, particularly L4 (greening) and L5 (public space and architectural improvements).

4. Budget allocation in relation to population and apartment prices. Figure 4 compares three normalised indicators across districts: the share of participatory budgeting allocation (B1), the share of total population (P1), and the share of average apartment price per m² (M2). All values are expressed as proportions within their respective totals.

The budget-to-population ratio reveals where participatory budgeting may reinforce or compensate for spatial inequalities in public space investment.

First, the distribution of budget shares is uneven across districts. One district (Almalinsky) accounts for the largest budget proportion (approximately 0.30), substantially exceeding its corresponding population and housing price shares (around 0.12–0.14). In contrast, several districts display comparatively modest budget proportions ranging between approximately 0.04 and 0.12.

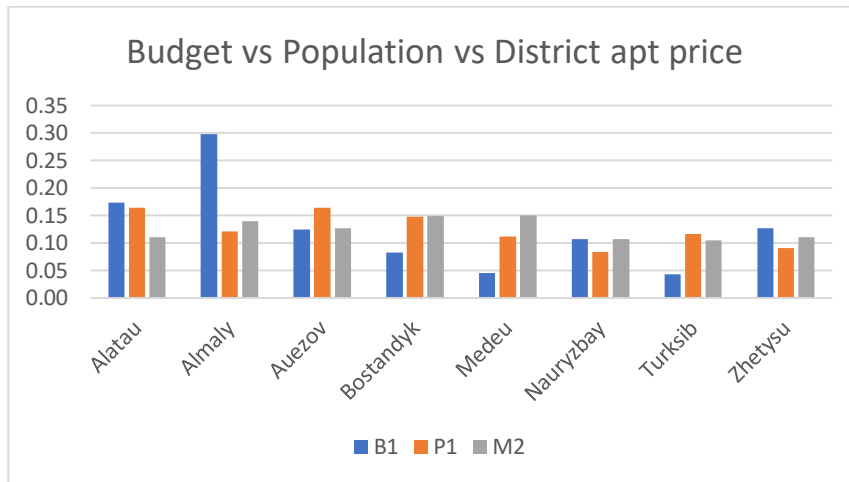


Figure 4. Average budget per project

Second, population shares are more evenly distributed across districts than budget shares. Most districts fall within a relatively narrow range (approximately 0.08–0.16), indicating a more balanced demographic distribution compared to the concentration observed in budgeting.

Third, apartment price shares also cluster within a moderate range (roughly 0.10–0.15) and appear more evenly spread than budget allocations. Overall, the figure demonstrates visible differences in how budget proportions align with demographic weight and housing price indicators across districts.

1. Spatial Differentiation of Civic Activation. The variation in votes per project reveals distinct spatial patterns of civic activation across districts [22,23]. Voting levels are different in each area. Some projects get many votes, while others receive fewer but more consistent participation [24]. From an urban planning perspective, this suggests that participatory dynamics are embedded within differentiated neighbourhood structures [24,25].

Districts characterised by mixed-use density, active public interfaces, and established community networks may generate stronger collective mobilisation around specific spatial interventions [22–24]. Conversely, districts with fragmented urban fabric or lower levels of public space interaction may exhibit more moderate or homogeneous engagement patterns [22,24,26]. The distribution of votes, therefore, reflects not only civic interest but also the spatial conditions that facilitate collective organization [22,24].

2. Threshold Attainment and Urban Territorial Capacity. The uneven number of projects surpassing the 50-vote threshold [27] indicates variation in territorial project-generation capacity [27]. Certain districts produce a high volume of qualifying initiatives, while others contribute relatively few [27].

In urban morphological terms, this may correspond to differences in block structure, residential density [24,28], and the availability of identifiable micro-territories (courtyards, playground clusters, local parks) that lend themselves to project-based intervention [22,27]. Areas with clearly defined spatial units may more easily translate spatial concerns into structured proposals [29,30], while more diffuse or infrastructurally dominated districts may struggle to articulate interventions within the participatory format [26,27]. Thus, the threshold operates not only as a participatory filter [26] but also as a spatial selector, privileging districts with stronger neighbourhood coherence [22,27].

3. Project Typology as Expression of Everyday Urbanism. The predominance of specific project categories—particularly greening (L4+), yard improvements (L2), playgrounds (L1), and small public space enhancements (L5)—reflects a clear orientation toward everyday urbanism [30]. Rather than proposing large-scale infrastructural transformation, residents prioritise incremental spatial upgrades within the immediate residential environment [31].

This typological pattern aligns with contemporary planning discourse that emphasises human-scale interventions, micro-public spaces, and tactical improvements to the urban realm [22]. The concentration in L4 (planting and greening) across multiple districts indicates demand for ecological enhancement and environmental comfort within dense residential areas [30,32]. Similarly, the presence of L5 (alleys, small architectural forms, parks) signals interest in placemaking and spatial identity at the neighbourhood level [27,32].

The variation in typology between districts suggests that urban form and landscape condition influence the type of spatial improvements perceived as most urgent [24,32]. 4. Budget allocation and spatial equity. The comparison between budget shares, population proportions, and apartment-price indicators reveals differentiated spatial investment patterns [33]. In some cases, budget allocation appears concentrated beyond demographic proportionality, while in others it remains comparatively modest relative to structural indicators [24,34].

From a planning standpoint, this raises questions of spatial equity and distributive justice in the urban environment [23,33]. If participatory budgeting is understood as a micro-infrastructure redistribution tool, then alignment between financial allocation and territorial need becomes a key design consideration [24]. Discrepancies may reflect differences in project scale, land availability, or spatial feasibility rather than purely demographic factors [28,31].

Moreover, districts with higher land values may face greater implementation costs for similar spatial interventions, potentially influencing the proportional budget distribution [24,28,33].

To strengthen the descriptive interpretation of the district-level differences, additional proportionality indicators were calculated. In particular, the analysis uses the ratio between the budget share and the population share in each district. This indicator allows us to assess whether the budget allocation is proportionally aligned with the demographic weight of each district.

The disproportionality ratio was calculated as follows:

$$\text{Budget-to-population ratio} = \text{Budget share} / \text{Population share} \quad [3]$$

A value above 1 indicates that a district receives a higher budget share relative to its population share, while a value below 1 indicates a lower budget share relative to its demographic weight.

The results indicate that budget allocation is unevenly distributed in relation to population shares. The most pronounced deviation is observed in Almaly district, where the budget-to-

population ratio reaches approximately 2.50. This means that the district's budget share is about 2.5 times higher than its population share.

Table 2. Budget-to-population proportionality ratio by district

District	Budget share	Population share	Budget-to-population ratio
Alatau	0.17	0.16	1.06
Almaly	0.30	0.12	2.50
Auezov	0.12	0.16	0.75
Bostandyk	0.08	0.15	0.53
Medeu	0.04	0.11	0.36
Nauryzbay	0.11	0.08	1.38
Turksib	0.04	0.12	0.33
Zhetysu	0.13	0.09	1.44

A relatively high ratio is also observed in Zhetysu and Nauryzbay districts. By contrast, Medeu, Turksib, and Bostandyk districts demonstrate ratios below 1, indicating comparatively lower budget allocation relative to their population shares. These results provide additional descriptive statistical support for the conclusion that budget allocation is not fully proportional to the demographic distribution across districts. At the same time, given the limited number of district-level observations, these results should be interpreted as descriptive evidence of spatial disproportionality rather than as proof of a causal relationship.

Conclusion

This study demonstrates that participatory budgeting in Almaty can be interpreted not only as a mechanism of citizen participation, but also as a micro-urban planning instrument for identifying and prioritizing local public space problems. The analysis of 197 project proposals across eight districts shows that residents primarily use participatory budgeting to address everyday spatial needs, including playgrounds, courtyard improvements, sport facilities, greening, alleys, small architectural forms, and local parks.

The findings reveal three key planning-relevant patterns. First, civic participation is spatially uneven: some districts generate a significantly higher number of qualifying projects and stronger voting activity, while others remain weakly represented. This suggests that participatory budgeting outcomes depend not only on formal access to the platform, but also on the ability of local communities to articulate spatial problems and mobilize support. Second, the functional structure of projects shows that participatory budgeting is especially relevant for neighbourhood-scale public space development. The concentration of projects in greening, courtyard improvements, playgrounds, and small public spaces indicates that residents use this mechanism to address deficiencies in the everyday urban environment rather than large-scale infrastructure transformation.

Third, the comparison between budget shares and population shares reveals disproportions in the territorial allocation of resources. The budget-to-population ratio shows that some districts receive a higher budget share relative to their demographic weight, while others remain

comparatively underfunded. This indicator can therefore be used by municipal authorities as a simple planning tool for monitoring spatial equity in participatory budgeting.

The practical implication of the study is that participatory budgeting data can support urban planning decisions when it is interpreted not only administratively, but spatially. Municipalities can use project categories, voting patterns, and proportionality indicators to identify underserved districts, adjust funding priorities, provide design support to underrepresented areas, and develop typology-sensitive guidelines for small-scale public space improvements.

The study is limited by its descriptive design and by the available project-level data. It does not measure the physical quality of implemented projects or long-term social outcomes. Future research should combine participatory budgeting data with spatial indicators such as green space per capita, accessibility to playgrounds and sport facilities, courtyard density, pedestrian connectivity, and implementation quality. Nevertheless, the present analysis shows that participatory budgeting can serve as an evidence base for more equitable and responsive micro-urban planning.

The contribution of the authors

S. G. Kazhenov — conceptualized the study, developed the research methodology, designed the data collection approach, collected and systematized the data, conducted the analysis, interpreted the findings, and contributed to drafting the manuscript.

A. S. Yermukhanova — contributed to data cleaning and verification, assisted in organizing the dataset, reviewed and edited the manuscript, improved the clarity and structure of the text, and supported the final preparation of the article.

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