

ME100+

Proceedings of the conference
2025



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ME100

10th annual
student
scientific
conference on
economy at
the scale of
a city or region

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The conference took place at the Centre for Architecture and Urban Planning on 13 and 14 November 2025. The conference project entitled *ME100 Student Research Conference on Economy at City or Regional Scale* is supported by CTU grant 54/25/F5.

Organizers:

Spatial Planning Department FA CTU Prague:

Prof. Ing. arch. Karel Maier, CSc.

Doc. Ing. arch. Jakub Vorel, Ph.D.

Ing. arch. Vít Řezáč

Ing. arch. Jan Bittner

Ing. arch. Zuzana Poláková

Marie Lišková, Dis.

Other institutions:

Prof. Ing. Renáta Schneiderová Heralová, Ph.D.,

Faculty of Civil Engineering CTU Prague / Fakulta stavební ČVUT

Doc. Ing. Petr Toth, Ph.D.,

Faculty of Economics UEB Prague / Národohospodářská fakulta VŠE

Ing. David Mazáček,

Faculty of Finance and Accounting UEB Prague / Fakulta financí a účetnictví VŠE

Ing. Sylva Jablonská

Translations

Ing. Sylva Jablonská

MĚ100 for the tenth time

The MĚ100 conference thematically links spatial planning with the economy. Since 2016 the conference hosted active participants from 11 countries whereas 16 universities delegated 46 Ph.D. students. Besides that, 50 guest speakers shared their experiences and discussed with doctoral students.

The conference ME100 2025, organized again by the Faculty of Architecture of CTU in cooperation with eight other universities, took place in Prague on 13 and 14 November 2025 and was held in a combined mode: with participants personally presented and connected online. The attendees registered from all over the country, one third from abroad. The papers were divided into two sessions: the first featured presentations by Ph.D. students, the second featured papers of invited guests.

The aim of the conference

Participants open a topic that is seldom discussed in the context of spatial planning in central Europe: the organizers aim to explore the connection between urban and regional planning and the economics. Since 2016 we invite every year academics from various universities and professionals in this field and moderate a discussion in an open forum with Ph.D. students.

The conference concept

The conference combines presentations of Ph.D. students' work with conference papers of invited experts, allowing for a scholarly and scientific debate and engagement to occur. To this end, the organizers invite professionals that work outside of the academic sphere: municipal representatives, especially those in departments responsible for the budgets of towns and regions; representatives of banks involved in financing public construction projects; or experienced managers of private sector interested in co-operation between public and private sector.

The attractiveness of the conference is underlined by the traditional use of the inspiring space of the Centre for Architecture and Urban Planning (CAMP) in Prague and the involvement of the professional streaming company Film CZ.

Over 100 registered experts visited in person or on-line the tenth edition, about a third of them from abroad. The entire conference was held in English without interpretation.

The focus of the conference is on the presentation of papers by young Ph.D. students whose research work deals with urban and regional planning in relation to the economy. Continuing restrictive policy of Czech universities in employing Ph.D. students resulted in limited number of local entries. After a certain increase of these papers in the past years, the number of papers coming from the Czech Republic has decreased.

The decrease of local works has been compensated by the interest of foreign universities. The conference was promoted on AESOP Young Academics NETWORK what brought wider international interest.

The conference is annually enriched by lectures of foreign and domestic experts from practice.

Prof. **Joris van Wezemael**, ETH Zurich in his presentation „Urban Transformation in the Age of Mediation“ argued that we witness a change in the way how to reach the trust of people in what the planners are doing. There are no simple projects anymore in Europe. Planners must adapt their approaches and become true mediators of their visions.

A young colleague **Maxime Charreire** from a prestigious private French university ESPI Paris described features of market structure and housing production in France. There is a clear shift in character of building business – projects are getting more complex and bigger. This brings an advantage to strong companies what on the other side modifies the market competition and housing supply.

Two colleagues from The Prague Institute of Planning and Development IPR Praha Ms. **Zdeňka Havlová** and Mr **Jan Krtička** prepared an overview of research projects running within the institute. They presented how the relationship of public amenities analysis and planning may influence the finance allocation decision making in Prague.

A recording of the conference is permanently available for viewing on the conference website www.me100.info.

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The Bartlett School of Planning (UCL), London

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Partners of the conference:

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Urbanismus a územní rozvoj

Pro města a obce

Faculty of Architecture CTU Prague

doc. Ing. arch. Jakub Vorel, Ph.D.

Head of the Spatial Planning Department

Exactly ten year ago the Spatial Planning Department of Faculty of Architecture CTU Prague initiated the launch of the conference ME100. Our department has always been involved in the issue of the economy in the territory. Thousands of graduates of the faculty have undergone short training in this field. We try to teach students to think rationally, to bring them closer to the economic background of the projects they will deal with in their creative work.

The conference ME100 is a long-term project inviting various experts involved in economics and spatial planning. The conference ME100 shall strengthen the teaching of economics and project management at universities. As we always emphasize: we invite anyone to the ME100 conference who wants to see what is being researched at other universities in the planning field and to learn how city and regional planning affects the real estate market. Maybe by doing so we can help someone open a direction for their future professional career.



MĚ100 2025

10th annual conference

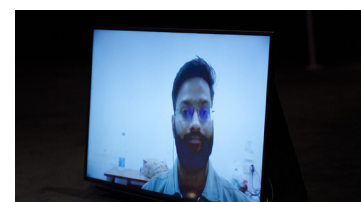
The conference was divided into two sessions: the first featured presentations by Ph.D. students, the second featured papers of invited guest speakers.

Ph.D. students

Mr David Bouz from Faculty of Law, Charles University of Prague, aimed in his paper to answer the question how the Czech legal system addresses density and which behaviors among developers, municipalities, and residents are encouraged by legal norms, whether intentionally or unintentionally. Higher urban density is generally considered to be beneficial by economists and urban planners. His analysis was not limited to construction law, but examined the Czech legal system across various sectors, with particular emphasis on **municipal finance** and the tax system, which are often overlooked in debates on Czech construction law.

The most distant participant Mr. Honey Kumar from Jawaharlal Nehru University in New Delhi, who joined us on-line, presented a case study of Mumbai. He described some unprecedented ways how climate change is affecting human societies. Particularly marginalized communities and populations are disproportionately affected by its negative impacts. The problem is compounded in large urban centers as Mumbai, where huge populations are at risk. The current research explores the role of urban financial governance in the city and its sensitivity towards reducing the vulnerability of marginalized communities. Findings of his study indicate a poor or negative correlation between the two, invoking the need to assess it in the larger context of climate justice.

Two Romanian Ph.D. students from „Ion MINCU” University in Bucharest Ms Gabriela Ciulinaru and Ms Laura Simona Cotan presented jointly outcome of their qualitative research. Drawing on a survey of residents near defense facilities, their analysis highlights perceived benefits, alongside challenges. The survey examines the dual function of Romania’s national defense system as both gua-



rantor of security and driver of local development. Their findings underscore the importance of integrating defense infrastructure into sustainable urban and regional planning.



Indonesia is truly the most remote place presented in the conference, nevertheless **Mr Ramdan Pano Anwar** studies at MATE University in Budapest. He presented on-line his paper: Makassar City - Mapping Informal Settlements for Urban Economic Analysis. Informal settlements in Makassar, Indonesia, occur both at the periphery and within formal neighborhoods, complicating urban economic analysis. His study integrates Sentinel-1 SAR and Sentinel-2 optical imagery with Random Forest classification to map these areas at city scale. Spectral indices, texture features, and neighborhood context analysis are used to distinguish settlement types, including mixed zones. The resulting maps quantify the extent and distribution of informal housing, providing robust spatial data to support urban economic assessment and inclusive planning in rapidly growing cities.



Invited guest speakers

Prof. Joris van Wezemael from ETH Zurich argued in his excellent presentation that spatial and urban development has, over recent decades, transitioned from a paradigm of command-and-control, through phases of collaborative planning between public and private actors, towards a new logic of transformation—one that increasingly relies on mediative strategies. Drawing on the innovation economy literature (notably Schumpeter and Kondratieff), he suggested that this shift is not merely procedural but structural: it reflects a fundamental reconfiguration of planning rationalities and institutional frameworks. In his view the movement across these generational modes of planning is marked by a redefinition of risk profiles in development processes, a dramatic increase in the plurality and diversity of stakeholders to be engaged, and the emergence of a profound cognitive and organisational shift within both public and private domains. Focusing particularly on the role of economic actors, he unpacked the tensions and potentials inherent in this mediative turn. He concluded his talk with reflections on what the current age of mediation means for both practice and academia in the field of spatial development.

Mr. Maxime Charreire, ESPI Paris, examined in his paper how the competitive structure of the real estate development market influences housing production and its spatial distribution. Using a monocentric city model, he showed that large developers, with high fixed costs but low marginal costs, concentrate their activities in central areas with high land values, while smaller developers dominate peripheral zones. Empirical evidence from building permit data in France (2014–2022) and a case study of the Lyon metropolitan area confirm this spatial specialization. The analysis also identifies differentiated price thresholds for market entry, highlighting an increasing segmentation between leading and secondary actors. These results underscore the importance of linking urban planning policies with market structure analysis to foster balanced housing development.

Ms Zdeňka Havlová and Mr Jan Krtička spoke at IPR's home ground. The Prague Institute of Planning and Development (IPR) systematically monitors key categories of public amenities and conducts annual evaluations of their spatial accessibility and capacity availability for the city's residents. Beyond this monitoring role, the Institute also contributes to the planning of new urban districts, where the provision of adequate capacities and appropriate locations of public amenities constitutes a critical element in negotiations between the city and private developers. This paper showed the relationship of public amenities analysis and planning with finance allocation decision making in Prague.

Expert panel

Relationship between practice and research

The next MĚ100 conference will take place in November 2026. Follow www.me100.info. Proceedings from previous years can be seen on www.me100.info (<https://vimeo.com/474656241>) or www.camp.cz.







Scientific conference committee

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ME100-

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Bjorn Mattsson, Skanska Residential Development Europe, Praha

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Doc. Ing. Petr Toth, Ph.D., Národohospodářská fakulta VŠE

Doc. Ing. arch. Jakub Vorel, Ph.D., Fakulta architektury ČVUT

Stefano Wagner, SASA, Lugano

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Prague University of Economics and Business, Faculty of Finance and Accounting

On the auspice of

Association for Urbanism and Spatial Planning of the Czech Republic

IPR Prague

Association for Real Estate Market Development.



The organizers

Vít Řezáč is an assistant professor at the Institute of Spatial Planning, Faculty of Architecture, CTU in Prague. Since 1994 he has been working in international companies (e.g. Skanska Property CR) as a project manager. During his professional career he has always worked in the field of urban planning. Since the beginning of the 1990s, he has been working at the faculty on the issues of economics in urban planning, the management of large projects and planning processes and spatial planning legislation abroad.

David Mazáček, MRICS has been in the real estate market for 12 years with experience in the Czech Republic, Poland and Germany. He co-founded the Real Estate and Valuation course at the University of Economics with Jaroslav Kaizer, MRICS MBA. He also heads the Institute of Strategic Investing at the VŠE which publishes, among other things, a ranking of real estate mutual funds and a continuous analysis of rental housing. David is a member of the Royal Institution of Chartered Surveyors. David works as CEO in the Upvest KB.

Zuzana Poláková is a graduate of the Faculty of Architecture of the Czech Technical University in Prague. She has long been working on sustainable mobility in the context of urban development with a focus on accessibility and the promotion of active modes of transport. She works as an urban planner in the non-profit organization AutoMat. At the Faculty of Architecture she co-organizes the international student competition Urban Design Award.

Jan Bittner is a PhD student and researcher at the Institute of Spatial Planning, FA CTU in Prague. His dissertation examines the influence of the availability of local amenities on the transport behaviour of residents of the Prague metropolitan area. Jan is involved in national and international research projects such as ESPON NoStaGeo, focusing on the management of non-traditional geographic units, and SGS Analysis of the Impact of the Built Environment on Residents' Mobility Based on Mobile Operators' Location Data. He organises the international PhD conference People-City-Transport, and participates in the international ATHENS programme.

Sylva Jablonská studied music at the Academy of Performing Arts in Prague and later Arts Management at the University of Economics in Prague. In addition to her work in the arts she has long been involved in teaching, translation and organization of cultural activities. Since 2020 she has been a member of the organizational team of the MĚ100 conference and is involved in the preparation of the City development course.



Authors / Ph.D. Students

David Bouz, Karlova Univerzita

David Bouz is a PhD candidate at the Department of Economics and Empirical Legal Studies, Faculty of Law, Charles University in Prague. He also works as an advisor to the chair of the Prague City Assembly's Financial Committee. He focuses on issues related to urban development, municipal finances and building law.



Honey Kumar, Univerzita Jawaharlala Nehru, Dillí

Honey Kumar is a PhD scholar at the Center for the Study of Regional Development, JNU, New Delhi. He is working on the impacts of climate change and sea level rise on the coastal megacity of Mumbai, particularly focusing on differential spatial vulnerability patterns and their disproportionate effects. He works at the intersection of the discipline of geography with climate change and urban studies.



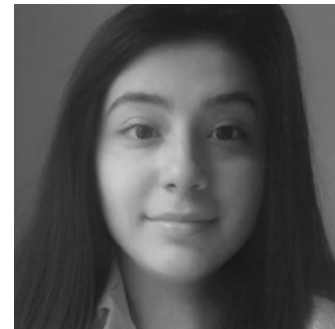
Gabriela Ciulinaru, Univerzita „Ion MINCU” Bukurešť

Gabriela is a fourth-year PhD candidate at the Doctoral School of Urban Planning, “Ion Mincu” University of Architecture and Urban Planning. The paper presented is part of her doctoral research, “Urban Management in the Context of the National Defense System’s Strategic Planning.” The study aims to highlight the role of strategic management in connecting national defense planning with urban development and with the enhancement of quality of life from social, economic, and cultural perspectives.



Laura Simona Cotan, NUO Bukurešť

Laura Simona Cotan is a graduate of the National University of Defence, with experience in the field of public procurement. Through procurement procedures involving feasibility studies, approval documentation for intervention works, design and construction. She had the pleasure of discovering the interconnectedness between the private sector, the economic environment, and the way in which urban development is influenced by the national defense system.



Ramdan Pano Anwar, MATE Budapešť

Ramdan is an urban development and environmental management professional with strong expertise in GIS (ArcGIS/QGIS/Google Earth Engine), spatial analysis, and environmental data visualization. Experienced in conducting Environmental Impact Assessments using GIS tools. Served as Project Coordinator for a Waste-to-Energy FS in Makassar with SUS ENVIRONMENT CHINA. Currently pursuing a PhD at MATE Budapest, focusing on Urban Green Infrastructure and sustainable urban planning.



Guest speakers

Joris van Wezemaal, ETH Zurich

Joris is the founder of de plek, a Switzerland-based consultancy specializing in strategy, mediation, and negotiation. He is also teaches at ETH Zurich, where he established the interdisciplinary platform ETH RAUM. Van Wezemaal holds a PhD in Economic Geography from the University of Zurich and title of Privatdozent (PD), authorizing independent teaching at the university level (*venia legendi*). Previously, he served as Associate Professor of Spatial Development and Economic Geography at the University of Fribourg and was Managing Director of a real estate investment foundation (Pensimo Management). Today, he advises cities, institutional investors, and family offices on strategic development and decision-making processes. He also serves on several boards and professional associations.



Maxime Charreire, ESPI Paris

Maxime Charreire is an Associate Professor in Economics at the French Graduate School of Real Estate Professions (École Supérieure des Professions Immobilières – ESPI). He earned his PhD from the University of Nanterre Paris Ouest in 2021, with a focus on law and economics. His early research explored civil and environmental liability rules, particularly the mechanisms for allocating compensation under these frameworks.

Since joining the ESPI2R research lab in 2022, his work has focused on the efficiency of real estate brokerage markets and the competitive structure of real estate development. His recent research investigates the impact of local urban planning regulations on housing supply, the competitive nature of real estate intermediation, and the competitive dynamics between housing developers.



Zdeňka Havlová, IPR Praha

The accessibility and availability of public amenities play a fundamental role in shaping the quality of life of urban populations. This raises two essential questions: how can accessibility be effectively assessed, and how can cities be planned in ways that enhance it? The Prague Institute of Planning and Development systematically monitors key categories of public amenities and conducts annual evaluations of their spatial accessibility and capacity availability for the city's residents. Beyond this monitoring role, the Institute also contributes to the planning of new urban districts, where the provision of adequate capacities and appropriate locations of public amenities constitutes a critical element in negotiations between the city and private developers. This paper shows the relationship of public amenities analysis and planning with finance allocation decision making in Prague.



Jan Krtička, IPR Praha

Milan Dont holds the position of Director of the Office of the Director Jan Krtička is an urban planner working at the Institute of Planning and Development of the City of Prague, where he heads the Office of Urban Neighborhood Development. He is an architect (Faculty of Architecture, Czech Technical University) and a sociologist (Faculty of Arts, Charles University). He focuses on the development of new neighborhoods, especially spatial regulation and planning of public amenities.



DAVID BOUZ

Does the Czech Legal System Encourage or Discourage Urban Density? Examining Municipal Budgetary Incentives



Introduction

In the face of a deepening housing crisis, urban density has become a key question of public policy. The Czech Republic maintains one of the highest housing price-to-income ratio relative to other OECD members, rendering housing ownership unaffordable (OECD, 2025). Increasing urban density through infill development is a key strategy to expand housing supply and curb rising prices (Glaeser & Gyourko, 2018; Quigley & Rosenthal, 2005).

Dense urban structures are typically cheaper and more effective in terms of public expenditures (Hudeček et al., 2018). Pushing housing supply from existing urban cores to the suburban areas drives urban sprawl, which significantly increases costs of public services (Carruthers & Ulfarsson, 2003; Hortas-Rico & Solé-Ollé, 2010). Urban sprawl also tends to lead to car dependency, higher infrastructure costs, and increased energy consumption, making it less environmentally sustainable (Newman & Kenworthy, 1989).

Legal and regulatory mechanisms dictate the extent to which high-density urban development is permitted. The legal system is not a neutral set of rules. Complex, interconnected regulation often results in unintended consequences. Law has practical economic effects, which incentivise particular behaviour (such as car dependence in the United States, as shown by Shill, 2020).

The Czech legal system has been, whether deliberately or inadvertently, structured to mostly discourage urban density. Although various legal mechanisms influence urban density – ranging from building codes and land-use planning to private law – this conference paper focuses on the tax and budgetary incentives

shaping municipal decision-making regarding new construction.

Viewed through the lens of the municipal budget, new construction is mostly a liability. Given that Czech legal system fails to provide sufficient means to offset these costs, the prevailing opposition from local officials and voters is a logical consequence of the system.

Municipalities as Key Players

Czech regions and municipalities have a strong influence on new construction on their territory, both formal and informal. When municipalities leverage their various powers to resist development, the developer confronts a formidable challenge. The resulting process may be delayed for months or years, imposing substantial financial burdens on the investor, or ultimately terminated entirely.

Most importantly, municipalities are key players in land use planning, with local politicians having the autonomy of the final decision on passing land use regulations. Since the act of enacting or amending a zoning plan is a discretionary power of the local government, unwilling municipalities cannot ultimately be compelled to adopt zoning regulations permitting new housing.

Additionally, municipalities are automatically granted participation in every building permit proceeding, where they can comment on the proposed project, raise objections, or even challenge the decision in court.

Lastly, they can strongly influence new construction informally. The necessity of connecting to public transport or technical infrastructure grants municipalities great leverage,

as they usually control the essential networks required for development. If land concessions are needed, municipalities can block new housing as well. In extreme instances, local politicians may even attempt to exert undue influence over permitting officials, leveraging the fact that these officials are municipal employees despite their formal administrative independence.

Financial Incentives of Municipalities

Fundamentally, the fate of new housing construction rests in the hands of local politicians. Because their career mostly depends on re-election, they naturally prioritize the demands of the voting public. If constituent sentiment regarding new construction is predominantly negative, local leaders face a powerful motivation to impede development through the use of their legal and informal tools.

New construction almost always causes negative externalities for existing residents – ranging from inconvenience during construction, loss of green space and views, to pressure on existing municipal infrastructure, including schools or parking. The old-time residents may thus use various means to oppose new development, including pressuring their elected officials (Einstein et al., 2019).

Given that resident resistance to the externalities of development is rational, the fundamental issue becomes whether the legal system enables sufficient mitigation or compensation of the adverse effects.

I argue that one of the most critical incentives for local governance is the impact on the municipal budget. If new construction yields a net positive for the budget, politicians can justify development to their constituents by using the generated revenue to offset negative externalities through public investment. However, in the Czech Republic, this fiscal feedback loop is largely absent.

Czech Allotment of Tax Revenue

Although Czech regions and municipalities enjoy considerable fiscal autonomy regarding expenditures, they remain structurally depen-

dent on the central government, possessing only limited autonomy over their budgetary revenues.

The taxes with the highest revenue – personal and corporate income tax and value added tax (VAT) – are set, administered and collected by the central government. Local governments directly administer only a narrow range of fees, such as those for tourism, dogs, and waste disposal. However, local fees represent only a fraction of municipalities' income, with most of the revenue coming from centrally administered taxes. In 2024, local fees generated only 11 billion CZK out of a total 456 billion CZK in municipal tax revenue, representing a roughly 2.4% share (Ministry of Finance of the Czech Republic, 2024).

While the real estate tax is a direct municipal income and offers a degree of local flexibility, its scope is also heavily constrained by state legislation. Ultimately, the yield is too low to enhance municipal fiscal autonomy or decouple local budgets from state funding. In 2024, the real estate tax contributed only 23 billion CZK in 2024 – roughly 5% of the total municipal tax revenue (Ministry of Finance of the Czech Republic, 2024).

The distribution of state tax revenue to municipalities is governed by the Act on Budgetary Allocation of Taxes (BAT, rozpočtové určení daní or RUD in Czech). The BAT allocates revenue among municipalities according to three key criteria: number of inhabitants, area of the municipality, and number of pupils in primary education and kindergartens.

The number of inhabitants holds the highest weight in determining revenue allocation and is also the metric local politicians can most realistically influence. In contrast, increasing the number of pupils requires costly school infrastructure, and comes primarily as a consequence of higher overall population count, and expanding the municipal area is generally only possible through mergers.

Consequently, a local politician seeking to maximize municipal revenue should, in theory, welcome population inflows and logically support housing development, prioritizing higher densities. Under this logic, municipali-

ties are financially incentivized to support not only new development but also the densification of existing urban structures, as the BAT correlates higher population with increased revenue.

Issues with the Allocation of Taxes

In practice, however, two key issues undermine this principle and significantly reduce its impact on incentives of local politicians.

Firstly, the BAT considers only those with official permanent residency, failing to capture the actual number of people utilizing municipal infrastructure. All inhabitants of the Czech Republic are required to have a permanent residence address, which is recorded in the official resident registry. In theory, when relocating, an individual should update their permanent residence accordingly.

However, this often does not occur. The process is cumbersome, requiring a visit to the municipal office, replacement of identification documents, and reporting the change to many institutions, ranging from banks to the insurance companies. Furthermore, citizens lack a compelling incentive to comply; there are few tangible benefits to updating the address and no repercussions for failing to do so.

By design, the permanent residency system is also rigid and cannot account for modern mobility patterns – residents who split their time between locations, such as the daily or weekly commute for work or study. As a result, tax revenue is directed solely to the municipality of the registered address, depriving the secondary location of tax revenue despite the individual's regular consumption of its services and infrastructure.

This leads to a serious discrepancy between the actual number of inhabitants – for whom services and infrastructure must be provided – and the official count that determines tax allocation. Municipalities lack effective mechanisms to compel individuals to update their permanent residence (relying only on indirect incentives, such as allocating parking or schools only to residents), meaning that new housing developments may fail to generate the theoretically projected increase in tax revenue.

The evidence supports this. Based on anonymous geolocation data provided by mobile carriers, an analysis by the Czech Ministry of the Interior (2023) reveals significant population disparities: Prague and Brno effectively support 200,000 and 60,000 uncounted residents respectively, while cities in the shrinking north-west Bohemia region, such as Ústí nad Labem, generally record 10–20% fewer actual inhabitants than their official census counts. Although this creates an unintended fiscal transfer to struggling regions, it fundamentally undermines the incentive for growth centres to build housing, as they incur the costs of development without receiving the corresponding tax revenue.

Secondly, the system suffers from a significant time lag in revenue allocation. Tax revenue adjustments occur only after apartments are completed and occupied, delaying funding by at least a year or more. However, the demand for public services is immediate. Because municipalities must incur these costs before revenue materializes, the burden often falls on existing often saturated infrastructure, negatively affecting the original residents. This creates a rational basis for Not-In-My-Backyard effect as they perceive a direct reduction in the quality of public services.

Consequently, elected officials face a political dilemma: they cannot effectively justify new developments to their incumbent constituents, while the future beneficiaries (newcomers) hold no current voting power. Large-scale housing projects necessitate immediate, heavy capital expenditure on social and technical infrastructure. However, since tax revenue from new residents is realized only after these facilities are built, municipalities face a liquidity gap that makes supporting development difficult.

While private entities can typically manage these issues through debt financing, Czech municipalities face strict statutory limits by the Act on Budgetary Responsibility Rules. This law caps municipal debt at 60% of average revenue in last four years, meaning a municipality with a 250 million CZK budget can borrow only roughly 150 million CZK. This sum is often inadequate for capital-intensive infrastructure such as elementary schools. Moreover, exhausting this credit limit severely impairs the mu-

municipality's future investment potential, preventing it from undertaking other necessary projects until the debt is reduced.

Conclusion

In conclusion, municipalities are not effectively fiscally incentivized to pursue new development; instead, the BAT system tends to reinforce the status quo. While new inhabitants offer clear long-term benefits, new projects require significant upfront costs that existing residents must subsidize. Given the constraints of the short election cycle, the current system does not offer enough immediate value to offset the political pressure from established residents to limit development.

Since municipalities cannot offset the negative externalities of new housing, construction is often a net fiscal loss, leaving politicians with little incentives to support it. However, this dynamic suggests that neither the voters nor their representatives are truly at fault. Their opposition is a rational reaction to the legal environment.

The Czech regulatory framework generally creates significant barriers to all forms of construction. However, where development does occur, the path of least resistance lies in lower densities, which impose a lighter burden on local infrastructure, create fewer negative externalities and are thus easier to permit. By structurally prioritizing less dense development, the Czech legal system creates a misalignment of incentives that pits municipalities against housing expansion, sadly rendering the housing crisis far more difficult to resolve.

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HONEY KUMAR

Financial Resources and Vulnerable Populations: Governance and Spatial Context of Climate Vulnerability at City Scale in Mumbai



1. Introduction

The climate change phenomenon is expected to affect populations at an increasingly higher rate, with intensifying climate change. The climate risk is not just the outcome of environmental shocks and stresses, but is also determined by social, political, and cultural factors, and low-income, marginalized sections of the population suffer disproportionately from the hazards associated with climate change [1]. Developing countries, especially those in South Asia, are particularly vulnerable to the impacts of climate change due to several factors, including inadequate financial resources, flawed governance policies and infrastructure, and a large population of poor and marginalized communities. The initial reports of the IPCC focused mainly on the aspect of physical vulnerability, that is, the stresses on physical resources, such as land, water, farmland, and infrastructure, based only on geo-physical indicators of climate vulnerability. Later on, the whole discourse has changed with the inclusion of social drivers of climate change vulnerability, which determine the spatial patterns of vulnerability, and the non-uniform distribution of climate hazard risks [2]. The cities around the world, especially the coastal cities, need to and are preparing climate adaptation plans, which detail out the available resources, changes in land use, and development planning [3]. This paper discusses the spatial patterns of financial resource allocation to different wards of the Municipal Corporation of Greater Mumbai and attempts to correlate these allocations with various aspects of vulnerability in different wards. Hence, the theme of the paper is to highlight the inconsistencies in financial allocations to different wards, which may re-

sult in increased vulnerabilities and financial governance injustices in the city. The allocations relevant to enhancing coping capacity and resilience to climate change hazards have been considered, including allocations for slum development, creation and maintenance of civil amenities, disaster management, and construction of storm drains, among others. The funds allocation for these abovementioned sectors has been correlated with the proportions of slum population, total population, etc, for different wards. The analysis is based on data collected from various secondary sources, including local government bodies

2. Literature Review

The climate change phenomenon has become a point of intense discussion ever since it emerged as a key aspect of human-environment relations. The latest report on the climate change phenomenon, the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC), specifically the contributions by Working Group I, highlights the physical basis of the climate change process. The report emphasizes that global temperatures have increased by approximately 1.09°C compared to the pre-industrial period and are expected to surpass the 1.5°C limit agreed upon in the Paris Climate Agreement [5]. The same report also states that the Global Mean Sea Level has risen by 0.2 meters between 1901 and 2018, and the rate of sea level rise has increased to 3.7 mm/yr during the period 2006-2018. Increasing global temperatures and sea level rise pose serious threats to coastal areas, specifically large urban centres. The low-lying coastal areas of South Asia, which host some of the world's

most populous megacities, are among the most vulnerable regions to the hazards of climate change [6]. The process of climate change is known to increase both the frequency and intensity of hazardous events, and South Asian coastal cities are at a comparatively higher risk due to natural, as well as economic, structural, and developmental factors [7]. The vulnerability, as defined in synthetic terms from various literature, is the susceptibility of a place/region/population/system to be harmed by a hazardous event, which affects its ability to prepare for, cope with, and recover from such an event [8]. Within the concept of vulnerability is embedded the subordinate concept of social vulnerability, which reflects those socioeconomic characteristics of a society that make it specifically prone and susceptible to disaster events.

The impacts of extreme weather events and other climate change-related threats are not always uniform over space. Most often, the negative impacts and consequences of hazardous events are unevenly distributed across different populations and social groups, even at very small spatial scales, such as intra-city levels. These differential patterns of vulnerability to climate change threats result from a combination of factors, including social, economic, political, and structural factors. [2]. The increased vulnerability of poor and marginalized sections of society, compared to other well-off groups, is a universally accepted fact; however, the root causes behind such patterns are particular to different places, based on the structure of the political economy in those regions. The concept of vulnerability encompasses multidimensional aspects, including social factors, which can enhance the effectiveness of mitigation and adaptation strategies to climate change. The adaptation plan and resource access, as well as the utilization of financial resources for climate mitigation and adaptation, are also fraught with inequalities on varying spatial scales. The same socio-economic, structural, and political factors that determine the differential vulnerability also affect the access and utilization of financial resources for climate adaptation [1]. Sensitive and vulnerable groups to climate change hazards, such as

poor and migrant communities, also experience climate injustice, often being beyond the sight of the administrative apparatus, and being further marginalised due to discriminatory developmental policies in the urban centres [9]. Cities worldwide are developing climate adaptation plans to mitigate the effects of climate change. The plans on climate adaptation need to be just so that they include the most vulnerable, marginalized, poor, and informal populations, so that the concept of social and socio-economic justice is maintained through policy interventions [3]. Understanding the root cause of differential vulnerability is essential for addressing climate adaptation and social justice effectively from a governance perspective. Understanding of inequality is a prerequisite for addressing climate adaptation and vulnerability, and for delivering justice with regard to climate change policy and governance [10]. In developing countries, including India, there is a growing trend of migration from the poor and labouring classes towards highly populous megacities, which are already facing increasing threats from climate change. Good governance and justice require greater attention to be paid towards inclusion of these migrant and vulnerable groups into adaptation and mitigation policies, who lack resources and coping capacity [11]. The climate adaptation inequalities and injustices can be grouped into two types: omissions, when the adaptation interventions negatively affect weak and poor communities, and commissions, when the adaptation policies specifically target only elite and empowered groups at the expense of the poor [12]. The integration of poor and vulnerable communities into climate action plans and adaptation policies can have potential positive impacts. The need and positive impacts of financial grants and funds to the local poor communities have been highlighted in the report of the Standing Committee on Finance, named Climate Finance and Sustainable Cities, published by UNFCCC [13]. The analysis of the literature aforementioned suggests a clear need to focus on socially vulnerable sections of society in the process of climate policy formation, governance, and implementation, to make such adaptation viable and effective on the ground. This is even more required since these vulnerable and poor com-



munities are the ones who suffer most in the event of climate hazards in terms of loss of livelihood, housing, displacement, degradation in community health, etc.

3. Research Questions

1. Do the distributions of population and financial resources for infrastructure, disaster management, storm water drains creation, etc, correspond?

2. Does the distribution of the marginalized slum population affect the resource allocation in the budget for the city?

4. Methodology

4.1 Analytical Framework

Climate change vulnerability and adaptation patterns can be addressed through effective adaptation policies and planning, which requires good governance practices. Financial governance forms an indispensable part of the governance process, as financial resources are critical inputs in addressing most urban problems. Urban finance and its equitable and just distribution at the intra-city scale are part of the effectiveness and equity indicators of urban good governance, as included in the UN-HABITAT Urban Governance Index report. In the background of this assumption, the paper attempts to analyze the distribution of municipal finance within the Greater Mumbai Municipal Corporation, so that climate change adaptation and vulnerability can be addressed within the framework of urban governance. The theoretical assumptions in this case assume a positive correlation between the population, the percentage of slum population, and all other indicators of financial resource allocation, such as funds for slums, civic amenities, disaster management, and storm drain construction. This implies that as the population or slum population increases, funds should increase correspondingly. This assumption has been tested using correlation statistics, which are used to address the research questions posed.

4.3 Tools and Techniques

The data collected from different sources have been analyzed using the statistical tool of Pearson's Correlation to establish a quantitative statistical relationship between different parameters of vulnerability and fund allocation, as summarized in Table 1 below. The values obtained from correlation statistics have been compared with the critical values for correlation statistics, and significant values are marked with an asterisk in the table. The data and spatial distribution of population, slum population percentage, and fund allocation for different sectors are shown using ward-wise maps created with the QGIS mapping software.

5. Findings and Discussion

5.1 Population and Funds

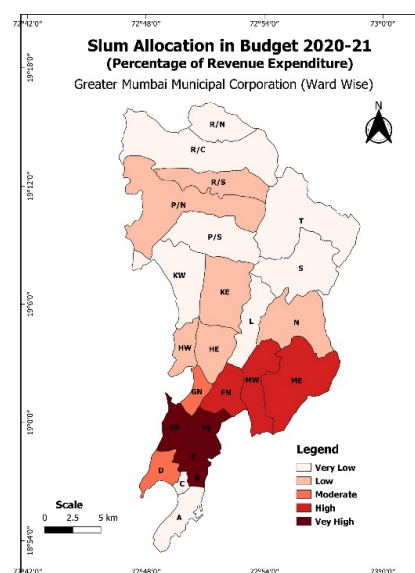
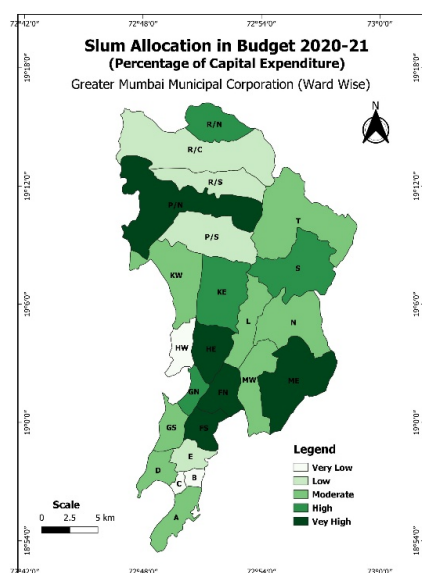
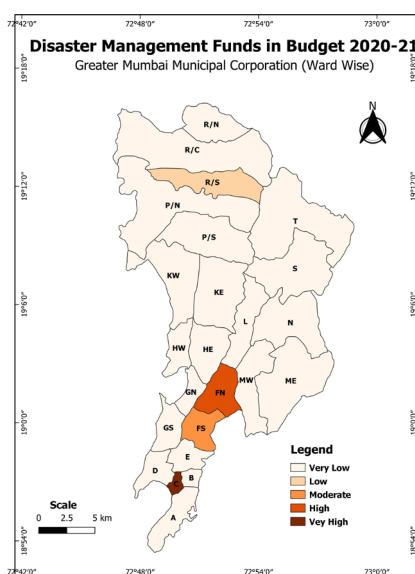
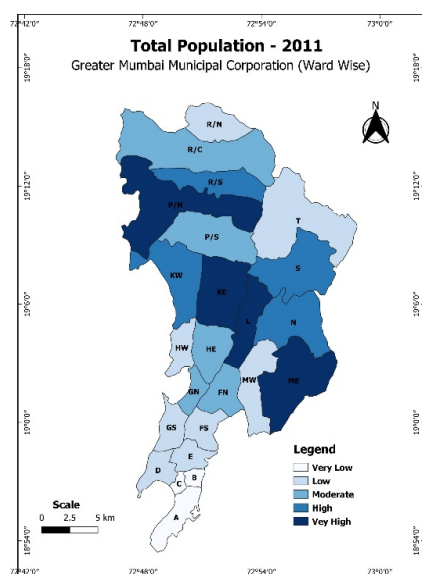
The study examines the relationship between population distribution and financial allocations for different sectors, which impact adaptation capacity and resilience to climate change hazards. The population is unevenly distributed throughout the city, with wards P/N, KE, and ME having the highest populations, while wards A, B, and C have the lowest populations. The capital expenditure and revenue expenditure for civic amenities, as well as the allocation for storm drain construction, are determined by the population distribution in the city, with a strong positive correlation, as summarized in Table 1. On the other hand, the funds allocation for disaster management projects shows a weak negative correlation. Theoretically, the relationship should have been an opposite one, so that a higher population commands larger amounts of funds, considering their cumulative vulnerability. Therefore, the theoretical assumptions for the disaster management sector are not supported by this study, whereas other sectors of adaptation continue to maintain their adaptation. This means that population distribution affects the distribution of financial resources, and hence climate adaptation and resilience, but not necessarily in the same way across all sectors of climate planning



Parameters	Slum Population (%)	Total
Slum Allocation of Total Capital Expenditure (%)	0.70262662*	-----
Civic Amenities from Capital Expenditure	-----	0.763382184*
Civic Amenities of Total Capital Expenditure (%)	-0.724379712*	-----
Slum Allocation of Total Revenue Expenditure (%)	-0.01936966	-----
Civic Amenities from Revenue Expenditure	-----	0.837439849*
Civic Amenities of Total Revenue Expenditure (%)	0.259076425	-----
Disaster Management	-0.220017	-0.282585
Storm Drains Construction	0.300509682	0.544507865*

*Significant at $\alpha 0.05$, $df=22$, Critical Value = 0.404386

Table 1: The correlation statistics values between different parameter combinations



and adaptation, which show variations depending on the sector of adaptation being considered.

5.2 Slums and Funds

The second research question proposed was whether the distribution of the slum population affects financial resource allocation for climate adaptation and resilience planning sectors. The study reveals a strong positive correlation between the distribution of slum populations and capital expenditure for slums. The relationship is weak in the case of storm drain allocation and civic amenities allocation from the revenue expenditure. On the other hand, the allocation for civic amenities from capital expenditure in slum-dominated areas shows a strong negative relationship, which highlights the fact that areas with a lack of infrastructure are again being given less

priority for infrastructure creation, seriously affecting their disaster coping capacity. The allocation of slums from total revenue expenditure also exhibits the same trend. The near-zero or negative relationship contradicts the theoretical assumption that vulnerable areas should be given higher financial priority to empower them.

6. Conclusion

Financial resources are the backbone of any climate mitigation and resilience endeavour. Therefore, an equitable and just distribution of financial resources and governance is a prerequisite for making climate adaptation plans successful and targeted at vulnerable populations. The same objective has been pursued in this study, specifically in the context of Mumbai city, with respect to the distribution of financial resources and vulnerable populations. Theoretical assumptions from existing literature suggest a positive relationship between the allocation of financial resources and the distribution of vulnerable groups. These assumptions hold true for Mumbai city to some extent, but not in all the parameters, as discussed above. The vulnerable population in slums commands less of the finances to improve their infrastructure, which determines the lines of their response to future climate stressors. There is a need to reorient governance practices and financial distribution mechanisms in a way that not only addresses highly populated and vulnerable sections of society but also targets them directly. Inclusivity and just resource distribution are the two pillars of good governance, and such governance practices must be incorporated into policy formation and practice to make climate action plans more viable in cities in India.

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GABRIELA CIULINARU, LAURA-SIMONA COTAN

Between security and economy: Defence institutions as poles of influence in urban and regional development



Gabriela CIULINARU

„Ion MINCU” University of Architecture and Urban Planning
ciulinarugabriela@yahoo.com

Laura-Simona COTAN

„Carol I” National Defence University

Tutor of the Ph.D. work **Vasile MEIȚĂ**

„Ion MINCU” University of Architecture and Urban Planning
vasile.meita@gmail.com

Abstract

The national defence system represents a fundamental pillar of national security, with the central aim of protecting citizens and the national territory against various threats. It involves the efficient use of military resources and international cooperation for conflict prevention and peacekeeping. In a globalized world where risks can cross borders, the national defence system must be flexible and capable of responding quickly and effectively.

In the current context, characterized by accelerated social, economic, and geopolitical dynamics, the relationship between defence infrastructure and urban development becomes a major subject of interest for researchers, decision-makers, and local communities.

Institutions within the National Defence System play an essential role in maintaining security, yet their influence extends beyond the military sphere, impacting the socio-economic environment and the configuration of urban and peri-urban space. Their placement can generate multiple direct and indirect effects: stimulating the local economy through job creation and attracting related investments, modernizing pu-

blic infrastructure, or increasing the sense of safety among the population. At the same time, significant challenges may arise, such as access restrictions, urban planning constraints, pollution, or potential social tensions.

In Romania, the lack of a unified regulatory framework regarding the location of defence institutions results in an uneven distribution across the territory, sometimes in close proximity to residential areas, generating both negative perceptions regarding quality of life and questions about how urban strategies can integrate national security objectives without affecting the sustainable development of communities. This reality raises questions about how such placements influence quality of life, urban attractiveness, and community cohesion. A coherent approach, integrated into urban and regional planning strategies, could ensure a balanced distribution of these objectives, minimizing land use conflicts and maximizing benefits for the community.

This article explores these aspects through a case study based on the application of a questionnaire to a sample of 121 respondents, residents in areas where National Defence System institutions are present. The methodology used allows observation of varied perspectives on the impact of these institutions, highlighting both perceived benefits—such as increased sense of security and stimulation of the local economy—and identified challenges, including access restrictions, environmental impact, and possible negative effects on tourism or other economic activities. In this article, particular emphasis will be placed on the economic dimension of these perceptions as a central element of the relationship between defence institutions and urban and regional development.

These results highlight the need for an integrated approach in urban planning that harmoni-

zes security objectives with sustainable development strategies. Defence institutions should be seen not only as security elements but also as potential poles of economic and social influence in the communities in which they operate.

This article aims to contribute to the foundation of public policies and urban strategies capable of harmoniously integrating national security objectives into the sustainable development of urban and regional communities. In this way, defence institutions can be seen not only as essential security actors but also as potential catalysts of economic and social progress.

Keywords: national security, influence, economic, social, community, urban.

INTRODUCTION

Institutions that make up Romania's National Defence System occupy a central role in the architecture of Romania's security.

The impact of these institutions is not limited to the military dimension; their presence generates indirect effects on the national economy, labor market, infrastructure, and even social life.

The international context, marked by uncertainties and risks, redefines the way citizens perceive the institutions of the National Defence System. From a neutral or even marginal perception of their activity, they have come to be considered central actors in ensuring security and maintaining social stability.

This research was based on a questionnaire applied to a sample of 121 respondents, comprising demographic questions (age, gender, locality, area of residence) and items regarding perceptions of benefits, risks, and opportunities associated with these institutions.

The results obtained from the analysis were supplemented with statistical data at the national and international level to provide an inte-

grated view of the economic and social impact.

ANALYSIS AND INTERPRETATION OF RESULTS

In the analysis conducted, the demographic characteristics of respondents were considered essential for understanding perceptions of institutions in the National Defence System. Factors such as age, gender, place of origin, and area of residence can significantly shape expectations and the level of receptivity of the population. These factors can also generate unexpected results, highlighting that the impact and mode of influence of defence institutions may vary depending on the specific demographic groups analyzed.

		Gender		
		Female	Male	Prefer not to say
		No respondents	No respondents	No respondents
Residential Area	Rural	16	16	22
	Urban	34	19	14
	Total	50	35	36

Table 1: Gender distribution of respondents

This table presents the distribution of respondents by gender and area of residence. Out of the total sample (n=121), 16 females were from rural areas and 34 from urban areas. Among males, 16 responses came from rural areas and 19 from urban areas. Additionally, 22 respondents from rural areas and 14 from urban areas preferred not to declare their gender.

				Gender		
				Female	Male	Prefer not to say
				No respondents	No respondents	No respondents
Residential Area	Rural	Age	18-30	4	5	4
			31-50	8	5	11
			51-65	2	3	6
			65 +	2	3	1
	Urban	Age	18-30	15	7	1
			31-50	11	5	6
			51-65	7	4	5
			65 +	1	3	2
	Total	Age	18-30	19	12	5
			31-50	19	10	17
			51-65	9	7	11
			65 +	3	6	3

Table 2: Distribution of respondents by age

This table presents the distribution of the 121 respondents by age groups, highlighting their distribution by gender and area of residence (urban/rural). The data allow identification of relevant demographic trends within the sample, such as concentration of certain age categories in urban or rural areas, as well as gender differences within each age group.

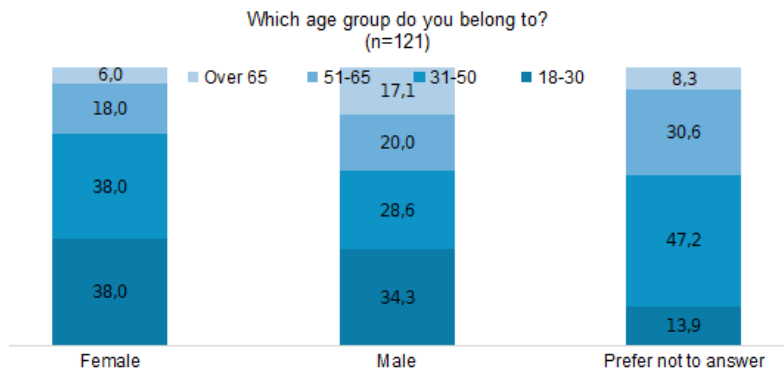


Figure 1: Distribution of respondents by age

This figure shows the distribution of respondents by age groups. Males are predominant in the 18–30 age group (34.3%). Females are predominant in both the 18–30 age group (38.0%) and the 31–50 age group (38.0%). Among those who preferred not to declare their gender, most belong to the 31–50 age group (47.2%).

Analysis of demographic characteristics reveals a relatively high proportion of respondents who did not wish to declare their gender, potentially influencing the general interpretation of results. However, the predominance of socio-economically active groups constitutes an advantage for this research, as these categories are the most affected by the economic and social impact of institutions in the National Defence System.

Evaluating the social impact of these institutions allows understanding how citizens perceive the concrete benefits or, conversely, risks associated with these institutions.

The main benefits of the presence of National Defence System institutions, according to respondents' perceptions in the questionnaire, are presented in the Figure 2.

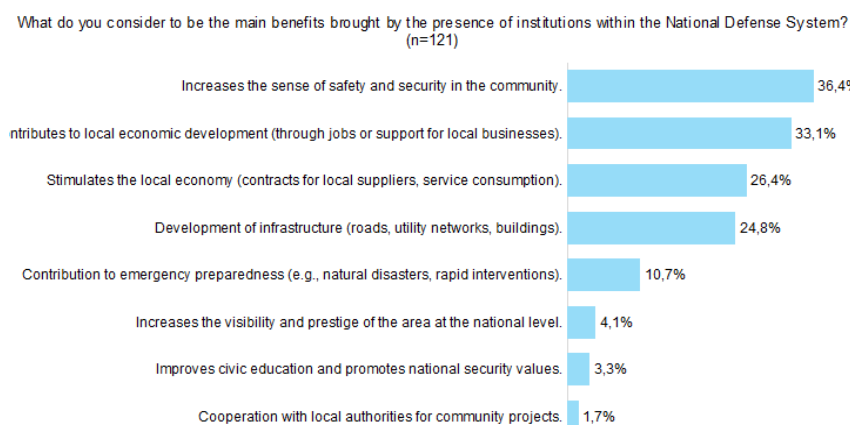


Figure 2: Respondents' perception of the main benefits of the presence of National Defence System institutions

Results indicate that the main benefit brought by the presence of National Defence System institutions in the residential area is "Increased sense of safety and security in the community" (36.4%), showing that the population primarily values the role of these institutions in maintaining order and protecting citizens. The second most cited benefit is "Contributes to local economic development" (33.1%), reflecting the perception that the presence of these institutions generates jobs and supports the local business environment. Other significant identified benefits are "Stimulating the local economy" (26.4%) and "Infrastructure development" (24.8%), suggesting that the population sees a direct link between the activity of these institutions and community investments.

On the other hand, benefits related to "Contribution to emergency preparedness" (10.7%) and "Increasing visibility and prestige of the area at the national level" (4.1%) are less frequently perceived. The lowest percentages are recorded for "Improving civic education and promoting national security values" (3.3%) and "Collaboration with local authorities for community projects" (1.7%), indicating that these aspects are either less visible to citizens or perceived as having an indirect impact.

The fact that the argument "Contributes to local economic development" ranks second in questionnaire responses indicates a significant national perception: institutions in the National Defence System are seen not only as security structures but also as stable sources of jobs and catalysts for community development.

The employment rate of the population in the first quarter of 2025, for the working-age group (15–64 years), was 62.7%, based on a total of 8,156,500 individuals, including employees of the armed forces and associated structures[CITATION Nat251 \l 1048].

Compared to 2024[CITATION Red241 \l 1048], sources iden-

tified that the institutions within Romania's national defence system recorded the highest number of occupied positions, for example:

- Ministry of Internal Affairs (MAI) – approximately 124.094 employees (police, gendarmerie, firefighters, etc.);
- Ministry of National Defence (MAPN) – approximately 74.695 employees (military personnel from various force categories).

Although there are no complete official data regarding the total number of employees in the entire system, for security reasons, these two ministries can be considered representative, probably accounting for around 50% of the national defence system's workforce.

If we add an estimate for the other institutions within the National Defence System, which do not publish exact figures but can be approximated at another ~50% of this total, we reach:

$$198.789 (\text{representing MAI} \wedge \text{MAPN employees}) * 2 = 397.578 \text{ employees}$$

In relation to the employed workforce at the national level, defence institutions directly provide an estimated 5% of the total public and private jobs.

This result is obtained using the formula:

$$\text{Share} = \frac{\text{Number of employees} \in \text{the national defence system}}{\text{Total active population}} \times 100$$

$$\text{Share} = \frac{397.578}{8.156.500} \times 100 \quad \text{Share} = 4,87\%$$

At the macro level, the 4.87% share of employees in the national defence system can be considered relatively low compared to the total workforce, but in relation to the public sector, it represents one-third of the total personnel.

The fact that employees of Romania's National Defence System account for approximately one-third of all state employees makes this sector one of the largest public-sector employers in the country.

At the local and regional levels, the effect is much more visible than at the national level; in many communities, these institutions are major employers and even central economic actors, indirectly stimulating private-sector activity through their purchases, services, and

generated consumption.

Another essential element in evaluating the economic impact of these institutions is the substantial budget allocations from the state budget. In recent years, Romania has directed over 2% of GDP to the national defence system, generating major investments in infrastructure and advanced technologies. These investments produce economic and social effects that far exceed the contribution suggested by the simple share of personnel in the workforce.

Thus, the discrepancy between the relatively low percentage of employees (4.87%) and the high perceived economic contribution (33.1%) does not represent a contradiction; rather, it confirms the status of defence institutions as centers of economic and social influence, playing an essential role in urban and regional development.

When asked about the contribution of National Defence System institutions to the prestige of the area, respondents' perceptions, collected through the questionnaire, are presented in the following chart:

Regarding respondents' perception of the prestige of the area where these institutions are located, the results show a divided view.

The most frequent opinion is that these institutions do not contribute significantly to the prestige of the area (39.7%), suggesting that their impact on the community's image is not perceived as visible or relevant by a significant portion of the population.

On the other hand, 33.1% of respondents believe that the presence of these institutions contributes to a positive image of the community, indicating a favorable perception regarding local reputation. About a quarter of participants (24.8%) view these institutions as a symbol of commitment to national security, associating them with values of stability and protection.

Low percentages are recorded for opinions stating that these institutions attract investment and national attention (5.8%) or for "Don't know / Not sure" responses (0.8%), indicating that the economic and national visibility dimension is less recognized or considered less

relevant by the majority of respondents.

The relatively low result of 5.8% for the option “Attract investment and national attention” should be interpreted in relation to the primary mission of Romania’s defence institutions, namely ensuring security and public order. Considering their mission, the 5.8% figure becomes relevant not in absolute terms, but because a segment of Romania’s population sees these institutions also as economic attractors.

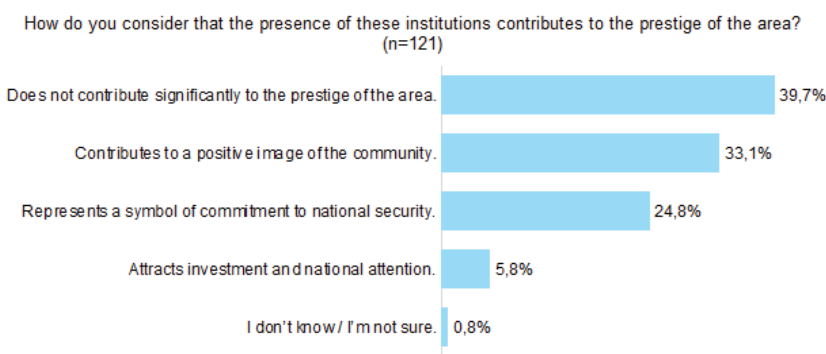


Figure 3: Respondents’ perception of the prestige of the area where institutions of the National Defence System are located

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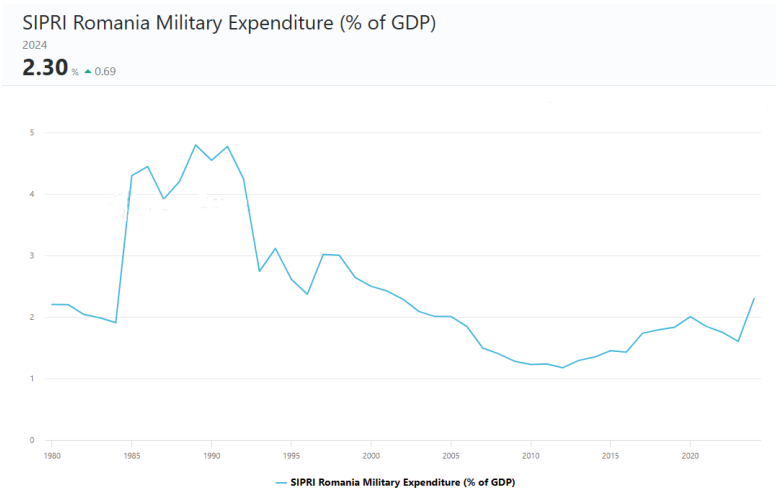


Figure 4: SIPRI Romania Military Expenditure (% of GDP) (SIPRI, 2025)

indicating a favorable perception regarding local reputation. About a quarter of participants (24.8%) view these institutions as a symbol of commitment to national security, associating them with values of stability and protection.

Low percentages are recorded for opinions stating that these institutions attract investment and national attention (5.8%) or for “Don’t know / Not sure” responses (0.8%), indicating that the economic and national visibility dimension is less recognized or considered less relevant by the majority of respondents.

The relatively low result of 5.8% for the option “Attract investment and national attention” should be interpreted in relation to the primary mission of Romania’s defence institutions, namely ensuring security and public order. Considering their mission, the 5.8% figure becomes relevant not in absolute terms, but because a segment of Romania’s population sees these institutions also as economic attractors.

According to SIPRI (Stockholm International Peace Research Institute) data, it can be observed that Romania experienced a significant decrease in defence spending over the past five years, reaching 1.6% of GDP in 2023, due to budgetary constraints. In 2024, it allocated 2.30% of GDP, marking a moment for reopening opportunities to leverage the indirect economic impact generated by institutions in the defence and national security sectors.

The main opportunities provided by the presence of institutions within the National Defence System in the residential area, according to respondents’ perceptions in the survey, are presented in the following chart:

The main opportunity identified by respondents, generated by the presence of institutions within the National Defence System, is the increase of public and private in-

vestments in the area (30.6%). This perception suggests that the population associates the presence of these institutions with a higher potential for attracting capital, both through government projects and through investments stimulated by the stability and strategic importance of the area.

The development of new local businesses or services (10.7%) highlights an indirect economic dimension, where the private sector responds to the needs of the institutions (catering, transportation, maintenance), thereby stimulating the local economy through job creation and diversification of offerings.

Partnerships for managing emergency situations (7.4%) can be seen not only as a security component but also as a source of economic efficiency, as they involve logistical resources, training, and joint plans that foster inter-institutional collaboration and create demand for specialized services.

Promoting the area as a strategic destination for investors or tourists (3.3%), although minor, suggests an emerging perception that the presence of institutions within the National Defence System can contribute to local branding and attract external economic flows.

When asked about the support provided by these institutions for integrating the community into local development projects, respon-

dents answered as follows:

Respondents assign an important role to institutions within the National Defence System in facilitating community integration into local development projects, highlighting the educational dimension as the primary vector of involvement. This indicates their formative role and capacity to support human resources at the local level.

Approximately one-quarter of respondents (25.6%) believe that involvement could be achieved through the provision of grants or financial support for local initiatives, emphasizing the importance of material and financial resources for stimulating community projects and strengthening the local economy.

Additionally, the creation of community centers accessible to the public (23.1%) and participation in volunteer programs or civic projects (23.1%) are seen as concrete ways to bring institutions closer to the community, fostering both social cohesion and citizen engagement in public life.

The very low percentage of those without a formed opinion (0.8%) reflects a high level of awareness regarding possible collaboration opportunities, suggesting a real potential to capitalize on these avenues of involvement.



Figure 5: Respondents' Perception of the Main Opportunities Generated by the Presence of Institutions within the National Defence System

These results indicate that, from the community's perspective, integration into local development projects could be effectively supported through a combination of investment in education, financial support for local initiatives, and the creation of spaces and programs that

facilitate direct interaction between citizens and institutions.

The perception regarding how these institutions might limit the development of tourism or other businesses was as follows:

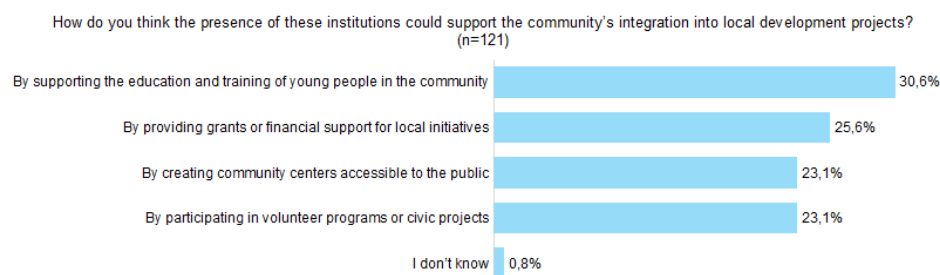


Figure 6: Respondents' perception regarding the support provided by institutions within the National Defence System for integrating the community into local development projects

Promoting the area as a strategic destination for investors or tourists (3.3%), although minor, suggests an emerging perception that the presence of institutions within the National Defence System can contribute to local branding and attract external economic flows.

When asked about the support provided by these institutions for integrating the community into local development projects, respondents answered as follows:

From an economic perspective, the balanced distribution of responses indicates a dual perception regarding the role of institutions within the National Defence System in relation to tourism and business development. On one hand, the 31.4% who perceive a significant restrictive impact can be associated with the limitations of special-regime areas: restricted access, additional controls, or limitations on certain commercial activities. These elements can be interpreted as factors that slow down some economic initiatives, particularly in sectors sensitive to image and accessibility, such as tourism or related services.

On the other hand, neutral attitudes (34.7%) and those perceiving a minor influence (33.9%) suggest that, for a significant portion of the population, the presence of these institutions is not seen as a real obstacle to the local economy. Moreover, this result can also be interpreted positively: the absence of a majority perception of restrictive effects indicates the potential for defence institutions to coexist with economic development, provided there is better coordination between urban planning and local development strategies.

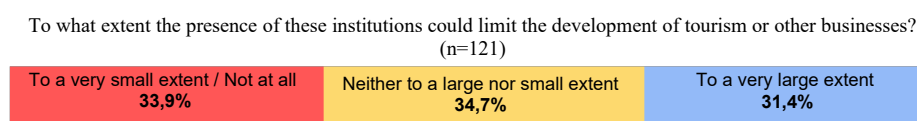


Figure 7: Respondents' perception regarding the extent to which the presence of institutions within the National Defence System may limit the development of tourism or other businesses

is mentioned by only 4.1% of respondents, the lowest percentage among all risk categories.

This finding suggests that, although these institutions are not seen by the community as major economic actors, they are also not perceived as a source of financial pressure on the local budget.

In a comparative analysis, the negative economic impact is marginal compared to concerns related to the environment or social cohesion, reinforcing the idea that the presence of these institutions does not generate significant additional costs for communities.

CONCLUSIONS

The analysis conducted based on the questionnaire, combined with statistical data and official information, highlighted several rele-

From this perspective, the role of these institutions should not be interpreted solely through the lens of constraints, but also as an opportunity to generate stability, infrastructure, and local demand for goods and services, which can indirectly stimulate the economic environment. Therefore, the challenge is to transform

these neutral or slightly skeptical perceptions into positive ones through controlled openness policies, public-private partnerships, and social responsibility projects aimed at multiplying beneficial effects on the community.

The main risks and threats generated by these institutions are:

From an economic perspective, it is notable that the perceived risk of increased maintenance costs for heavily used public infrastructure

vant aspects regarding the impact of the institutions within Romania's National Defence System on urban and regional communities.

Firstly, the results showed that the primary perceived benefit is the increased sense of safety and security within the community (36.4%), confirming that the fundamental role of these institutions is recognized by the population. Nevertheless, a significant percentage (33.1%) believes that the institutions also contribute to local economic development, indicating an increasingly visible perception of their economic dimension. Stimulating the local economy (26.4%) and developing infrastructure (24.8%) further complete the picture of benefits, suggesting that these institutions should not be viewed solely as security actors, but also as entities with structural impact on the community.

Secondly, their role as major employers cannot be overlooked. Data shows that the institutions within the defence system account for approximately 5% of the total employed workforce

flects the tension between their security role and expectations regarding economic visibility; however, the 5.8% who mention attracting investments confirms that the population is beginning to perceive an economic catalyst dimension as well.

Regarding perceived risks and threats, the emphasis falls on environmental aspects (33.1% pollution, 26.4% environmental degradation) and social tensions (26.4%). Nevertheless, the direct economic risk (increased costs for public infrastructure) is mentioned by only 4.1% of respondents. This result confirms that defence institutions are not perceived as generators of economic vulnerabilities, but rather as stable actors whose costs are integrated into state operations.

In conclusion, the findings support the idea that institutions within the National Defence System act as poles of economic and social influence, even if this role is secondary to their primary mission. They contribute to security, but also to community development through

employment, stimulation of local businesses, modernization of infrastructure, and inter-institutional partnerships. The challenge for public policies and urban planning strategies remains to leverage these positive effects while simultaneously reducing environmental and social risks, ensuring the harmonious

integration of security objectives into the sustainable development of urban and regional communities.

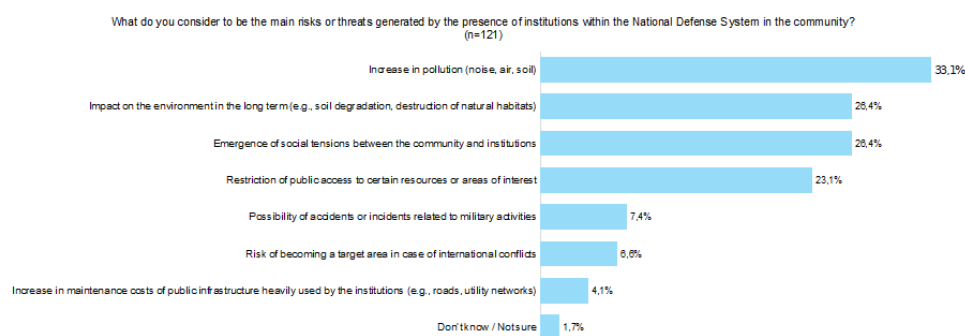


Figure 8: Respondents' perception of the risks and threats generated by the presence of institutions within the National Defence System in the community

at the national level and nearly one-third of all public sector employees. This reality positions them as central economic actors in many communities, with multiplier effects on the private sector through consumption, procurement, and related services.

On the other hand, the analysis of perceptions regarding local prestige shows a fragmented view: 39.7% of respondents believe that these institutions do not contribute significantly, while 33.1% associate them with a positive image, and 24.8% perceive them as symbols of stability and protection. This divergence re-

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Mapping Informal Settlements Using Building Morphology:



A Case Study of Makassar City, Indonesia

Ramdan Pano Anwar, Melanesya Nada Rantetandung, Nurul Istiqamah, Reynata Anugrah, Laszlo Kollányi*

**pano.anwar.ramdan@phd.uni-mate.hu*

Abstract

Rapid urbanization in Indonesian cities has intensified the growth of informal settlements, while existing administrative delineations often fail to capture their actual spatial extent. This study examines the morphology of informal settlements in Makassar City using building footprint-based spatial analysis. Approximately 250,000 building polygons were analyzed and aggregated into a uniform 100×100 m grid to calculate three key indicators: mean rooftop size, building density, and rooftop size variability. These indicators were mapped and compared with the official informal settlement boundaries established under SK Kumuh Kota Makassar 2021. The results show that government-designated informal settlements are generally characterized by small average rooftop sizes and high building density, confirming the relevance of morphology-based indicators. However, most of these areas exhibit low to medium rooftop size variability, indicating internally stable and consolidated settlement structures rather than highly irregular forms. Importantly, extensive areas displaying similar morphological characteristics occur outside the official informal settlement polygons, suggesting that the current administrative deli-

neation underrepresents the spatial extent of informality. Conversely, zones with very high rooftop variability primarily reflect transitional areas where informal settlements intersect with formal residential, commercial, or institutional land uses. Overall, the study demonstrates that grid-based building morphology analysis provides a robust and scalable approach for identifying informal settlement patterns and for critically evaluating official classifications. Integrating such spatial indicators into urban planning frameworks can support more accurate targeting of upgrading programs and evidence-based urban governance in rapidly growing cities like Makassar.

Keyword: Informal settlements; Building morphology; Rooftop size; Grid-based spatial analysis; Building density

1. INTRODUCTION

Rapid urbanization in the Global South has accelerated the expansion of informal settlements, particularly in coastal and riverine cities where land scarcity, environmental risk, and unequal infrastructure provision intersect (Davis, 2006; UN-Habitat, 2015, 2020). In Indonesia, informal settlements (kawasan kumuh) persist despite long-standing upgrading programs, reflecting structural challenges related to land tenure, housing affordability, and uneven urban governance (Firman, 2019; Mineri et al., 2013; Kementerian PUPR, 2021). These settlements are commonly associated with high building density, small dwelling sizes, proximity to waterways, and exposure to flooding and sanitation risks (Marfai et al., 2015; Rusti-

adi et al., 2018; Sareta et al., 2019).

Accurate identification of informal settlements is critical for effective urban planning, service provision, and risk mitigation (UN-Habitat, 2020; Angel et al., 2016). However, informal settlement mapping in Indonesia largely relies on administrative delineations and qualitative field assessments, which are often fragmented, static, and shaped by programmatic priorities rather than continuous spatial analysis (Hudalah & Firman, 2012; Song et al., 2016). In Makassar City, informal settlements are officially designated under SK Kumuh Kota Makassar 2021, yet the spatial validity of these boundaries has rarely been assessed using quantitative indicators of urban form (Pemerintah Kota Makassar, 2021; Rotoni et al., 2025).

Recent research demonstrates that building morphology indicators, such as rooftop size and building density, provide robust proxies for identifying informal settlements across diverse urban contexts (Kuffer et al., 2016; Mahabir et al., 2018; Wurm et al., 2019). Small rooftop sizes reflect incremental self-built housing and constrained land access, while high density captures the compact spatial structure typical of informal settlements in Asian cities (Taubenböck et al., 2018; Angel et al., 2016; Breilsford et al., 2018). Rooftop size variability further reveals internal settlement structure, distinguishing stable informal areas with low to medium variability from urban transition zones characterized by mixed formal and informal development (Taubenböck & Kraff, 2014; Kuffer et al., 2020; Fallatah et al., 2017).

To operationalize these indicators at the neighborhood scale, grid-based spatial analysis has been widely adopted, enabling consistent comparison of urban morphology while reducing sensitivity to individual building outliers (Herold et al., 2005; Batty, 2013; Wang et al., 2021). Despite its effectiveness, such approaches remain underutilized in Indonesian informal settlement studies, which continue to emphasize socio-economic surveys over quantitative spatial morphology (Rukmana, 2015; Song et al., 2016).

This study applies a 100 × 100 m grid-based

analysis of building footprints in Makassar City, using average rooftop size, building density, and rooftop size variability to examine informal settlement morphology and to evaluate the reliability of the official SK Kumuh delineation. By directly comparing morphology-derived patterns with administrative classifications, the study provides evidence that informality in Makassar is more spatially extensive and morphologically nuanced than currently recognized, underscoring the value of data-driven spatial indicators for more inclusive and adaptive urban governance (Glaeser et al., 2018; Duranton & Puga, 2020).

2. MATERIALS AND METHODS

This study was conducted in Makassar City, South Sulawesi, Indonesia, a rapidly urbanizing coastal city where informal settlements commonly develop in inner-city areas and along river corridors (Marfai et al., 2015; Rustiadi et al., 2018). The analysis used approximately 250,000 building footprint polygons representing rooftop geometries across the city, which provide a direct representation of urban physical structure and are widely used in informal settlement and urban morphology studies (Taubenböck & Kraff, 2014; Kuffer et al., 2016). The official informal settlement map established under SK Kumuh Kota Makassar 2021 was used as an administrative reference for comparison (Pemerintah Kota Makassar, 2021).

Rooftop area was calculated for each building footprint, and a uniform 100 × 100 m grid was applied to aggregate building-level attributes at the neighborhood scale. For each grid cell, three indicators were computed: mean rooftop size, building density (total rooftop area divided by grid area), and rooftop size variability (standard deviation). These indicators were classified based on their empirical distributions to produce citywide morphology-based maps, which were then overlaid with the official informal settlement boundaries to assess spatial correspondence and identify mismatches between administrative delineation and observed urban form (Herold et al., 2005; Batty, 2013; UN-Habitat, 2020).

3. RESULT

3.1. Spatial Distribution of Rooftop Size in Makassar City

The rooftop size map shows a clear spatial differentiation of building morphology across Makassar City, reflecting varying residential typologies and levels of urban formality. Rooftops were classified into five categories: extremely small ($<30 \text{ m}^2$), very small ($30\text{--}40 \text{ m}^2$), small ($40\text{--}80 \text{ m}^2$), medium ($80\text{--}150 \text{ m}^2$), and large ($>150 \text{ m}^2$).

Extremely small and very small rooftops ($<40 \text{ m}^2$) are highly concentrated in dense inner-city areas and along river corridors, forming continuous clusters of tightly packed buildings. These areas exhibit irregular layouts, limited open space, and narrow access, which are commonly associated with informal settlements. The spatial continuity of these clusters indicates incremental and self-built housing processes.

Small rooftops ($40\text{--}80 \text{ m}^2$) are the most widespread category and often surround clusters of very small rooftops. This pattern suggests transitional zones where mixed formal-informal housing structures coexist, reflecting gradual morphological change rather than sharp spatial boundaries.

Medium-sized rooftops ($80\text{--}150 \text{ m}^2$) dominate planned residential neighborhoods, particularly in suburban areas, where street patterns and plot sizes are more regular. Large rooftops ($>150 \text{ m}^2$) are sparsely distributed and mainly represent commercial, institutional, industrial, and gated residential developments, appearing as isolated structures rather than part of dense residential clusters.

3.2. Spatial Patterns of Building Density

The building density map depicts the intensity of built-up areas across Makassar City using a

$100 \text{ m} \times 100 \text{ m}$ grid. Density was calculated as the total rooftop area (m^2) within each grid cell divided by the grid area, producing a continuous index that reflects both building size and spatial concentration rather than simple building counts.

Density values were grouped into seven classes, from very low ($0\text{--}0.68$) to extremely high ($8.98++$). Very low and low-density grids are mainly found in peri-urban zones, coastal buffers, wetlands, and areas dominated by large parcels, indicating sparse development and planned land use. Moderate density grids ($1.25\text{--}2.24$) form transitional zones around the urban core, where mixed residential typologies and incremental densification are evident.

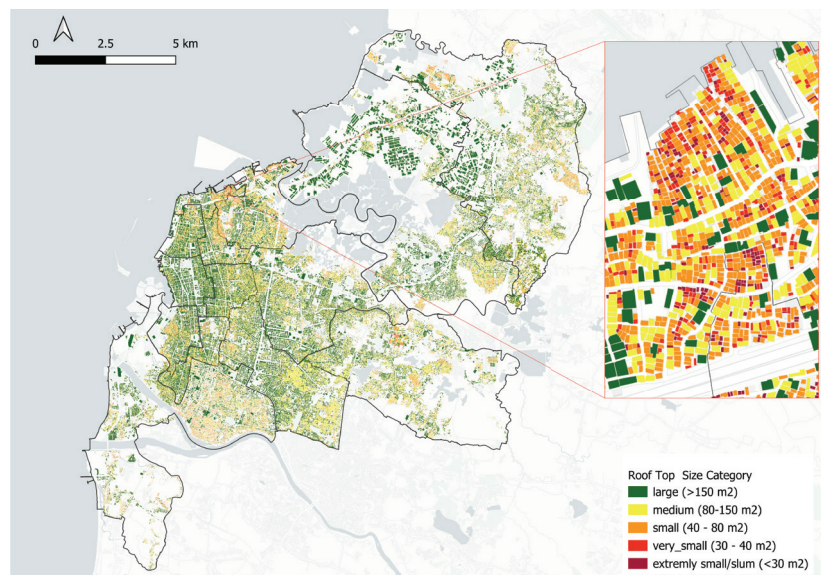


Fig 1: Spatial distribution of rooftop size in Makassar City; *Source: Map created by the authors using building footprint and base spatial data from the Regional Development Planning Agency (Bappeda) of Makassar City (2021).*

High and very high density classes ($2.24\text{--}3.64$ and $3.64\text{--}8.98$) dominate inner-city neighborhoods and river-adjacent areas, characterized by compact building arrangements, minimal open space, and irregular layouts. These spatial patterns closely align with morphological characteristics of informal settlements. The extremely high density class ($8.98++$) appears in localized clusters, particularly along river corridors and older urban cores, representing the most compact built environments in the city. The concentration of these high-density grids underscores a strong spatial association between building density and urban informality.

3.3. Government-Defined Informal Settlement Areas

Figure 3 shows informal settlement areas as officially designated by the City of Makassar under SK Kumuh Kota Makassar 2021. These polygons represent locations formally identified by the municipal government as slum or degraded settlements requiring intervention.

The distribution of these areas is spatially fragmented, with clusters concentrated in inner-city zones and along river corridors, while smaller, isolated polygons appear across peri-

pheral districts. This pattern reflects an administrative and site-based designation approach, rather than a continuous spatial assessment of urban form.

Many designated informal settlements are located near rivers and major roads, highlighting the role of environmental risk and accessibility in the government's classification framework. However, comparison with grid-based rooftop size and building density maps indicates that only a portion of morphologically dense and small-roof areas are captured within the official boundaries.

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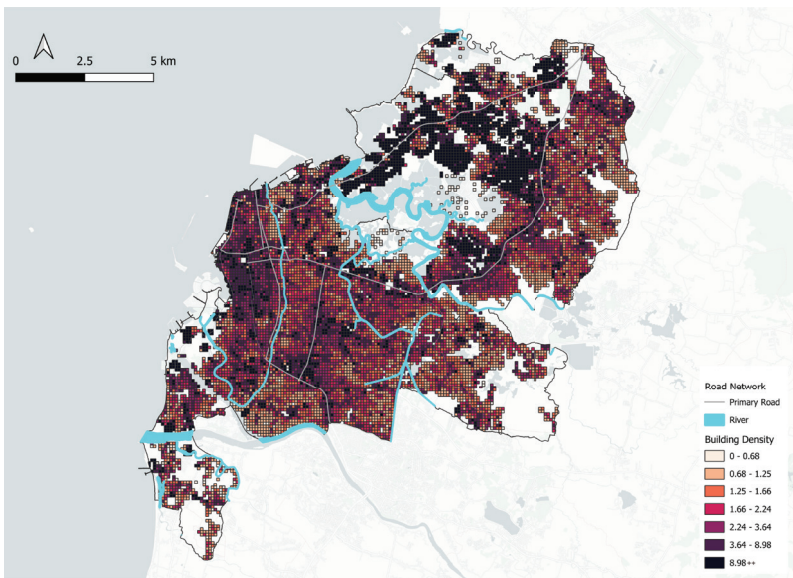


Fig 2: Spatial patterns of building density in Makassar City based on a 100 m × 100 m grid. *Source: Map created by the authors using spatial data from the Regional Development Planning Agency (Bappeda) of Makassar City (2021).*

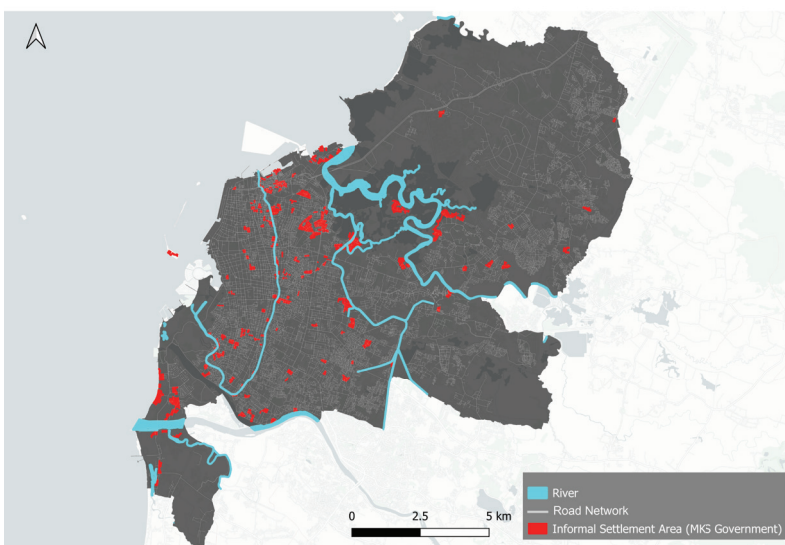


Fig 3: Official informal settlement areas in Makassar City based on SK Kumuh Kota Makassar 2021. *Source: Map created by the authors using spatial data from the Regional Development Planning Agency (Bappeda) of Makassar City (2021).*

3.4. Average Rooftop Size and Official Informal Settlement Delineation

Figure 4 presents the spatial distribution of average rooftop size calculated within a 100 m × 100 m grid and overlaid with the officially designated informal settlement areas issued by the City Government of Makassar (SK Kumuh Kota Makassar, 2021). The map reveals a strong morphological differentiation of the urban fabric based on rooftop size, highlighting clear contrasts between compact residential zones and more formally planned areas.

Grids dominated by small and small-medium average rooftop sizes (0–71 m² and 71–120 m²) form extensive, contiguous clusters, particularly in the western and southern parts of the city and along major river corridors. These areas are characterized by compact building arrangements, limited open space, and relatively uniform rooftop dimensions, which are widely recognized as physical attributes of informal and high-density settlements. Most government-designated informal settlement polygons overlap with these small-roof clusters, indicating a strong correspondence between official classifications

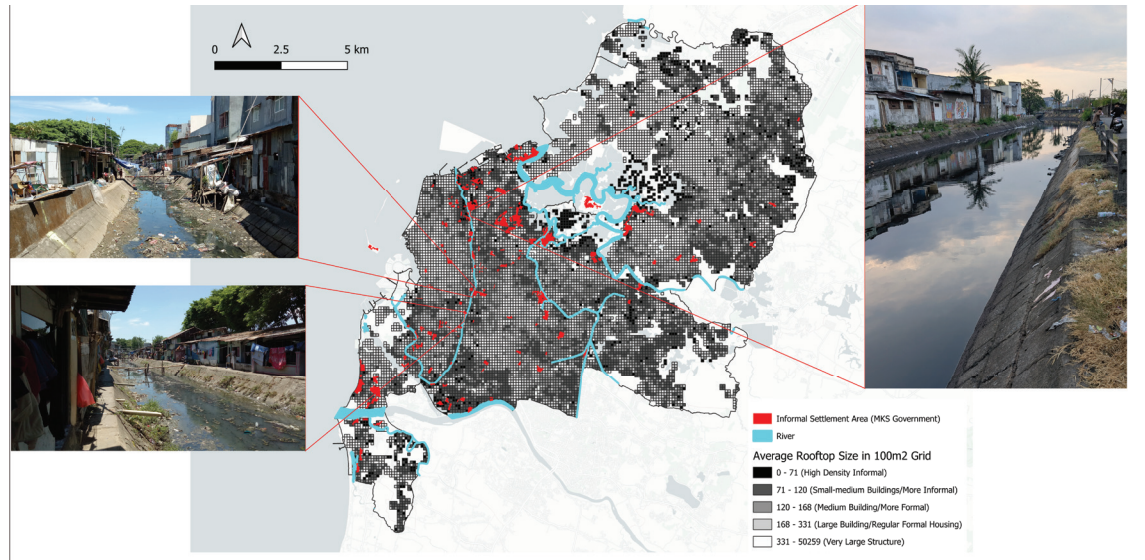


Fig 5: Ground validation of rooftop size patterns using field photographs and high-resolution imagery. *Source: Map created by the authors using building footprint and base spatial data from the Regional Development Planning Agency (Bappeda) of Makassar City (2021).*

and fine-scale building morphology.

At the same time, the overlay reveals numerous areas outside the official informal settlement boundaries that exhibit identical rooftop size characteristics. These morphologically similar zones suggest the presence of informal-like urban fabrics that are not captured by the current administrative delineation. In contrast, grids with medium to large average rooftop sizes ($\geq 120 \text{ m}^2$) are more fragmented and spatially associated with planned residential areas, gated communities, and non-residential functions, while very large rooftops ($> 331 \text{ m}^2$) appear as isolated commercial or institutional structures. Overall, the combined map demonstrates that average rooftop size is an effective morphological indicator for identifying informal settlement patterns and exposes potential underestimation in the existing government-defined boundaries.

3.5. Ground Validation through Field Photographs

Integrates rooftop size mapping with field photographs is shown in Figure 5 to contextualize the spatial patterns observed. Areas identified by the grid analysis as having small average rooftop sizes correspond closely with on-site conditions characterized by narrow housing plots, irregular building arrangements, and proximity to riverbanks and drainage channels. These physical characteristics are consistent with commonly documented features

of informal settlements in Indonesian cities. Conversely, areas mapped with larger average rooftop sizes correspond to visually distinct environments dominated by more regular building layouts, wider plots, and improved infrastructure. The photographic evidence therefore reinforces the validity of rooftop-size-based grid analysis as a reliable proxy for identifying informal settlement morphology, even beyond officially designated areas.

3.6. Rooftop Size Variability and Informal Settlement Morphology

Figure 6 presents the spatial distribution of rooftop size variability, measured as the standard deviation of roof areas within each $100 \times 100 \text{ m}$ grid, overlaid with officially designated informal settlement areas (SK Kumuh Kota Makassar, 2021). This metric captures the degree of morphological heterogeneity within neighborhoods, distinguishing areas of uniform building size from zones where contrasting building scales coexist.

At the city scale, low to medium variability dominates much of Makassar's dense urban fabric. Notably, most government-defined informal settlement areas fall within these low and medium variability classes, indicating that informal settlements are often composed of relatively homogeneous clusters of small dwellings rather than highly heterogeneous building forms. This reflects incremental self-built processes constrained by limited land availa-

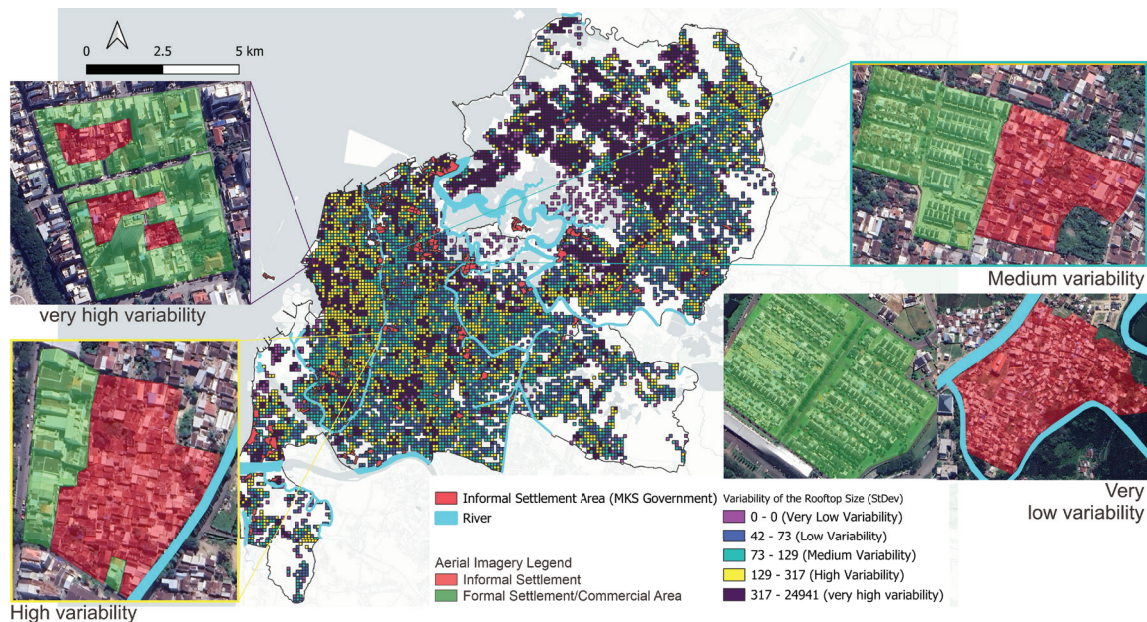


Fig 6: Rooftop size variability and informal settlement morphology in Makassar City. *Source: Map created by the authors using building footprint and base spatial data from the Regional Development Planning Agency (Bappeda) of Makassar City (2021).*

bility, resulting in uniform roof sizes despite informality.

In contrast, high and very high variability clusters appear more fragmented and are frequently located along major infrastructure corridors, river edges, and transitional zones between informal neighborhoods and formal developments. These areas exhibit sharp contrasts in building scale, where small informal houses directly abut larger formal structures, such as gated housing, commercial buildings, or institutional facilities. High-resolution imagery and field photographs confirm these abrupt spatial juxtapositions, which generate elevated variability values.

4. DISCUSSION

The comparison between morphology-based indicators and the official SK Kumuh Kota Makassar 2021 delineation reveals that current government mapping does not fully capture the spatial reality of informality in Makassar. While many designated informal areas align with zones of small rooftop size and high building density, these areas predominantly exhibit low to medium rooftop size variability, indicating internally stable and consolidated settlement patterns. This finding challenges the assumption that informal settlements are morphologically chaotic and suggests that informality in Makassar is often structurally con-

sistent rather than irregular.

More critically, numerous grid cells displaying strong informal characteristics, small average roof sizes combined with high density, lie outside the officially designated polygons, indicating potential under-recognition of informal settlements. Conversely, zones with high rooftop variability tend to mark transition areas between informal and formal development, rather than informal settlements themselves. As a result, reliance on fixed administrative boundaries risks excluding vulnerable areas from upgrading, infrastructure provision, and environmental risk management.

These findings highlight the need for policy frameworks to integrate grid-based, morphology-driven mapping approaches alongside administrative classifications. Incorporating rooftop size, density, and variability metrics would enable more adaptive identification of informal settlements, better reflecting ongoing urban transformation and supporting more equitable, evidence-based urban interventions.

5. CONCLUSION

This study confirms that informal settlements in Makassar can be reliably identified using building morphology indicators, specifically average rooftop size, building density, and rooftop size variability, calculated within a 100 ×

100 m grid. Officially designated informal areas largely coincide with zones of small rooftops and high density, validating the use of rooftop-based metrics. However, most informal settlements display low to medium rooftop variability, indicating morphological stability rather than extreme heterogeneity.

The analysis also reveals clear mismatches between morphology-based indicators and the SK Kumuh Kota Makassar 2021 delineation, with several informal-like areas remaining unrecognized and high-variability zones primarily reflecting transitional or mixed-use environments. These findings suggest that administrative boundaries alone underestimate the spatial extent of informal urbanization. Overall, grid-based building analysis offers a scalable and evidence-based complement to existing policy frameworks.

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JORIS ERNEST VAN WEZEMAEL

Spatial Planning in the Age of Mediation



Joris Ernest Van Wezemael. De Plek Ltd., Switzerland

1. A Planning Paradox

Spatial planning in contemporary cities is marked by a striking paradox. Never have planning systems had access to such extensive data, analytical tools, and formalised participatory procedures. At the same time, never has the legitimacy of planning decisions been so persistently questioned. Across many European contexts, increasing procedural sophistication has gone hand in hand with growing public distrust, escalating conflicts, and a proliferation of appeals and litigation. More participation, more information, and more regulation appear to coincide with less acceptance and weaker collective ownership of spatial decisions (Healey, 1997; Flyvbjerg, 1998; Innes and Booher, 2010).

This paradox cannot be adequately explained by a lack of professional competence, insufficient participation, or declining civic responsibility. On the contrary, planning institutions today are often highly professionalised, legally robust, and normatively committed to inclusivity and transparency. The problem, this chapter argues, lies at a deeper level: in a structural misalignment between inherited institutional logics of planning and the socio-economic conditions under which spatial development now takes place. What is commonly experienced as procedural overload or participatory fatigue is better understood as a form of institutional fatigue — a condition in which governance systems designed to ensure fairness and predictability lose their capacity to generate legitimacy under conditions of heightened complexity, acceleration, and social proximity (Rosa, 2013; Van Wezemael 2010).

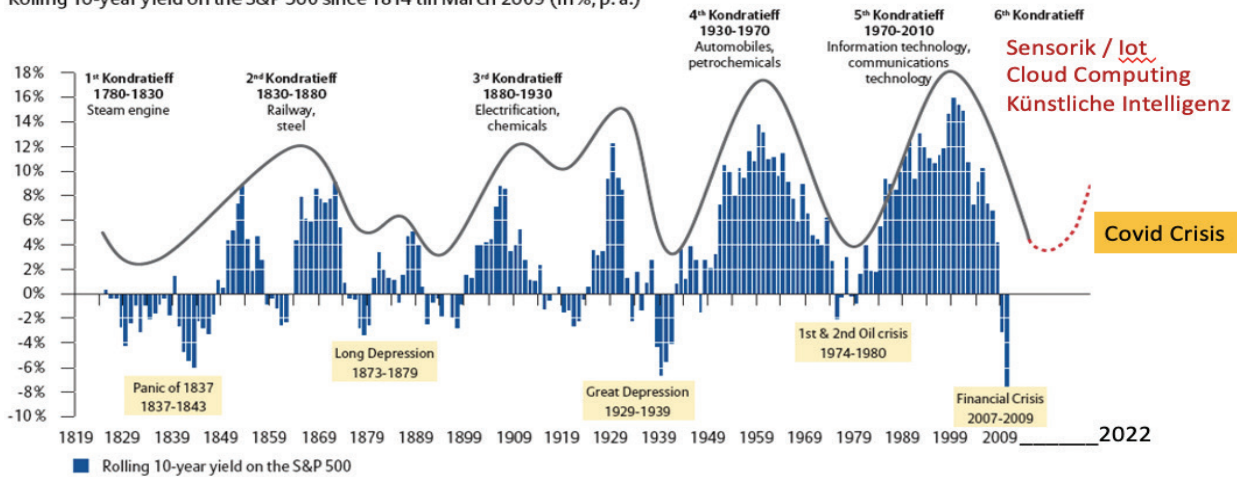
Contemporary planning operates in an environment characterised by inner-city densification, redevelopment, and transformation of already inhabited spaces. Unlike the expansionary planning of earlier decades, today's spatial interventions directly affect established communities, everyday routines, and local identities. As a result, conflicts are no longer marginal disturbances but structural features of planning processes. Yet the prevailing institutional response continues to rely on coordination logics that translate interests into fixed positions, privilege procedural compliance over mutual understanding, and treat conflict as an anomaly to be managed rather than as a resource to be processed.

The central claim of this chapter is that this mismatch is not accidental. Planning systems evolve in relation to broader socio-economic transformations, and their effectiveness depends on how well their coordination logics correspond to the dominant forms of scarcity of their time. Drawing on a long-wave perspective of socio-economic development, the chapter argues that contemporary planning is entering a new phase in which trust — rather than land, infrastructure, or information — has become the critical scarce resource. In this context, legitimacy can no longer be secured primarily through control or negotiation alone. Instead, it must be actively produced through institutionalised fairness and constructive conflict-handling.

The chapter develops this argument in three steps. It first situates spatial planning within a long-wave framework of institutional change. It then traces the evolution of three generations of spatial development, each associated with a distinct coordination logic. Finally, it introduces mediative governance as an emer-

Kondratieff cycles – long waves of prosperity.

Rolling 10-year yield on the S&P 500 since 1814 till March 2009 (in %, p. a.)



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ging institutional response to trust scarcity in the age of densification and digitalisation. The aim is not to propose a normative ideal of consensus, but to outline a realistic and practice-oriented framework through which planning institutions can regain legitimacy by transforming conflict into a productive force.

2. From Long Waves to Institutional Logics

To understand why contemporary planning institutions struggle to generate legitimacy, it is necessary to situate spatial planning within a broader perspective of socio-economic transformation (Schneeberger & Van Wezemaal, 2022). Planning systems do not evolve in isolation; they are embedded in long-term dynamics of technological change, economic organisation, and social coordination. One useful heuristic for analysing these dynamics is the concept of long waves of development, commonly associated with the work of Nikolai Kondratieff and later extended by evolutionary and institutional scholars. In this chapter, long waves are not treated as deterministic economic cycles, but as learning processes through which societies adapt their institutional arrangements to changing conditions of scarcity (Kondratieff, 1935; Schumpeter, 1939; Händler, 2010).

Each long wave is characterised by a cluster of dominant technologies that reorganise production, communication, and everyday life. Crucially, however, these technological shifts also reconfigure what becomes scarce at the societal level. Scarcity, in this sense, does not refer simply to a lack of physical resources, but to the systemic constraints that limit collecti-

ve coordination. When existing institutions are no longer able to address these constraints effectively, their legitimacy erodes, and pressure builds for institutional innovation (North, 1990; Williamson, 2000). Long waves can therefore be understood as periods in which societies repeatedly recalibrate their coordination logics in response to shifting scarcities. Up until the 4th wave scarcity was primarily material. Rapid urbanisation, industrial production, and mass mobility created urgent needs for housing, infrastructure, and functional order. Planning institutions responded by institutionalising directive coordination: command-and-control instruments such as zoning, building regulations, and infrastructure plans were designed to reduce uncertainty through standardisation and hierarchical decision-making. Legitimacy was derived from authority, expertise, and the promise of orderly growth (Faludi, 1973; Hall, 2002).

With the transition towards a knowledge-based and globalised economy in the late twentieth century, material scarcity gradually gave way to a different challenge: the scarcity of coordination under conditions of growing complexity. Deindustrialisation, functional differentiation, and fragmented ownership structures made it increasingly difficult for hierarchical planning alone to steer spatial development. In response, planning systems began to institutionalise cooperative coordination logics. Negotiation, partnership, and dialogue between public authorities, private developers, and civil society actors became central mechanisms for aligning interests and managing un-

certainty. Legitimacy was increasingly sought through inclusion and consensus rather than through authority alone (Healey, 1997). The contemporary situation marks another qualitative shift. While complexity and coordination remain relevant challenges, they no longer capture the core constraint under which planning operates today. Instead, the defining scarcity

Waves	Basic Innovation	Source of Prosperity	Bottleneck
1st–4th Wave	Mechanics, Steam, Electricity, Chemistry	Material Production	Capital & Energy
5th Wave	Information Technology	Knowledge & Communication	Motivation & Values
6th Wave (currently emerging)	Health, Social Competence, Sustainability	Social Trust	Ethics & Social Behaviour

Tab 1: Kondratieff waves according to Hänseler (2010), *Source: Author's own*

of the current phase is trust. Accelerated social change, inner-city densification, and digital mediation have intensified conflicts over space, while simultaneously undermining confidence in institutions' capacity to handle these conflicts fairly. Planning systems now operate in contexts where actors are highly informed, deeply affected, and often sceptical of procedural assurances. Under such conditions, neither hierarchical control nor negotiated cooperation is sufficient to stabilise expectations.

This shift towards trust scarcity has profound implications for institutional design. Trust cannot be commanded, nor can it be fully negotiated on a case-by-case basis. It must be produced structurally, through procedures that are perceived as fair, transparent, and capable of dealing constructively with disagreement.

3. Three Generations of Spatial Development

Directive Planning (Generation I)

The first generation of modern spatial planning emerged in the context of the fourth Kondratieff wave and was closely associated with the industrial growth regimes of the mid-twentieth

century. This period was marked by rapid urbanisation, post-war reconstruction, and the mass diffusion of the automobile. The dominant form of scarcity was material: housing shortages, insufficient infrastructure, and the need to accommodate expanding industrial and residential functions within a limited spatial framework. Planning institutions responded to

these challenges by institutionalising directive coordination logics.

Directive planning was grounded in a command-and-control approach to spatial development. Its core instruments — zoning plans, building regulations, technical standards, and

infrastructure master plans — were designed to impose order, reduce uncertainty, and ensure functional separation. Decision-making authority was concentrated within public institutions, and planners were positioned as expert coordinators acting in the public interest. The legitimacy of planning decisions derived primarily from legal authority, technical expertise, and the promise of efficiency in delivering urgently needed urban development (Hall, 2002; Taylor, 1998). Spatially, this generation of planning produced highly structured urban forms. Functional zoning separated living, working, and leisure, while transport infrastructure enabled extensive suburbanisation and commuter landscapes. Growth was conceived as expansion into largely undeveloped territory, and planning operated at a distance from everyday social conflict. Disputes over land use existed, but they were typically framed as technical or legal issues rather than as questions of social recognition or distributive justice. In this context, the directive model was effective precisely because it aligned with the dominant scarcity of the time.

However, the strengths of directive planning were inseparable from its limitations. Its reliance on fixed plans and hierarchical decision-making assumed a relatively stable and predictable environment. As social differentiation

increased, environmental concerns gained prominence, and economic structures began to change, this assumption became increasingly untenable. Directive planning struggled to accommodate plural values, conflicting interests, and uncertainty. Participation, where it existed, was largely consultative and occurred after key decisions had already been taken. By the late twentieth century, these limitations translated into declining legitimacy. Citizens and market actors alike questioned the capacity of top-down planning to respond to local knowledge, contextual diversity, and emerging socio-economic dynamics. Yet directive planning fulfilled a historically specific and indispensable role. It institutionalised the principle that spatial development is a collective concern requiring public coordination.

Cooperative Planning (Generation II)

The second generation of spatial development emerged as a response to the growing limitations of directive planning in the late twentieth century. This period broadly coincides with the fifth Kondratieff wave, characterised by information and communication technologies, globalised production networks, and increasing social differentiation. While material scarcity became less acute in many urban contexts, a new form of scarcity gained prominence: the scarcity of effective coordination under conditions of rising complexity (Händler 2010). Cooperative planning institutionalised a coordination logic based on negotiation, partnership, and dialogue. Rather than relying primarily on regulatory authority, planning institutions sought to align interests through communicative processes and negotiated agreements. The role of the planner shifted accordingly: from authoritative regulator to facilitator and broker between public authorities, private developers, landowners, and civil society actors (Forester, 1999). This cooperative logic proved particularly effective in contexts of urban transformation rather than expansion. Deindustrialisation had left many cities with brownfields and fragmented urban areas that could not be redeveloped through standardised zoning alone. Cooperative planning enabled flexible, site-specific solutions by integrating market knowledge, public objectives, and local expertise (Healey, 1997). Legitimacy in coope-

rative planning was primarily generated through inclusion and consensus-building. However, cooperative planning retained a fundamentally positional logic. Negotiations often revolved around defending and trading positions rather than exploring underlying interests. When conflicts intensified — particularly in contexts of densification — cooperative processes frequently reverted to adversarial behaviour, undermining legitimacy (Flyvbjerg, 1998; Allmendinger and Tewdwr-Jones, 2002).

Mediative Planning (Generation III)

In this chapter I want to argue that the third generation of spatial development is emerging in response to a qualitatively different form of scarcity: the scarcity of trust. This generation unfolds in the context of the sixth Kondratieff wave, characterised by digital platforms, artificial intelligence, and pervasive data infrastructures. Its defining feature is not technological innovation as such, but the socio-institutional conditions under which spatial development now takes place. Densification and inside growth fundamentally alter the conflict structure of planning. Inner-city transformation directly affects established communities and everyday practices. Planning conflicts increasingly concern fairness, recognition, and procedural legitimacy. Traditional procedures tend to activate positional behaviour, leading to escalation rather than resolution.

Mediative planning responds by institutionalising fairness and constructive conflict-handling. Mediative governance generalises the principles of mediation — interest-based negotiation, neutrality, transparency, and learning — from the micro level of dispute resolution to the macro level of planning systems (Forester, 2009; Moore, 2014). Trust is not assumed as a precondition; it is produced through predictable, credible, and fair procedures (Luhmann, 1979).

Contemporary digital technologies play a decisive enabling role. Digital platforms and AI-assisted tools can reduce information asymmetries and support shared sense-making. When embedded within mediative governance frameworks, such technologies facilitate, incentivise, and stabilise trust-producing behaviour.

Wave	Dominant Scarcity	Institutional Type	Coordination Logic	Collective Capability
4th (ca. 1940–1970)	Energy, Infrastructure	Hierarchical Command-and-Control	Centralised planning, regulation	Discipline, standardisation
5th (ca. 1970–2020)	Information, Complexity	Cooperative Governance	Negotiation, network learning	Communication, knowledge sharing
6th (from 2020 onwards)	Trust, Social Cohesion	Mediative Governance	Simultaneous understanding, commitment	Conflict capability, fairness, resilience

Tab 2: A moder of governance for the 6th Kondratieff wave, *Source: Author's own*

Conversely, where digital tools are introduced without mediative governance principles, they risk accelerating positional behaviour and institutional fatigue rather than mitigating it (O'Neil, 2016; Janssen et al., 2020). Mediative planning reframes trust as a productive force. This trust is neither universal nor permanent; it remains contingent, reversible, and dependent on the continued credibility of institutional procedures. By stabilising expectations under disagreement, trust reduces transaction costs and enables sustained engagement.

Conclusions

Mediative governance redefines planning as the design of fair and reliable processes rather than the mere production of legally robust decisions. Authority derives from the capacity to sustain engagement under disagreement. Four principles operationalise this logic: early integration, neutrality, transparency, and learning. Early integration prevents the escalation of conflict by involving actors before positions harden. Neutrality separates facilitation from decision-making authority. Transparency establishes shared evidence and traceable reasoning, supported by digital tools. Learning enables adaptation over time and sustains institutional credibility (Tyler, 2006;

Ansell and Gash, 2008; Argyris and Schön, 1978). Mediative governance does not promise harmony. It makes disagreement governable and transforms conflict into a source of institutional learning.

For real estate developers, trust scarcity increases transaction costs through delays, objections, and reputational risks. Mediative governance stabilises expectations early and reduces downstream conflict. For public authorities, it

enables decision-making capacity under political pressure and pluralism. Participation becomes qualitative rather than symbolic. Digital tools support transparency and accountability when embedded in mediative frameworks. Trust reduces uncertainty and lowers the cost of coordination (Williamson, 2000; Suchman,

4th Kondratieff Wave: Petrochemistry

Directive (command-and-control)

Democratisation of the automobile
Commuter landscapes and dormitory suburbs



5th Kondratieff Wave: ICT

Cooperative Planning

Globalisation of production chains
City of brownfield redevelopment



6th Kondratieff Wave: IoT, AI, Cloud Computing

Mediative

Platform and sharing economies, self-learning governance systems
Hybrid spaces, alternative facts



Tab 2: A moder of governance for the 6th Kondratieff wave, *Source: Author's own*

1995).

Thus, the crisis of legitimacy in spatial planning reflects institutional fatigue. As scarcity shifts from material resources to trust, planning must evolve from control and negotiation towards mediation. Trust is a productive force that enables coordination under pluralism and uncertainty. Mediative governance institutionalises fairness and constructive conflict-handling, offering a structural response to the dominant scarcity of our time.

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MAXIME CHARREIRE

Market Structure and Housing production in France



There are now more than 7,500 active property developers in France. Such a number may suggest that the development market is highly competitive. However, this apparent atomicity conceals a strong disparity between two groups of actors. On the one hand, a small group of around ten large firms, each employing several thousand workers, accounts for between 28% and 38% of total housing output produced by developers per year. On the other hand, a large number of small developers, most of which employ fewer than ten people, share the remainder of supply. This pronounced heterogeneity among developers raises several important questions : Does it lead to differences in strategies between market leaders and other developers, both in terms of production choices and the location of projects? Does it affect the structure and performance of the development market? Finally, to what extent can these differences be explained by structural factors, such as costs, access to finance, or urban regulation?

Traditionally, the economic literature has tended to view property developers as homogeneous actors operating in a competitive framework (Coiacetto, 2009). More recently, however, several authors have examined heterogeneity among developers and the implications it entails, both for developers' strategies and for market performance (see, for example, Leishman, 2015, or Meijer and Buitelaar, 2023). Our work contributes to this emerging literature.

In a first paper (Charreire, Girard and Lefebvre, 2025), we conducted a analysis at both the national and the Lyon functional urban area levels¹. This two-tiered approach allows us to identify broad, structural patterns of developer heterogeneity at the national scale, while also examining how these patterns translate within

a single functional urban area. Focusing on Lyon further enables us to capture fine-grained spatial dynamics and to relate developers' location choices to intra-urban price gradients and local market conditions.

Developers' Production and Location Strategies under Cost Heterogeneity

The national analysis reveals a clear and consistent pattern of spatial and productive segmentation among developers. The six leading firms² concentrate nearly 65% of their activity in very large functional urban areas (over 700,000 inhabitants) and about 25% in large areas, while less than 10% of their output takes place in small and medium-sized markets. Other developers, although also present in large urban areas, allocate a smaller share of their production there (58% in very large areas) and remain significantly more active in peripheral and intermediate markets (around 19% of their output). This contrast is reinforced within urban areas: over 80% of housing units built by leading developers are located in central municipalities, compared with 68% for secondary firms. Leading developers also implement larger projects, with a median of 48 dwellings per project in central municipalities and 37 in peripheral ones, against 21 and 16, respectively, for smaller developers. Overall, these results indicate that market leaders specialize in dense, high-value territories and large-scale developments, while smaller developers adopt more flexible strategies in less central and less dense markets.

Let us now turn on what we found within the Lyon functional urban area. Studying Lyon allows us to move from a macro to a micro-geographical perspective, examining how developers behave inside a single urban area. It also

gives us the opportunity to integrate spatial price data, since we can now link the location of development projects to average prices per square meter. This allows us to test whether developers' choices are associated with specific price thresholds within the urban area. The Lyon functional urban area includes about 2.2 million inhabitants and 398 municipalities. Its urban structure closely aligns with the monocentric city model. Most activity and population are concentrated in the core — mainly Lyon and Villeurbanne — with densities and prices gradually decreasing toward the periphery. Average prices per square meter over the 2014–2022 period are highest in the city center and along the Rhône–Saône corridor, and decline steadily with distance.

The structure of housing production within the Lyon functional urban area closely mirrors the national configuration. The market is highly concentrated, with a small number of large national developers accounting for approximately 30 to 40 percent of private housing construction over the 2014–2022 period. While both leading and secondary developers are present in central municipalities, their spatial strategies differ markedly. Leading developers concentrate their activity in the most central and dense areas, particularly in Lyon and Villeurbanne, whereas secondary developers are more geographically dispersed across intermediate and peripheral municipalities. These patterns reflect distinct production strategies: large firms specialize in large-scale, capital-intensive projects in high-value locations, while smaller developers operate more flexibly, adapting to local planning constraints and smaller land opportunities. Overall, the local evidence confirms a clear spatial segmentation of housing supply within the functional urban area.

To assess whether these spatial differences are driven by price conditions, we estimate a logit model identifying price thresholds for developer entry. The results reveal a clear hierarchy between firms: over the full period, leading developers are significantly

more likely to be present in municipalities where average prices exceed approximately 2,800 euros per square meter, compared with about 2,450 euros for secondary developers. This gap widens markedly after 2018, as the threshold for market leaders rises to around 4,450 euros per square meter, while that of smaller developers reaches only 3,400 euros. These findings indicate that developers' location choices are governed by non-linear decision rules, with entry occurring once a minimum price level is reached rather than increasing smoothly with prices. Economically, this suggests that large developers selectively target large and high-value operations.

We interpret these findings in light of differences in cost structures between leading developers and other firms. Leading developers operate with lower marginal costs, benefiting from economies of scale, accumulated experience,



Figure 1: Lyon Metropolitan Authority and its CTMs Source: Lyon Metropolitan Authority, Metropolitan Coherence Pact 2021–2026

and better access to finance, but they also face higher fixed costs due to more complex organizational structures. This trade-off—between efficiency and rigidity—helps explain why leading developers tend to concentrate on dense, high-value urban markets, where demand and profitability are sufficient to absorb these fixed costs. Smaller firms, by contrast, typically operate with more flexible organizational structures and lower overheads, making them better suited to smaller or more peripheral markets, where adaptation to local conditions is crucial.

The results of our first paper stop at this point, however; an important empirical fact remains: crossing a price threshold does not imply that leading developers concentrate their activity in the highest-priced municipalities. As evidenced by the limited number of operations launched by market leaders in some high-price areas of the inner suburban ring such as the north-western municipalities of the Lyon metropolitan area, price conditions alone cannot fully account for the observed spatial patterns. This discrepancy suggests that additional constraints—beyond market prices—shape developers' location and production choices. Motivated by this observation, our subsequent analysis therefore shifts focus toward local urban planning regulations, which may restrict density and project size, and thus play a central role in structuring housing supply within the Lyon Metropolitan Authority.

Developers' Production and Location Strategies under Planning Regulation

The Lyon Metropolitan Authority comprises more than 1.4 million inhabitants and brings together 58 municipalities, which are organized into nine Territorial Conferences of Mayors (CTMs).

In 2019, it adopted a new Local Urban Development Plan (PLU-H), which constitutes the central regulatory framework for urban development. This document defines buildable zones, sets urban planning rules, and more broadly guides land-use and spatial development. It specifies, for instance, maximum building heights in certain areas or delineates protected natural spaces. In practice, the PLU-H strongly shapes the urban landscape and living environ-

ment and is binding on all actors, as it directly governs the allocation of building permits.

In its strategic orientations, the PLU-H of the Lyon Metropolitan Authority reaffirms the ambition to enable an average annual production of 7,500 housing units and to spatially concentrate this production in the central, southern, and eastern parts of the metropolitan area. This objective is reflected in the spatial organization of planning instruments, for instance through the concentration of Urban Project zones (UPr) in these territories. Explicitly delineated in the zoning maps and regulatory documents of the 2019 PLU-H, UPr zones correspond to a finite set of strategic redevelopment sites—such as Part-Dieu, Confluence, Gerland, and La Soie. They are specifically designed to accommodate large-scale and complex development projects, by providing a flexible regulatory framework suited to high-density, mixed-use, and capital-intensive operations, thereby supporting the metropolitan housing production strategy.

As expected, at the metropolitan level we observe patterns similar to those identified at the scale of the Lyon functional urban area³. National market leaders account for a substantial share of housing production. Among the five developers that produced the largest number of dwellings between January 2020 and June 2025, four are national leaders (Altarea, Vinci, Bouygues, and Nexity). Together, these firms alone account for 27.93% of the total housing production carried out by developers over the period. However, substantial differences in housing production can be observed across CTMs, as illustrated in Table 1.

Total private housing production is substantially higher in territories where the PLU-H allows for denser and larger-scale development projects. Yet these areas, which largely coincide with the central, southern, and eastern parts of the Lyon Metropolitan Authority, not only concentrate housing output but also attract a disproportionate share of national leading developers' activity. For instance, in the Porte des Alpes CTM, located in the eastern part of the metropolitan area, the four national leaders account for more than 42% of total housing production. By contrast, in the Val d'Yzeron CTM, situated in the western part of the metropolitan area—where planning regulations



are more restrictive and large-scale projects scarcer—the same four firms account for only about 21% of total production. These contrasts illustrate that leading developers tend to concentrate their activity in territories where the PLU-H enables projects of sufficient scale. We

market. Nevertheless, the evidence presented here indicates that such mechanisms are both theoretically and empirically plausible, thereby providing a strong motivation for future research along this line of inquiry.

Territorial level	Housing units produced by the Top 4 developers	Total housing units produced (all developers)	Share of housing units produced by the Top 4 developers (%)
CTM01 - Lyon	1655	5414	30,6
CTM02 - Îles et Coteaux du Rhône	197	1041	18,9
CTM03 - Ouest Nord	213	848	25,1
CTM04 - Plateau Nord	541	1305	41,5
CTM05 - Porte des Alpes	1120	2645	42,3
CTM06 - Les Portes du Sud	469	2974	15,8
CTM07 - Rhône Amont	630	2408	26,2
CTM08 - Val de Saône	151	1188	12,7
CTM09 - Val d'Aixeron	380	1796	21,2
CTM10 - Villeurbanne	726	2078	34,9
Metropolitan area (total)	6179	22118	27,9

Source: Sitgadel2, authors' calculations

Table 1: Housing Supply Concentration in the Lyon Metropolitan Area: The Top Four Leading Developers at the Metropolitan and CTM Levels, January 2020 - June 2025

interpret this result as reflecting underlying differences in cost structures across developers. Owing to their cost structure, leading developers can operate profitably only when local planning regulations allow for projects of sufficient density to ensure adequate returns. When these conditions are met, leading developers tend to intensify their activity within the area, capturing a larger share of available land and, in turn, partially crowding out smaller developers, whose more limited scale constrains their ability to compete for such projects. As a result, market concentration is significantly higher in these areas, as reflected by elevated CR4 values.

Overall, these preliminary results suggest that the PLU-H not only shapes the location strategies of leading and smaller developers in different ways, but also indirectly affects local market concentration by channeling large-scale development opportunities toward specific parts of the metropolitan area. At the same time, the present findings do not allow us, at this stage, to establish whether—and to what extent—urban planning regulations causally influence developers' strategies, nor whether they may, in some contexts, give rise to anti-competitive effects within the development

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ZDEŇKA HAVLOVÁ, JAN KRTIČKA

Public Amenities Analysis and Planning in Prague



Ing. arch. Zdeňka Havlová, Ph.D.

Mgr. Jan Krτίčka

Prague Institute of Planning and Development

havlova@ipr.praha.eu

krticka@ipr.praha.eu

Abstract

The accessibility and availability of public amenities play a fundamental role in shaping the quality of life of urban populations. This raises two essential questions: how can accessibility be effectively assessed, and how can cities be planned in ways that enhance it? The Prague Institute of Planning and Development systematically monitors key categories of public amenities and conducts annual evaluations of their spatial accessibility and capacity availability for the city's residents. Beyond this monitoring role, the Institute also contributes to the planning of new urban districts, where the provision of adequate capacities and appropriate locations of public amenities constitutes a critical element in negotiations between the city and private developers. This paper shows the relationship of public amenities analysis and planning with finance allocation decision making in Prague.

Introduction

The accessibility and availability of public amenities play a fundamental role in shaping the quality of life of urban populations. This raises two essential questions: how can accessibility be effectively assessed, and how can cities be planned in ways that enhance it? The Prague Institute of Planning and Development systematically monitors key categories of public amenities and conducts annual evaluations of their spatial accessibility and capacity availa-

bility for the city's residents. Beyond this monitoring role, the Institute also contributes to the planning of new urban districts, where the provision of adequate capacities and appropriate locations of public amenities constitutes a critical element in negotiations between the city and private developers. This paper shows the relationship of public amenities analysis and planning with finance allocation decision making in Prague.

First, we delve into the aspects of analysis and monitoring. We introduce the Prague Population and Public Amenities Prognosis, a yearly study conducted by the Office for City Analysis at Prague Institute of Planning and Development, which serves as an important foundation for urban planning documents, urban studies, development projects in Prague, decision-making, and other activities concerning the development of the city. To add more the knowledge of public amenities in Prague, we add proximity analysis in connection with residential density and street network quality in the 15min Prague project. Lastly, we discuss the subject of availability of funds for the development of new public amenities in the city.

Second, we move on to the planning aspects of public amenities. We introduce how public amenities figure in urban planning documents, such as the zoning plan and urban studies. Another possible avenue the city and municipal parts have to influence the development of amenities are planning contracts, a new tool recently added to legislature. Through this tool, cities can at least partially capture the value created by the development of their own territory.

Prague Population and Public Amenities Prognosis

The main objective of the project Population and Public Amenities Prognosis for Prague is to assess the current state and future needs of selected types of public amenities in Prague as a whole and within smaller territorial units – municipal parts, balanced territorial units (divisions of larger MPs into smaller parts), and administrative districts (ADs), based on a population analysis and prognosis. The project is carried out in accordance with Resolution No. 757 of the Prague City Council dated April 11, 2022. The 2024 version is the second update of the project, which is expanded and supplemented annually. The project builds upon the long-term work of IPR Prague, focusing on demographic development, access to public amenities, or the continuous update of the Planning Analytical Materials (PAM) of the City of Prague.

The evaluation primarily addresses the question of whether public amenities will remain accessible to residents in the future, assuming no new facilities are built. We compare the estimated future population for 2030 and 2050 with the current availability of public infrastructure. The analysis also takes into account proposals for future construction, particularly in the education sector, where we use detailed data on proposals collected for this project. For other types of amenities, we use data from the PAM (Planning Analytical Materials), primarily for the contextual interpretation of the results of the accessibility analyses.

The project outputs are presented in a comprehensive study (IPR Praha, 2025), which consists of 10 chapters, and through the project's public website¹. The site includes 16 individual thematic dashboards (for each of the analysed types of public amenities), which allow for interactive comparisons between the current state of public amenities availability and predictions for 2030 and 2050. The data in each dashboard is displayed for all of Prague, and with the help of a map or list selection, it is possible to display the data for individual municipal parts or administrative districts, or for a group of terri-

torial units through a combined selection.

The primary finding of the project is the expected growth in population, which will significantly affect the future accessibility of public amenities. According to the developed population prognosis (done through the cohort-component method), the number of inhabitants in Prague is projected to increase by nearly 300,000 by the year 2050. It is therefore essential to plan the construction of new public amenity infrastructure, with the most critical situation found in the areas of education and social services. If current real capacities of schools established by the Capital City of Prague and the municipal parts were to remain unchanged, and the projected population growth according to the demographic prognosis were to be fulfilled, by 2050 there would be a shortage of over 10,000 places in primary schools, nearly 17,000 in kindergartens, and 12,500 in secondary schools. The current and future status of public amenities varies across individual municipal parts and balanced territorial units (BTU).

The current level of provision of polyclinics, general practitioners for adults, and general practitioners for children and adolescents is assessed as satisfactory. A moderate decline and a shift toward a limited level of service can be expected by 2050, in the context of population aging and increasing demand for healthcare services. The number of seniors aged 80 and over is projected to increase by 79% between 2023 and 2050. In addition to the growing need for accessible beds in retirement homes and homes with a special regime, demand will also rise for the development of field-based services that provide care to seniors with higher levels of independence. At the same time, the need to support informal care—capable of partially substituting field-based services—will increase. The current state of burial infrastructure is sufficient and stable at the citywide level. Nearly half of Prague's burial capacity is concentrated at Olšany Cemeteries and their immediate surroundings, which leads to the centralization of burial infrastructure and limited accessibility of cemeteries in other municipal parts. Overall, the availability of other observed types of public amenities can be considered good at the citywide level, though there are localized deficits.

¹ Available in English at the web address: uap.iprpraha.cz/pov

Prague as a 15min City

Originally theoretical concepts of walkable, multifunctional, compact and diverse cities are nowadays widely applied in the practice of urban design and planning agenda. Within their scope, much attention is focused on land use and public amenities, i.e., the location and level of spatial accumulation of various activities within the urban fabrics. However, we argue that there is a lack of connection between theory and practice.

Is Prague a 15-minute city? We have established an innovative framework for assessing public amenities within the context of the 15-minute city concept for the application in urban planning, promoting sustainable development initiatives and informed planning decisions. The theoretical concepts of walkable, mixed-use, and compact cities are now widely integrated into urban planning and design, and at the same time serving as foundational elements of the 15-minute city concept. These frameworks emphasize the spatial distribution and accessibility of essential public amenities

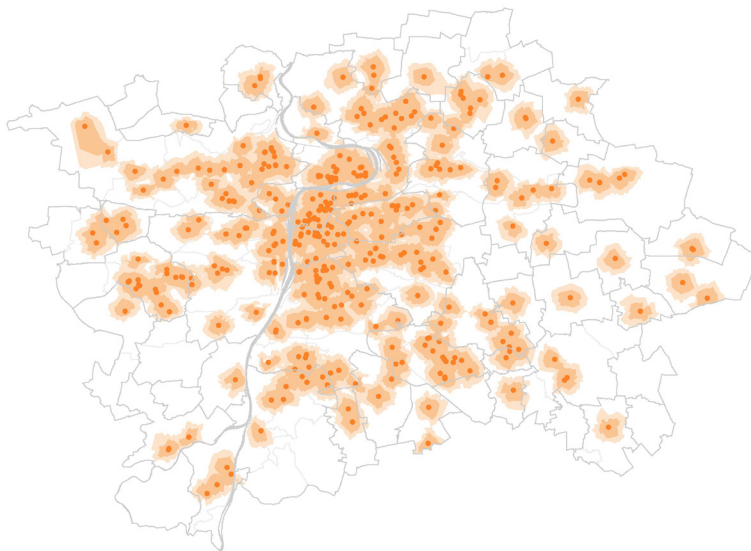


Image 1: Walking distances to amenities. Two levels (ideal + acceptable)

in relation to urban density and walkability.

While current models effectively identify spatial deficits in public amenities, they fall short in diagnosing whether these deficits are due to the absence of facilities, poor street network connectivity or are related to low population density. In the case of Prague, we have defined

a common spatial unit of analysis that is granular, continuous and internally consistent; operationalized the concepts of public amenities accessibility, population density and street network connectivity; applied these concepts in a novel composite model that keeps the multi-dimensional essence of the concept; integrated this model into an open and interactive web application².

Our experiences in the usage of the results indicate that the accessibility of public amenities is limited and spatially diversified and that in many areas, improving the connectivity of the street network itself can enhance the accessibility of public amenities, thereby saving public funds.

Future Developments of Public Amenities

When we look at the missing amenities, especially the fundamental one that should be provided by the municipality, such as education infrastructure, early provision of these facilities is critical. In 2050, there will be 116 missing kindergartens, 13 primary schools, 23 high schools, 3160 beds in kindergarten homes and so on.

The burden of funding these will expectingly fall on the municipal parts of Prague, therefore, after a pilot survey in May 2023, the members of Prague Council have asked the Prague Institute of Planning and Development in monitoring the plans of future development yearly. In the most recent results, the planned amenities would significantly lower the looming risk of deficits, and in some cases, might even solve it. Within the plans of 57 Prague municipa-

lities, there are currently 119 kindergartens, 104 primary schools, and 7 high schools.

These numbers could significantly ameliorate the situation if it wasn't for the financial aspects.

² Available in English at the web address: uap.iprpraha.cz/Praha-15min

Due to the subsidy system set up by the Ministry of Education, Prague cannot access some of the funds allocated at the state level for the building of new education infrastructure. The funding then has to come from the municipal and city level, which can be more challenging, as is seen in the **small percentage of funds already secured** for the new infrastructure mentioned above. From the total of 35 billion Czech Crowns in expected costs, only 2 billion were already secured as of October 2025.

Public Amenities in Zoning plan and Urban Study

Basic requirements for public amenities are already defined at the general level of the zoning plan — both in the current zoning plan and in the newly prepared zoning plan (the so-called Metropolitan plan), which is currently undergoing the public hearing process and is expected to take effect next year.

The zoning plan is a city-wide legally binding document. The current zoning plan typically defines basic requirements either by designating specific areas for public amenities or by

providing indicative point locations (Institut plánování a rozvoje hl. m. Prahy, 2025). The Metropolitan Plan employs both of these methods but additionally introduces the possibility of defining requirements through parameters set for individual development areas—specifically parameters defining the minimum share of the total area allocated to public amenities (Institut plánování a rozvoje hl. m. Prahy, 2025).

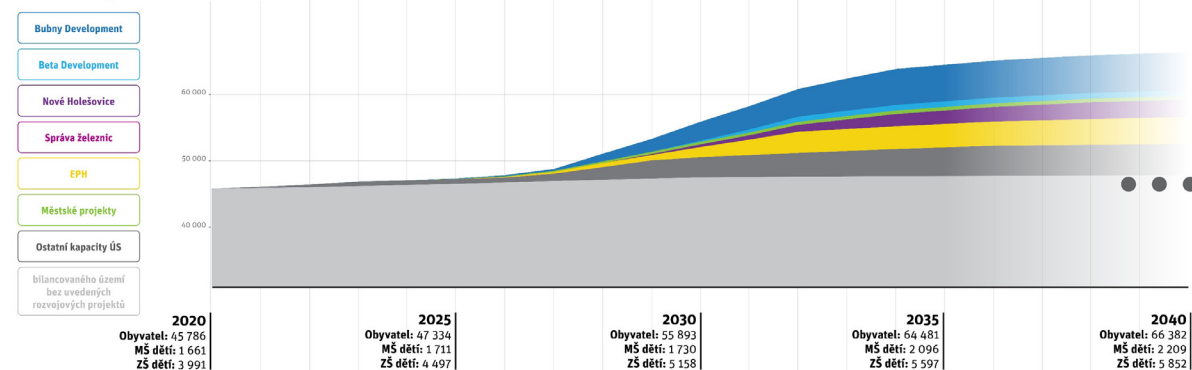
While the zoning plan establishes minimum binding requirements, more precise and detailed tools are needed to correctly locate and dimension public amenities. One such tool frequently used in Prague is the urban study. Urban studies define the basic layout of public spaces, urban blocks, parks, and public amenities.

At this scale, general requirements defined in the zoning plan can be translated into specific land parcels suitable for public amenities, or parts of individual urban blocks can be reserved for particular uses. When determining the size and placement of individual facilities, we rely on standards for appropriate accessibility and capacity for different types of pub-

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MODEL VÝVOJE POČTU OBYVATEL



MODEL ROZVOJE KAPACIT VYBAVENOSTI

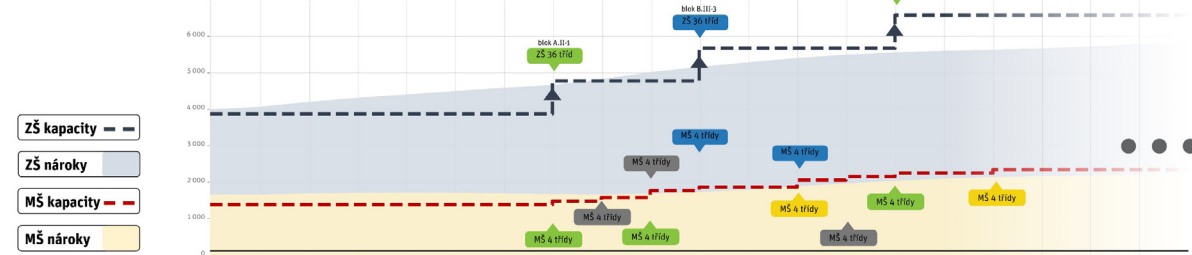


Image 2: Population growth model for Bubny Development and amenities capacity

lic amenities. At this more detailed level, it is possible to better assess whether a given area needs to increase school capacities, add care homes for the elderly, or, for example, establish a new library.

The capacities of public amenities are proposed primarily based on the projected numbers of new residents. We also take into the account the current situation based on analysis and expected demographic development of the area (Institut plánování a rozvoje hl. m. Prahy, 2024), to ensure that planned capacities adequately reflect anticipated changes. For key development areas, population growth is modelled and the adequacy of planned public amenity capacities—most commonly primary schools and kindergartens—is assessed.

Planning contracts

However, even an urban study remains only a plan: it establishes a framework but does not guarantee that public amenities will actually be built or that sufficient funding will be secured. For this reason, Prague has in recent years begun to formalize development agreements through planning contracts.

These contracts not only confirm the rules established by the urban study but also legally bind involved parties (the city, the city district, and the investor) to fulfil the obligations defined in the planning contract — very often addressing precisely the issues of public amenities development.

The fulfilment of such contracts ensures that the investor—whose land value increases through change of the zoning plan—returns part of this added value back to the area (as a kind of land-value capture mechanism).

This can be achieved through financial contribution, through transfer of plots of land to the city, or even through the complete construction of a public facility and its subsequent handover to the municipality.

It is a tool that already works under the current zoning plan (alongside its numerous changes), but its full potential will be realized mainly with the new zoning plan (Metropolitan plan),

where this mechanism is fully integrated into its design.

Since 2022 Prague has completed more than 20 planning contracts (Magistrát hl. m. Prahy), with dozens more in preparation. Through each contract, the city gains hundreds of millions of Czech crowns, a substantial portion of which is directed toward the development of public amenities.

It is important to note, however, that even so, the fulfilment of planning contracts represents only a fraction of the total costs associated with urban development (including technical infrastructure, transport, public spaces and public amenities). For example, investments required solely for primary schools and kindergartens in a new residential neighbourhood exceed what can typically be obtained through planning contracts alone.

Economic aspects of new neighbourhood development

Nevertheless, planning contracts provide significant support for the city and help to partially offset the weaknesses of the Czech system of fiscal redistribution between the state and municipalities.

Czech cities have very limited fiscal autonomy and receive only a small share of the direct financial benefits generated by development within their territories (Bouchal, Petr, a další, 2020) — especially when compared to the development-related costs they are required to bear.

Planning contracts thus represent a mechanism through which the city can at least partially capture the value created by the development of its own territory. Although this tool is not without limitations, it is extremely valuable in supporting the development of public amenities—particularly given the overall scarcity of municipal financial resources.

Conclusion

In this paper we have shown why such emphasis is placed on the accurate analysis of current needs and the modelling of future demands. The significant costs associated with constructing and operating public amenities are well recognized, and efforts are made to ensure that these facilities are appropriately sized and optimally located. The goal is to achieve a system in which public amenities are both easily accessible to residents and financially sustainable for local governments

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Conference partners

Association for Real Estate Market Development ARTN

www.artn.cz



The Association for Real Estate Market Development (ARTN) is a non-profit civic association whose members are leading representatives of real estate development and investment companies, real estate, legal and consulting firms, banks and other organizations active in the market, as well as leading representatives and senior management of public administration. The intention of the association is to bring together teachers and university students interested in this field.

Thanks to its diverse membership base, which today includes more than 100 leading personalities active in all areas of the real estate market, ARTN represents a grouping unique in its universal competence, which in this sense is unparalleled in the Czech Republic.

Association of Developers AD

www.wedevelop.cz



The Association of Developers was established to have an open dialogue about the responsible role of developers in the development of modern society and their positive contribution within the professional and social community. The members emphasize the maintenance of strict ethical rules. They strive to ensure that developers treat their clients and the public sector responsibly and sensitively and that the reputation of developers in Czech society is gradually repaired.

The Prague Institute of Planning and Development (IPR Praha)

www.iprpraha.cz

The Prague Institute of Planning and Development (IPR Praha) is the main conceptual workplace of the City of Prague. The IPR Praha is the main department of architecture, urban planning, development, design and administration of the city. It prepares strategic planning, urban planning and territorial development documents. The Institute is the founder of the Centre for Architecture and Urban Planning (CAMP), whose main mission is to improve the public debate on the development of Prague. It is a basic source of clear and accessible information about the present and future of the capital city and functions as an open platform, a „base camp“ for everyone interested in joint planning and development of Prague.



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auúp

Association for Urban Planning (AUÚP ČR)

www.urbanismus.cz

AUUP CR is a voluntary association of professionals involved in the creation and regulation of urban development, rural settlement and landscape. The members of the association strive for a better involvement of urbanism and spatial planning in the wider social context, for the improvement of the professional level of urban planners and the quality of their work, for the sharing of ideas and experience. As an independent and non-political organisation, it strives to be a professional background for public administration.

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Kontaktní adresa: Thákurova 9, 166 34 Praha 6 – Dejvice

Tel.: +420 22435 6325

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