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Urban mega projects on the rise: spatial and temporal shifts in urban development (1976–2020)

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Research on urban mega-projects (UMPs) has primarily focused on their characteristics, stakeholder dynamics, and social and environmental implications, often using qualitative descriptions, while their spatial and temporal patterns remained underexplored. This study aims to address these gaps by defining distinct types of UMPs and establishing threshold values for each; presenting an urban-intensity index developed to highlight the role of market-driven, neoliberal urban development approaches in shaping the nature, location, and impact of these projects on the urban environment; and analyzing UMPs' temporal and spatial distribution patterns across the Tel Aviv metropolitan area. A unique database of all UMPs constructed between 1976 and 2020 in that area was used in this examination. Through GIS mapping and analysis, the study investigates the development of these large-scale projects at macro (metropolitan) and micro (urban) levels. The findings reveal that while UMPs are not a new phenomenon, they have surged in prevalence over the past 2 decades, with 88% of projects completed since 2000, 77% of those since 2000 are classified as high-intensity. Spatially, 67% of UMPs are concentrated in Tel Aviv and adjacent cities, while 35.7% are located outside the metropolitan core, including 32% in neighboring cities. This study makes a threefold contribution: it introduces a quantitative, longitudinal approach to UMP research, establishes threshold values for smaller countries, and develops a novel index designed to assess the urban intensity of high-rise UMPs. Its extensive database and findings offer valuable insights for both stakeholders involved in UMP planning and development.

KEYWORDS

neoliberal city, Tel Aviv, urban intensity, urban mega projects, vertical urbanism

Introduction

Research on urban mega-projects (UMPs) has grown significantly in the past 2 decades, mostly dealing with their high cost and collaboration between stakeholders required for their development (Flyvbjerg et al., 2003; 2014; 2017; Lauer mann, 2018; Orueta and Fainstein, 2008). Reflecting post-modernist and globalist planning ideology, these projects are characterized by large-scale, mixed-use developments and vertical urban density (Datta and Shaban, 2017; Forouhar and Hasankhani, 2018; Harrison and Hoyler, 2015; Lehrer and Laidley, 2008; Mylonas and Xenidis, 2018).

The literature on UMPs has focused on three major themes: First, their physical characteristics and impact on the urban environment, among other

things in terms of urban morphology, the proliferation of mixed-use development, and increased pressure on infrastructure and services (Cai et al., 2022; Flyvbjerg, 2014; Flyvbjerg, 2017; Kazimierczak and Kosmowski, 2017; Lauer mann, 2018; Orueta and Fainstein, 2008). Second, the complex dynamics between stakeholders, shaped by conflicting interests, strategic partnerships, and occasional disputes (Enright, 2016; Salet, 2008; Schindler, 2015). Third, their social and environmental implications, such as shifts in quality of life and demographic composition (Majerowitz and Allweil, 2019; Söderlund et al., 2017; Avni and Teschner, 2019).

Despite this significant advancement, three key limitations of UMPs research persist, which are addressed by the current study. First, the topic has thus far never been approached quantitatively. To the best of our knowledge, this study constitutes the first attempt to offer a quantitative operational definition of UMPs in Israel, providing a measure of their environmental impact based on urban intensity. Using an extensive database, threshold values were established to map the phenomenon at the metropolitan level. Second, existing literature largely relies on single case studies from the Global North—Europe, North America, and East Asia (Datta and Shaban, 2017; Delphine and Spit, 2019; Flyvbjerg, 2014; Flyvbjerg, 2017; Lauer mann, 2018), while this study examines multiple UMPs in Israel, enabling a comparative analysis of their characteristics and spatial and temporal trajectories. Finally, conventional 'static' methodologies limit understanding of UMPs' evolution. To address this, we employ a dynamic methodology combining quantitative tools with a longitudinal qualitative analysis over 4 decades. A recent study by Raj et al. (2025), similarly employed mixed methods to examine the superblock model for redevelopment in Dhaka, Bangladesh, showing how combining quantitative and qualitative approaches enhances the understanding of urban spatial impacts. The current study not only further bridges existing methodological gaps, but also lays the groundwork for advancing comparative research and informing urban planning practices worldwide.

In Israel, while UMPs appear in both large and small cities, they are especially concentrated in the Tel Aviv metropolitan area, with notable examples such as the Jaffa Port redevelopment in Tel Aviv and the Ha'Elef district in Rishon Leziyyon (Avni, 2017; Weinberg et al., 2019) respectively. Due to limited land reserves, many UMPs in the Tel Aviv metropolitan area are built vertically, illustrating principles of vertical urbanism (Shoken, 2019; Margalit, 2009; 2013). Despite the growing presence of UMPs of all types, local research has remained limited, lacking quantitative, temporal, and spatial analysis, and has primarily addressed their social and environmental impacts (Avni, 2017; Avni and Teschner, 2019; Majerowitz and Allweil, 2019). To address these gaps, the current study introduces the first application of theoretical concepts for characterizing UMPs by establishing threshold values for their various types, including the development of a quantitative index to assess the urban intensity of large-scale initiatives. Describing the phenomenon of high-rise development as "towers blooming in the air," Margalit (2013) illustrates how these projects reflect broader political, economic, and cultural shifts within the city. Inspired by these insights, the study frames UMPs as central expressions of vertical urbanism, and situates vertical development within a neoliberal urban context, where private entrepreneurship, land financialization, and urban policy enable

and reinforce verticality across the urban landscape (Majerowitz and Allweil, 2019). Investigating their spatial and temporal development in the Tel Aviv metropolis, focusing on projects built between 1976 and 2020, the study aims to characterize, map, and explain their development patterns. The paper consists of four sections: a review of UMP literature, focusing on characteristics, stakeholder relationships, and social/environmental impacts; an outline of the research methodology and unique database; a presentation of regional and temporal UMP patterns, analyzed within Israel's economic, social, and cultural context; and a discussion of the study's theoretical, empirical, and policy implications, with suggestions for future research.

Urban mega-projects: a theoretical review

Contemporary urbanism is characterized by a clear shift from horizontal to vertical development, in which the urban fabric is designed according to a three-dimensional logic that stacks residential, commercial, and employment functions along a vertical axis. As Verbakel (2018), verticality is not merely a response to land scarcity, but a planning paradigm that produces spatial intensification by layering new urban strata onto existing ones. Extending this framework, Lin (2018) frames vertical urbanism as a three-dimensional city, in which infrastructure, transportation, ecology, and public spaces are integrated vertically within a multi-layered urban organism. This approach highlights that vertical urbanism employs vertical mega-structures not merely as prominent landmarks, but as instruments for achieving integrated, functional, and socially dynamic urban environments, allowing for locally adapted solutions that foster social and ecological benefits.

Within the research framework of vertical urbanism, the term UMP, used since the 1980s, refers to a large-scale urban development project involving public and private actors and diverse land uses (Altshuler and Luberoff, 2003; Lehrer and Laidley, 2008). Also called large urban developments, or strategic projects (Flyvbjerg, 2014; Salet, 2008; Weinberg et al., 2019), they dramatically alter the urban landscape (Lauer mann, 2018; Orueta and Fainstein, 2008). Mega projects are justified primarily by two advantages: economic benefits at urban and metropolitan levels, improving real estate value and global competitiveness (Avni and Teschner, 2019; Gold and Gold, 2008; Lehrer and Laidley, 2008); and their potential to transform urban areas into cultural landmarks, attracting residents, investors, and tourists (Jones, 2017). Del Cerro Santamaría (2020) highlighted that UMPs not only enhance local identity but also provide event venues, thereby enriching the cultural landscape. Additionally, they attract international attention and tourism, promoting cultural exchange and preservation of cultural heritage through innovative architecture. Beyond their cultural and economic rationales, UMPs exemplify the principles of neoliberal urbanism, a planning approach in which market logic and investment priorities guide urban governance. In this context, vertical projects are not merely physical interventions but also instruments of economic, social, and political power, concentrating authority over strategic urban spaces and functioning as nodes where urban density, land value, and infrastructure converge (Theodore et al., 2011).

Although there is no universally accepted definition of UMPs, scholars concur that these large-scale and costly initiatives, exceeding one billion USD, involve new construction in redeveloped areas, bring significant transformation, expand land uses, alter skylines, and generate major environmental impacts (Datta and Shaban, 2017; Drozd et al., 2017; Harrison and Hoyler, 2015; Hawken et al., 2021; Majerowitz and Allweil, 2019; Orueta and Fainstein, 2008; Shenhar and Holzmann, 2017). Their size and cost often lead to iconic architectural structures marked by technological innovation (Brunn, 2011; Delphine and Spit, 2019; Gellert and Lynch, 2003; Mylonas and Xenidis, 2018; Sklair, 2017; Priemus, et al., 2008). A further defining feature is their integration of diverse functions, housing, commerce, employment, and leisure, within a single urban framework (Eizenberg, 2019; Flyvbjerg, 2014; Flyvbjerg, 2017; Honey-Rosés et al., 2020; Lauermaun, 2018; Moos et al., 2018). Mixed-use UMPs promote dynamic urban lifestyles by concentrating on residential, commercial, cultural, and recreational uses within compact areas. They enhance social interaction, cultural vibrancy, and attract diverse populations, while also driving economic growth through higher property values, job creation, and tourism (Eizenberg, 2019; Lauermaun, 2018; Moos et al., 2018). Additionally, they serve as catalysts for urban regeneration, revitalizing neglected areas. However, some studies warn that such projects may result in exclusive, expensive, and sterile environments, becoming a bubble for mostly economically well-off populations (Eizenberg et al., 2019; Yang et al., 2016).

Studies have shown that UMPs have significant social and environmental impacts (Drozd et al., 2017). While they aim to enhance urban and private welfare by improving infrastructure and services near homes (Beatley, 2018; Delphine and Spit, 2019; Mylonas and Xenidis, 2018; Wessles, 2014), they often lack public participation, limit affordable housing and open spaces, and drive gentrification (Avni, 2019; Avni and Teschner, 2019; Beatley, 2018). Further emphasizing these dynamics, Barau et al. (2025) highlight that vertical expansion in traditional cities can exacerbate these social challenges: without focused planning, high-rise projects may lead to social alienation, the destruction of community fabric, and competition over urban resources within “tower blocks”. Addressing these challenges, and achieving sustainability and justice, requires inclusive planning that centers on vulnerable voices (Avni and Fischler, 2019; Camargo and Vázquez-Maguirre, 2021; Cheung and Tang, 2015). From an environmental perspective, UMPs may moreover disrupt landscapes, ecosystems, and infrastructure (Jones, 2017).

To date, limited attention has been given to the location of UMPs in the urban environment. Fainstein (2008) observed that many were built on former industrial or port sites that were either obsolete or repurposed to drive economic growth through relocation to suburban zones. Gold and Gold (2008) emphasized choosing locations that align UMPs’ functions with cities’ financial aims, as seen in global sporting event venues, for example,. Conversely, Lehrer and Laidley (2008) highlighted UMPs’ role in urban renewal and global competitiveness. Datta and Shaban (2017) noted that UMPs often require extensive urban planning to allocate land for high intensity uses, due to potential spatial expansion and connection of adjacent cities.

Eizenberg et al. (2019) highlight a shift in UMP location from industrial areas to downtown cores and affluent suburban commuter

towns, driven by changing urban functions. Avni and Teschner (2019) discuss conflicts arising when redeveloping coastal industrial zones, once marginal and now high-value real estate, into leisure and residential hubs, as these transformations often spark tensions between former and new land uses. Strategically locating UMPs can revitalize urban areas, enhance infrastructure and accessibility, and promote economic growth, while in culturally rich areas, they may also strengthen heritage and community identity. Similarly, Amen and Nia (2020) highlight the importance of project location, by showing how the redevelopment of the Erbil Citadel in Iraq has fostered tourism-oriented gentrification by attracting investment and symbolic value to the urban core.

Despite the growing body of research on UMPs, little attention has been given to their urban location, and dynamic analyses of how location decisions evolve over time remain rare. This study addresses this gap by examining UMPs through spatial and temporal lenses. The following section explores these processes in the Israeli context.

Urban mega-projects in Israel

UMPs in Israel are not an entirely new phenomenon. The first, Dizengoff Center in central Tel Aviv (see Figure 1A, marked by a red flag), opened in 1977 at a cost of hundreds of millions of shekels and combined commercial, cultural, and residential uses (Shauli and Margalit, 2010). Since then, Israeli cities have undergone major transformations, with a sharp rise in the number of large-scale projects, especially high-rise projects. This vertical trend is particularly evident in the Tel Aviv metropolitan area, where the historically low-rise, ground-oriented logic of development has been increasingly replaced by intensive vertical forms. The expansion of UMPs in the metropolis signifies the consolidation of vertical urbanism as a central shaping force, generating new density configurations, transforming land-use dynamics, and redefining the functioning of the metropolitan space (Verbakel, 2018). These transformations echo earlier discourse in Israeli urban planning on horizontal versus vertical visions, notably Elhyani (2004), who framed verticality as a functional and ideological alternative to the mainstream low-rise tradition. Bold vertical structures thus serve as instruments designed to shape urban density, enhance functionality, and reflect innovation and modernization in the metropolitan context. Complementing this approach, Harris (2015) highlights that vertical, multi-layered developments also operate as instruments of social, political, and economic power, forming three-dimensional assemblages of land uses, infrastructure, and public spaces that consolidate authority and influence within the urban environment. The rise in the number of UMPs in Israel can be attributed to three main factors. First, UMPs serve as important tools for urban branding, helping cities improve their public image and attract new residents, tourists, and investors (Benneworth and Dauncey, 2010; Eizenberg and Cohen, 2015; Eizenberg and Cohen, 2015; Wacquant, 2007). As demonstrated by Weinberg et al. (2019) in their study of the “Ha’Elef” project in Rishon Leziyyon, UMPs are instrumental in repositioning cities within the metropolitan hierarchy, enhancing their status and visibility. Much like mega-events, UMPs help stigmatized cities create an alternative, more positive urban image (Eizenberg and Cohen, 2015).

The second factor is the economic value added by UMPs, due to the higher tax revenues they generate compared to residential buildings, making them a priority for local authorities (Marmur et al., 2023; Moor, 2023). For instance, in Tel Aviv, non-residential properties contribute nearly 72% of the city's income, totaling 2.5 billion NIS, while in Jerusalem, non-residential income accounts for 40% of its total income, amounting to 1.1 billion NIS. This economic centrality of UMPs exemplifies the logic of neoliberal urbanism, as described by Peck et al. (2009), where market priorities and investment strategies shaped urban governance. In this context, the development of large-scale, non-residential projects is not only a fiscal strategy but also a manifestation of broader neoliberal urban dynamics, linking economic performance with urban planning decisions and spatial configurations.

The third factor concerns the relative ease of managing UMPs, from the perspective of local authorities. Paradoxically, although these projects typically involve a large number of stakeholders, they are often more manageable than multiple smaller-scale developments. When a single entrepreneur or firm leads the initiative, it streamlines bureaucratic processes such as permit approvals, budgeting, land use planning, and architectural oversight. Thus, from a municipal standpoint, concentrating efforts on one large UMP is frequently more efficient than navigating the complexities of coordinating numerous smaller projects across the same urban area.

Over the past 2 decades, Israeli UMPs have grown not only in number but also in scale and financial scope. The Sde-Dov project in northwestern Tel Aviv, formerly an airfield, covers over 617 acres and includes 16,000 housing units alongside extensive public, commercial, employment, hospitality, and green spaces. Likewise, Terminal 6 in Ramla, a second-tier city, comprises 2 million square meters of industrial, commercial, and office space. Once concentrated in metropolitan cores, UMPs have expanded to second- and third-tier cities, becoming a widespread feature of Israel's urban landscape. Yet, no systematic, empirical studies have been conducted to trace their temporal or spatial development.

Research methods

The spatial and temporal distribution patterns of UMPs in the Tel Aviv metropolitan area were analyzed through a combination of mapping, and spatial and qualitative analyses using visual-interpretive processing of the findings. The UMPs selected for this study are all located in the Tel Aviv metropolitan area, since it is the largest metropolitan area in Israel, where most of the economic and business activity takes place, and where urban trends and innovations that are later replicated in other metropolitan areas are first implemented. The cities included in this research, apart from Tel Aviv itself, are those located in the two inner rings that surround the city's core. Direct contact between the core and these cities allows for the flow of both physical activities and ideas. Urban localities in the Tel Aviv metropolitan area with more than 20,000 people were included in this study, encompassing the metropolitan core, as well as cities in the

inner and middle rings¹. A preliminary study was conducted to operationalize the phenomenon under investigation, enabling the identification of UMPs to be included in the study, determined according to the Israeli-local scale (Cohen, 2022). The following section outlines the work process used to operationalize these definitions.

Developing an analytical index for characterizing and identifying UMPs

Although UMPs are widely discussed in literature, no consistent quantitative definition exists. A review of theoretical approaches revealed that academic research in the field has yet to set minimum threshold values for characterizing all quantitative variables comprising the phenomenon. Flyvbjerg (2014), Flyvbjerg (2017) identified key variables for upgrading a development project's status to a megaproject, but apart from setting project cost (exceeding one billion dollars), did not define quantitative values for area, mixed-use integration, and stakeholders. The preliminary study identified variables in literature as a starting point for calculating threshold values: project area in dunams, type and number of mixed uses (residential, commercial, office, leisure and entertainment), type and number of stakeholders and developers (distinction between public and private sectors), permit duration, and project approval year.

Examining temporal and spatial development trends of UMPs in the Tel Aviv metropolitan area posed methodological challenges related to constructing an operational definition of the phenomenon and collecting data about it. Since Dizengoff Center (erected in 1976) was selected as the first UMP in Israel due to its compliance with minimum threshold values in the literature regarding project area and mixed-use integration, it was determined that the study would examine UMPs established between 1976 and 2020. The research area was defined to include urban localities in the Tel Aviv metropolitan area with populations exceeding 20,000 residents, located in the metropolitan core and the inner and middle rings, according to the Central Bureau of Statistics (2022) functional statistical divisions.

Data sources and collection process

Data collection relied on three primary sources. The first source constituted the Planning Administration and dedicated Israeli planning websites, which transparently share protocols of municipal and district planning committees, detailed plan specifications at various stages of advancement, architectural drawings, and digital files enabling spatial attribution. The second source consisted of professional press (Globes, Ynet, Walla, TheMarker, and real estate news websites) covering UMPs in

1 List of urban cities in the research area map: Metropolitan core: Tel Aviv-Jaffa. Inner ring: Holon, Bat Yam, Bene Beraq, Qiryat Ono, Giv'at Shmuel, Giv'atayim, Ramat Gan, Or Yehuda. Middle ring: Petah Tikva, Lod, Ramla, Rishon Leziyyon, Yehud-Monoson, Ganne Tiqwa.

recent decades, which served to cross-reference information and complete missing details, particularly for older projects whose plan specifications were presented in different formats. The third source was Google Earth, through which precise geographic coordinates of projects were collected to ensure accuracy in determining locations, and for analyzing inter-urban and intra-urban expansion dynamics. Since data collection was based on official sources and conducted systematically and identically for all projects, the data are considered updated, valid, and reliable.

Database creation and threshold value determination

The process began by formulating operational definitions, and subsequently building a comprehensive database using Excel that included all development projects in the research area. Collection was done using plan specification files and drawings from the Planning Administration website, supplemented by dedicated Israeli planning websites, digital files, professional press, and Google Earth. The database consisted of columns representing research variables (locality name, plan name and number, approval year, project boundary area, mixed-use areas including number of housing units, stakeholders and developers by sector, and rights validity duration) and rows detailing approved projects. At this stage, the comprehensive database included 221 development projects in the Tel Aviv metropolitan area, whose locations were documented using geographic coordinates.

The screening process, from the comprehensive database to a filtered database of UMPs, was based on determining minimum threshold values. Calculations were performed to establish decision points in which numerical values had the capacity to create meaningful distinctions between development projects and megaprojects. The analysis led to the conclusion that project area and number of integrated uses were the variables that yielded the most significant distinction, while type and number of stakeholders and developers, and rights validity duration, were not found to have a significant influence in this regard. Filtering was conducted in two stages: First, according to threshold values for area and number of uses, for large projects, and then according to an urban intensity index for smaller projects. The urban intensity index, whose formulation will be presented later in this section, was developed to identify projects whose size does not necessarily meet minimum threshold values, but due to their land use intensity and concentrated mixed-use integration, meet the UMP definition. The combination of both filtering processes led to a filtered database consisting of 207 UMPs that meet the minimum threshold conditions for characterizing UMPs in the Tel Aviv metropolitan area.

Development threshold values for characterizing UMPs

Prior studies identify relevant factors such as project cost, land area, number of mixed uses, number of stakeholders, and project

duration (Lauermann, 2018; Orueta and Fainstein, 2008), but these variables are rarely assigned specific threshold values; only project cost has been set a broadly recognized threshold exceeding one billion USD (Flyvbjerg, 2014; Flyvbjerg, 2017). To systematically identify UMPs and address this gap, we combined empirical analyses of project area with functional criteria, developing a systematic operational definition. Empirically grounded thresholds were established specifically for land area and number of mixed uses, variables which proved decisive for distinguishing UMPs from other large-scale urban developments. Based on this logical systematic approach, a multidimensional threshold was established for classifying UMPs, incorporating the number of mixed uses and the Urban Intensity Index, while project area served as a supporting cutoff value. The area threshold was established using percentiles.

The Urban Intensity Index is calculated as the ratio of mixed-use areas designated for productive (i.e., areas intended for employment, commerce, and leisure, excluding residential areas) to the total development area. Thus, a smaller total development area combined with a larger productive-use area results in a higher urban intensity, which can potentially exceed 100%. Each such development is necessarily a vertical project that alters the skyline and has significant environmental implications. The results are displayed in percentages.

Projects with an area of 17 dunams or more and two mixed uses are classified as UMPs, whereas smaller projects are classified as UMPs only if they have three mixed uses and an Urban Intensity Index above 100%. Higher values indicate greater functional density and urban impact, reflecting projects that contribute more significantly to local economic activity and urban vibrancy.

In conclusion, the process we conducted following data collection, allowed us to develop a quantitative index for measuring urban intensity for the first time in literature. This index highlights the importance of the vertical dimension (expressed in multi-use construction and volume for height), generating a numeric pattern that illustrates the environmental impact of UMPs that use the height dimension to maximize land use.

Only urban projects that met the threshold values for UMPs were mapped and included in the research. The mapping process was conducted using a dedicated database, built through an inductive method using ArcGIS Pro (by ESRI), and used for both the mapping and processing of the findings². These maps depict the spatial and temporal distribution of UMPs in the Tel Aviv Metropolitan Area from 1976 to 2020. Certain aspects of this study are reflected in the work of Lounis et al. (2024), as well as Kafrawy et al. (2022). Lounis et al. (2024) conducted a four-decade longitudinal analysis, providing a comprehensive view of urban sprawl dynamics and their impacts on population density and the urban fabric. Kafrawy et al. (2022) employed GIS to spatially and quantitatively analyze the impacts of transit-oriented development, highlighting the methodological advantages of geospatial tools.

² In preparation for mapping UMPs using GIS software, a link was made between the database file that included the quantitative values of the research variables, as organized in Excel, and the digital files identified for each UMP by running code.

The dynamics of UMPs' spatial expansion, at both the macro and micro levels, will be presented in the following chapter. This analysis will encompass both spatial and temporal perspectives. At the macro level, the focus will be on the relative location of UMPs between cities within the various rings of the metropolis. At the micro level, the examination will center on the placement of UMPs inside the cities themselves; in the city center, the historic core, and the outskirts. The temporal distribution patterns were deduced from the mapping of projects in each decade. These maps are accompanied by political, economic, and social contexts to explain the significant increase in the number of UMPs.

Findings

In this section, we present the spatial and temporal distribution of UMPs in the Tel Aviv metropolitan area, accompanied by an interpretive analysis of the emerging trends. Our work process and methods clarify the dynamics of UMP distribution, highlighting the changes that have occurred over time.

Spatial spread of UMPs at the macro-urban level over a temporal axis in the Tel Aviv metropolitan area: 1976–2020

Figure 1 consists of two panels, A and B. Panel A illustrates the metropolitan rings of Tel Aviv, which were used to define the spatial framework for the research. Panel B provides an orientation map of Israel, with the study area systematically highlighted (red square). According to the spatial and temporal distribution of UMPs in Tel Aviv and in the inner and middle rings surrounding it, as shown in Figure 1, Dizengoff Center, established in the 1970s, stood out as the first UMP in the Israeli landscape for at least 12 years. However, in the last 2 decades, UMPs rate and scope has significantly expanded beyond the country's core, particularly to coastal cities.

As seen in Figure 1A, about one-third (32%) of UMPs are located along the metropolitan coastline, while the rest are in the inner and middle rings. Historically, cities like Tel Aviv-Jaffa were industrial areas in the 19th century, while due to de-industrialization starting in the 1980s, industries moved out, making prime real estate available. This attracted stakeholders and entrepreneurs to develop mixed-use UMPs such as the Tel Aviv Port and Jaffa Port (Arlich and Korach, 2022; Hatuka and Ben-Joseph, 2017). Economically, municipalities prioritized residential and commercial mixed-use UMPs over industrial areas to maintain high real estate values and profitability.

Lifestyle shifts brought about by the 21st-century, favoring mixed land use (Hatuka and Ben-Joseph, 2017), alongside the escalating housing crisis, which was especially severe in the Tel Aviv metropolitan area, intensified the need to establish large-scale initiatives blending residential and employment areas. These factors were furthermore reinforced by the growing motivation of local decision-makers to nurture the city's competitiveness through recruitment, funding, and investment in UMPs (Fainstein, 2008). Governmental data shows that municipalities in the inner and

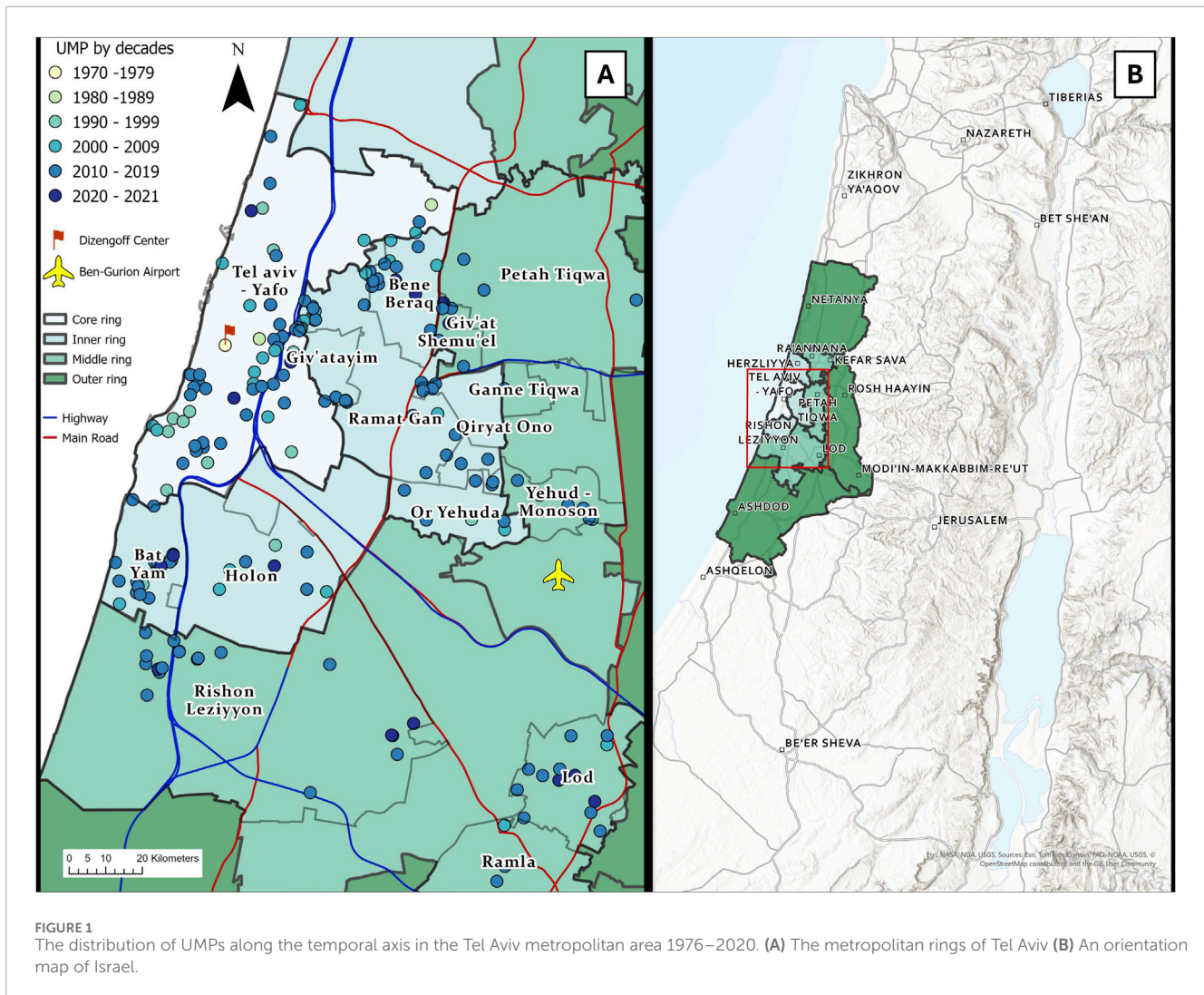
middle rings have fewer resources compared to the city of Tel Aviv³. UMPs located in the inner and the middle rings, in cities such as Bat-Yam and Bene-Beraq, Lod and Ramla, therefore have a lower profit potential, and thus the incentive for policymakers in these municipalities to invest in large-scale initiatives is less strong.

The competition among authorities to construct UMPs along the coastline is driven by the desire to build networks with stakeholders and entrepreneurs, and affects the proliferation of projects at the metropolitan area's core. These political motives help explain the varied number and density of UMPs in different coastal cities. In Tel Aviv, the metropolitan core, the number and density of projects are higher compared to coastal cities like Rishon Leziyyon and Bat Yam.

A spatial analysis conducted based on Figure 1A indicates a substantial surge of UMPs over the last 2 decades (2000–2020) in the Tel Aviv metropolis, during which 182 UMPs were constructed, making up approximately 88% of the total 207 UMPs documented throughout the research period. This increase in the number of UMPs is attributed both to local factors rooted in cultural aspects, and to external global factors like globalization, which led to the adoption of the SDG goals, in a strive to develop sustainable living policies.

UMPs address the issue of over-population that has become a serious challenge in Israel in recent years. Globalization and the opening-up of international physical borders have brought many foreign real estate investors, mostly British, French, and American, who mainly invest in mixed-use projects in the country's core (Mirovsky, 2021). For example, French company Ybox that has built the large Florentine Quartet project in Tel Aviv, has recently acquired Romano House in the city and plans to convert it into a UMP designed for residential, hotel, employment, and leisure use, and has also been building the Leithaus project in the Sea Park in Bat-Yam. The proliferation of UMPs and foreign investments supports the prevailing capitalist economic approach in Israel, the principles of which have a significant impact on the urban space (Zin, 2014). As indicated in Figure 1A, the UMP phenomenon gained great momentum in the second decade of the twenty-first century (2010–2020). Within that period, 143 UMPs were constructed, about 70% of all UMPs in the study period. Moreover, between 2015 and 2020, 84 projects (about 41%) of this type were built within the boundaries of the metropolitan area. This can be best explained by planning considerations of decision-makers in local authorities, who prefer to deal with a single large project, rather than many smaller ones. Another possible explanation for this growth in UMPs is marketing and branding: to develop attractive urban areas, the Tel Aviv municipality pursues various planning innovations and construction trends to create a unique development profile for large-scale initiatives, encouraging investment in UMPs based on mixed uses (Petersberg, 2020). Lichtman (2022), presenting the main vision of the city of Tel Aviv, also describes the drive of decision-makers in the city to maintain and strengthen its status as a vibrant economic and cultural center of Israel, and a meeting point between Israel and the rest of the world. Finally, there are the global cultural influences in fashion, food, and iconic building

³ The Central Bureau of Statistics (2022) ranked Tel Aviv at number 9 in the socio-economic index of cities and municipalities in Israel, compared to the cities of Lod and Ramla at 4, Bat Yam at 5, and Bene Beraq at 2.



projects (Mylonas and Xenidis, 2018). Intensive international travel and tourism over the last few decades have prompted a desire to recreate foreign lifestyles and architecture in Israel (Hoter, 2015). A prominent marker in Israel for the phenomenon is the tendency to name large-scale initiatives in English (e.g., MIDTOWN), as a way of conveying a luxurious international style. The spatial development patterns of UMPs over the temporal axis can be illustrated through the area data of UMPs within the core and two surrounding rings, relative to the total urban area. Table 1 compares UMPs size (in acres) in the core with their size in the rings, showing the total area of UMPs in the metropolitan area as 10,539.28 acres. An analysis reveals that the total area of UMPs in the inner ring constitutes 28% of the total UMP area in the metropolitan core. Furthermore, in the middle ring, the average area of UMPs represents 20% of the total area of large-scale initiatives in the metropolitan region.

Another interesting finding relates to the size of the projects. In the middle ring, the standard deviation of UMPs area is larger than the standard deviation of their area in the inner ring. This finding indicates the difference arising from the larger gaps in the area sizes of UMPs established in this urban ring compared to

those in the ring closer to the core. Therefore, Figure 1 clarifies the spatial distribution of UMPs throughout the temporal axis. A unique finding that stands out in Table 1 is that the average area of UMPs in the metropolitan core is 3.1 times larger than in the inner ring, and 4.4 times larger than in the middle ring. These data reinforce the picture obtained from Figure 1, according to which the highest concentration of UMPs in the Tel Aviv metropolitan area is in the core.

Hatuka (2020) explains the competitive considerations of local authorities in selecting UMP sites. According to her, since the 1990s, increasing trends in globalization and internationalism have facilitated the emergence of new urban initiatives along the coastline, as an engine for economic growth, tourism, and sustainable development, benefiting regional balance, environmental conservation, and quality of life. These trends help authorities like Tel Aviv-Jaffa gain a competitive edge over other local authorities struggling to establish UMPs along the coastline due to regulation. As the map shows, no UMPs with high urban intensity (over 100%) were found along the coast, due to planning laws that limit construction heights to preserve the landscape.

TABLE 1 Average of UMPs area (in acres) by rings.

Ring	UMPs area	UMPs area out of total area	Standard deviations	Proportion of UMPs' area in the rings compared to UMPs' area in the core
Core	2,314.56	22%	NA	100%
Inner ring	655.30	7%	524.58	28%
Middle ring	519.66	5%	809.59	20%

Despite the high land value and authorities' economic interest in high urban intensity UMPs, they are constrained by regulation. Finally, accessibility issues also influence UMP location, since they are designed to serve residents and visitors alike, and limited transportation connectivity outside Tel Aviv means that projects in nearby cities are not likely to fulfil their potential. Efficient public transportation is necessary before additional similar projects can be built outside the core.

Intra-urban spatial spread of UMPs at the micro urban level in Tel Aviv's metropolitan area: 1976–2020

The spatial locations of UMPs within the intra-urban distribution (micro-dimension) as shown in Figure 2, indicates their expansion into the city center, historical city, and the city's outskirts. Intra-urban spread depends on land availability and on the city's vision. For instance, Tel Aviv's strategic plan⁴ outlines a development pattern from south to north, aiming to optimize the use of UMPs to create an accessible city. The spatial distribution of UMPs in the metropolitan area can be attributed to two economic considerations: municipalities seeking to maximize profits by migrating UMPs to areas with cheaper land values due to saturation in the city center; and greater public land availability in the northern areas, facilitating faster construction on a larger scale.

Figure 2 reveals a significant concentration of UMPs along the borders between neighboring cities. This trend is clearly visible at the borders between Tel Aviv and Holon, Bat Yam, Ramat Gan, Givatayim, and Bene Beraq. 138 UMPs, approximately two-thirds (63%) of all UMPs in the metropolitan area, are in the Tel Aviv core and its neighboring cities, and over a third (35%) of all UMPs in the metropolitan region are within 300 m of city borders. Cities in the inner (Holon, Or Yehuda, Qiryat Ono) and middle (Petah Tikva, Yehud-Monosson, and Rishon Leziyyon) rings, however, show a more scattered and less dense distribution of UMPs.

Decisions by local authorities on UMP locations involve various planning and branding considerations. For instance, certain

locations could better enhance the city's economic profile, attract investments, or establish a unique urban identity.

Over the past 2 decades (2000–2020), many municipalities avoided building near urban borders due to the high infrastructure costs. This shifted due to soaring urban land values and government pressure for residential construction, prompting local authorities in high-demand areas like Tel Aviv, Giv'at Shmuel, and Petah Tikva to better utilize these border areas. Branding is another factor that influences location decisions, by including, beyond local benefits, also broader spatial considerations, sometimes even intentionally aiming to blur city boundaries, through a strategy known as the "Halo Effect"⁵, in which the prestige of high-value areas is consciously exploited to enhance the image of UMPs in adjacent, lower-value zones (Rosenk, 2020).

Generally, UMPs often integrate neighboring cities and attract regional populations from across the metropolis, and therefore serve not only local but also metropolitan interests. It is thus worth considering the hypothesis that Israel might currently be in an intermediate planning stage consisting of two phases. First, local authorities create UMPs that facilitate extensive cooperation with neighboring UMPs to form metropolitan regions. Second, in today's neo-liberal era, marked by a race for resources, building UMPs in areas accessible to neighboring city residents indicates intense competition among local authorities for urban attractions. This suggests a shift from an inward-focused autonomous urban approach to a wider regional one, influenced by authorities' wish to exploit these proximities for their benefit. Given the multiple interests involved in UMP investments, the expansion of metropolitan mega projects like the "Light Rail" and "Metro" in the Gush-Dan Region could offer additional regional benefits, such as shared economic burdens among neighboring cities for establishing common infrastructure.

Another aspect examined in the study was the proportion of UMP areas in the total urban area of the cities, as shown in Table 2.

The table shows that in the cities of Or Yehuda, Holon, and Kiryat Ono, UMPs make up approximately 40%–50% of the cities' total area. In Bene Beraq, UMPs take up approximately 30% of

4 The Tel Aviv strategic plan, called TA/5,000, is a legal and binding document outlining the city's long-term planning policy for land development allocation for housing, employment, and commerce.

5 The Halo Effect is a cognitive bias whereby a positive impression of one characteristic extends to influence the perception of other characteristics, leading to uniformly positive overall perception of a person or product.

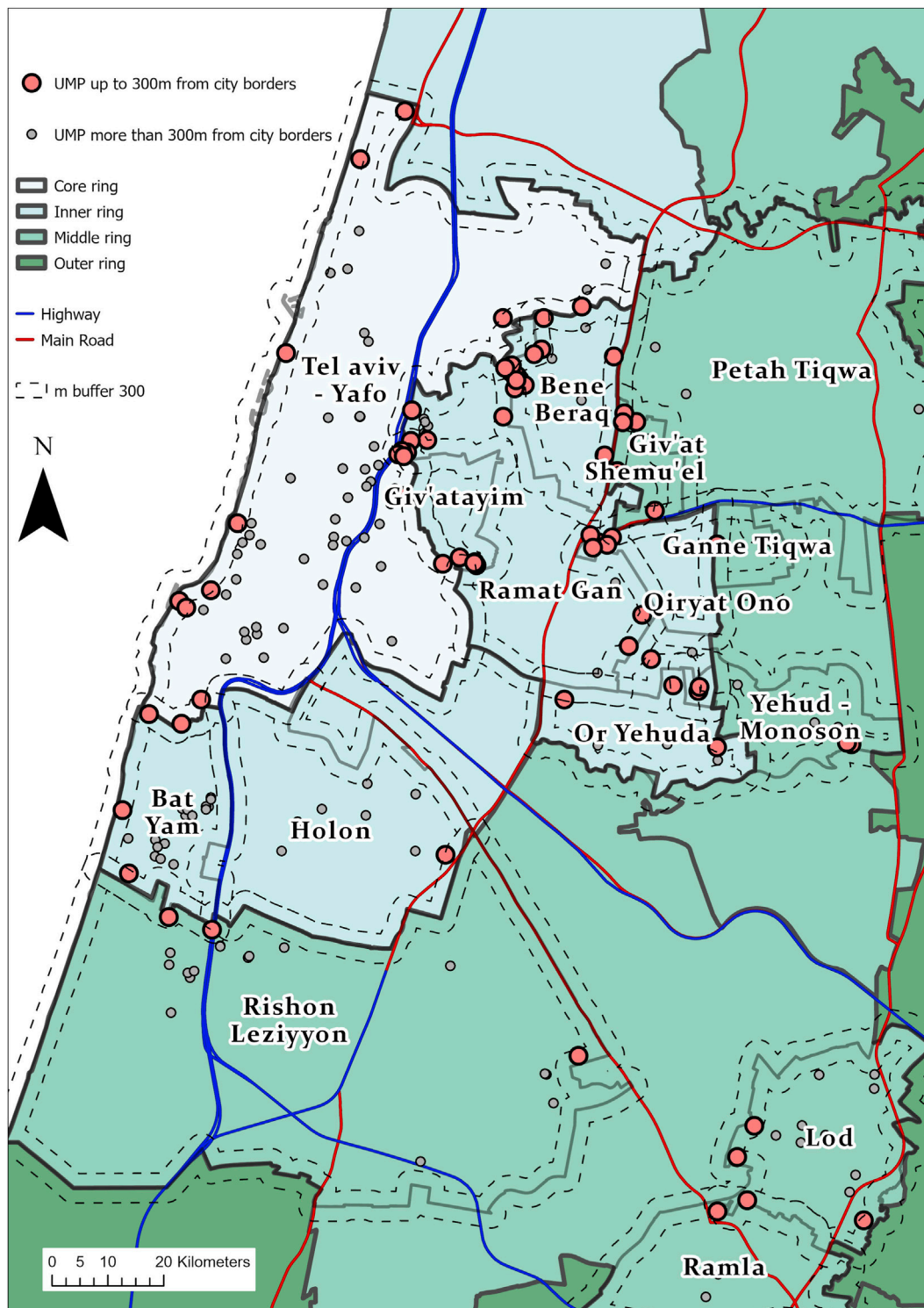


FIGURE 2
The spatial spread of UMPs in the Tel Aviv metropolitan area and on the borders of neighboring cities, 1976–2020.

the total area, while in Petah Tikva, UMPs comprise only about 2% of the city's total area. Despite the notable concentration of UMPs in Tel Aviv, [Table 2](#) demonstrates that UMPs constitute “only”

approximately one-fifth of its total area. These findings may provide insight into the significance each authority places on constructing UMPs, and may also reflect the financial state of the city.

TABLE 2 Proportion of UMPs area out of total city area.

City name	Zone	No. of UMP	Sum of UMP area (sq. Km)	City area (sq. Km)	Proportion of UMP area out of city area (%)
Tel Aviv - Yafo	Core	66	9.38	51.79	18.11
Bene Beraq	Inner ring	17	2.12	7.34	28.95
Qiryat Ono		8	2.28	4.52	50.46
Bat Yam		20	2.13	8.18	26.05
Or Yehuda		7	2.80	6.68	41.99
Giv'atayim		7	0.34	3.24	10.64
Ramat Gan		20	1.73	16.39	10.53
Holon		8	7.14	19.05	37.48
Ganne Tiqwa		Middle ring	1	0.04	2.11
Giv'at Shemu'el	6		0.68	2.57	26.53
Lod	13		2.86	12.11	23.62
Petah Tiqwa	3		0.65	35.62	1.85
Rishon Leziyyon	19		9.22	61.74	14.94
Ramla	3		0.22	11.99	1.86
Yehud - Monoson	6		1.01	5.75	17.71

Urban spatial spread of UMPs in the Tel Aviv metropolitan area, according to the urban-intensity Index

A recent study on vertical building extension (Sanei et al., 2025) provides key insights for understanding vertical urbanism, highlighting the use of existing vertical potential within the urban fabric as a strategy for urban intensification, relying on technological and structural innovations. The Urban Intensity Index measures the impact of UMPs on their environment, providing an additional micro-dimensional analytical tool. This original index was developed due to Israel's small size, particularly in the Tel Aviv metropolitan area, which necessitated setting threshold values for UMPs. In this paper, therefore, we defined UMPs as high-rise buildings on an area under 17 dunams, with at least three land uses, and a yielding area exceeding the project area by over 100%. Figure 3 shows the intra-urban spatial locations of UMPs that enhance urban intensity by utilizing vertical space, a necessity in areas with limited and costly land reserves, most evident in Tel Aviv, Ramat Gan, and Bene Beraq, especially on the borders between cities. Local authorities' support of vertical development in densely populated, saturated, and expensive areas, is well known in the literature (Drozd et al., 2017; Majerowitz and Allweil, 2019). Eizenberg (2019) conceptualizes large-scale urban developments (LUDs) as a dominant planning strategy adopted by cities worldwide. She emphasizes that such developments

not only reshape the urban form but also generate new socio-spatial relations and intensify urban environments through the vertical concentration of functions, populations, and capital within limited areas. This vertical intensification transforms planning principles and reconfigures urban power structures, making height and density central to contemporary urban strategies. Similarly, Nethercote (2018), Hother (2015) argues that skyscrapers and high-rise buildings are far more than physical responses to land scarcity; they represent symbolic expressions of power, prestige, and urban visibility, serving as key indicators of urban intensity. Expanding on this perspective, Eizenberg (2025) highlights how marketing narratives, architectural design, and residential experience actively shape the perception, desirability, and social significance of vertically intensified urban forms. The development of UMPs with a high urban intensity in the Tel Aviv metropolitan area exemplifies these theoretical approaches. These projects concentrate mixed uses, populations, and economic activity in dense urban sites, reflecting both the strategic deployment of vertical urbanization and the creation of highly visible, prestigious, and functionally intensive urban landscapes. By translating the global dynamics identified by Eizenberg and Nethercote into the local metropolitan context, the case of Tel Aviv demonstrates how high-intensity UMPs operationalize vertical urbanization as a mechanism for reshaping socio-spatial relations, intensifying urban environments, and redefining urban power and visibility.

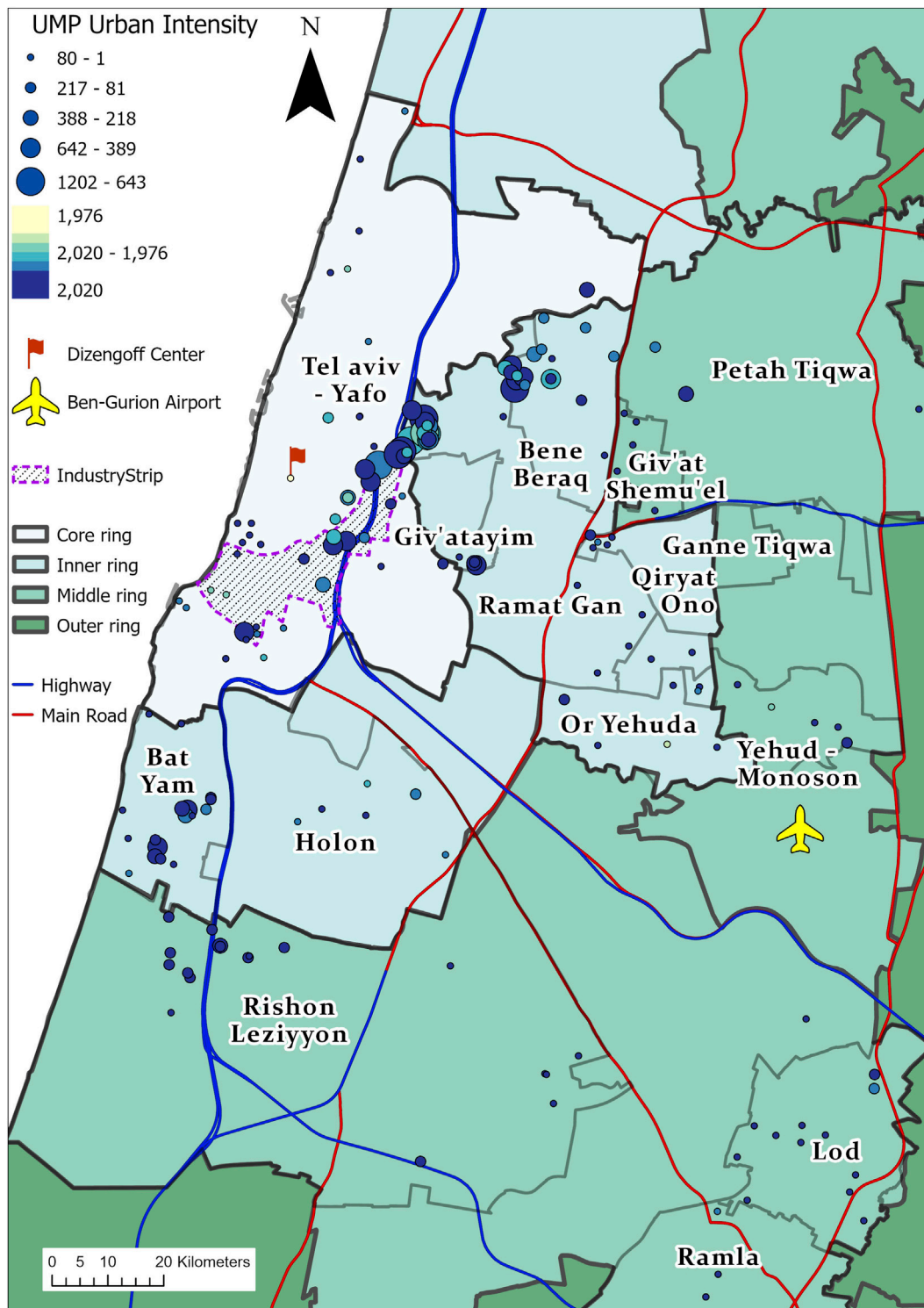


FIGURE 3 Spatial spread of UMPs over a temporal axis in the Tel Aviv metropolitan area according to the Urban Intensity Index, 1976–2020.

According to Figure 3, 74 projects (35.7% of all UMPs studied) meet the high urban intensity threshold. The literature highlights the significant urban impact of these high-intensity UMPs

(Hawken et al., 2021). From Figure 3, it is evident that high-intensity UMPs are concentrated in the Tel Aviv metropolitan core and its neighboring cities like Bene Beraq and Ramat Gan, along

TABLE 3 UMPs in the Tel Aviv metropolitan area 2000–2020.

Years	Total number of UMPs	Total number of high-intensity UMPs
1976–2000	26	4
2001–2005	16	8
2006–2010	23	7
2011–2015	57	21
2016–2020	85	32

Ha'Haroshet strip, a 5.4 sq.km (10% of Tel Aviv's metropolitan core) area previously known for its heavy polluting industries, which was freed up after regulatory laws pushed these industries out of city centers (Razin, 2010). Within the area highlighted on Figure 3, there are 22 UMPs, accounting for a third (33.33%) of all UMPs in the metropolitan core, 10 (45.4%) of which have a high urban intensity.

Figure 3 furthermore shows that while UMPs have proliferated outside the core, to cities like Ramat Gan, Holon, and Petah Tikva, their urban intensity rate remains low, due to lower land values. Our analysis shows that early UMPs in the 1980s and 1990s did not significantly impact their surroundings and were classified as having low intensity. However, 57 out of 74 UMPs (77%) (see Table 3) constructed in 2010–2020, were classified as having high-urban-intensity, for example, Tel Aviv MIDTOWN, and B.S.R. towers in Ramat Gan, close to the urban border. High-intensity mixed-use UMPs generate substantial revenue for municipalities and encourage intensive urban development. Aligned with high-density urbanism, mixed-use forms contribute to powerful, three-dimensional urban spaces (Gitler, 2022). Approximately 77% of high-intensity projects in the Tel Aviv metropolitan area were completed after 2010, driven by three main factors: first, economic and municipal policies that promote urban development and capitalize on land opportunities (Chudi, 2021); second, rising land values that increase returns and the appeal of high-rise projects (Nadlan center, 2023); and third, municipal planning incentives encouraging high-rise construction (Levi, 2017).

High-intensity UMPs that serve diverse functions and populations require proximity to transportation infrastructure. For example, all Azrieli UMPs are located next to railway stations in the Tel Aviv metropolis⁶. Table 4 illustrates this reliance on transportation infrastructure by showing the distance between UMPs and the nearest railway station.

Table 4 reveals that one-third of all UMPs (33.8%) are within 300 m of a railway station, and almost half (45.4%) are within 500 m. Moreover, 21.2% of UMPs within 300 m of a railway station are classified as high-intensity, reflecting a trend of locating UMPs in highly urbanized areas that already offer efficient public transportation. These patterns align with the

TABLE 4 The distance between UMPs in the Tel Aviv metropolitan area and the nearest railway station.

The distance between UMP and the nearest railway station	Total number of UMPs	Total number of high-intensity UMPs (out of the overall UMPs)
0 – 300	70 (33.8%)	44 (21.2%)
301 – 500	94 (45.4%)	56 (27.05%)

findings of Amen et al. (2023), emphasizing the importance of an accessible street network and the integration of urban services such as restaurants, shops, and leisure facilities for pedestrian and tourist density. Their findings indicate that locating large urban projects near transit stations and connected pedestrian corridors can maximize accessibility, attract visitors, and enhance integration into the urban fabric.

Discussion

UMPs have become prominent thanks to their potential to reshape urban landscapes, stimulate economic growth, and tackle infrastructural challenges. Viewed through the lens of vertical urbanism and neoliberal urbanism, UMPs embody a marked shift toward three-dimensional, vertically intensive urban forms that generate new density configurations, while also advancing a neoliberal logic that sees the city as a platform for value creation, asset leveraging, and private capital investment. While extensive literature has addressed their construction, management, and spatial impact, little attention has been paid to the differentiation between various UMP types, such as high-intensity UMPs driven by a neoliberal approach that promotes their development as part of market-oriented forces. Moreover, their temporal and spatial trajectories remain underexamined.

This article has addressed these gaps by defining UMPs and analyzing the distribution of large-scale initiatives over time and space in the Tel Aviv metropolitan area, at both macro (intercity) and micro (intracity) scales. Specifically, we introduced an operational definition of distinct UMP types and, through the development of the Urban Intensity Index, illustrated the uniqueness of large-scale initiatives in the City of Tel Aviv-Jaffa, as well as the cities in the two rings surrounding it, that implement vertical construction principles shaped by neoliberal logics. Furthermore, we found that high-urban-intensity UMPs are primarily concentrated in Tel Aviv and its neighboring inner-ring cities, particularly along the main highway. As the distance from Tel Aviv increases, the concentration of high-intensity UMPs declines, likely due to lower land values, leading local authorities to maximize land profitability through the development of lower-intensity projects.

High-intensity UMPs are part and parcel of the massive planning of high-rise buildings in Israel in general and the Tel Aviv metropolitan area in particular. This local form of vertical urbanism, conceptualized by Margalit (2013) as 'towerization' (Hebrew Migdul) is motivated by the increasingly neoliberal regime,

⁶ The Azrieli Group is a leading real estate company in Israel, specializing in the development of experiential mixed-use properties that include shopping malls, commercial spaces, offices, hotels, and residential units.

institutionalized since the late 1990s by Mayor Ron Huldai. These projects, shaped through collaboration between private developers and the municipality, are instrumental in the city's efforts to project economic power and agglomerate producer service businesses in core areas. In some cases, high-rise planning is designated for residential purposes, and is typically motivated by the desire to draw economically stronger populations 'back to the city' by way of new developments or urban regeneration projects (see [Nachmany and Hananel, 2022](#)). Their functions notwithstanding, their multi-story, mixed-use form serves to increase density, court new residents, businesses and tourists alike and re-shape urban image.

Spatial patterns of UMPs in the Tel Aviv metropolitan area reveal a pronounced concentration within the metropolitan core and its immediate surroundings, underscoring the core's pivotal role in directing large-scale urban development. A considerable number of UMPs are positioned near municipal boundaries between neighboring cities, a strategic placement exemplifying the integration of neoliberal planning logics. By leveraging city boundaries, these developments maximize land value, concentrate capital, and create new density configurations. In doing so, they actively shape metropolitan hierarchies and reinforce the function of UMPs as central instruments in restructuring the urban landscape: First, constructing large-scale projects near or along municipal borders, rather than in inner-city neighborhoods, enhances accessibility and visibility, making them more attractive and thus more profitable destinations for local residents and others. Second, cities adjacent to the metropolitan core, located in the inner ring, benefit from both symbolic and material spillovers, including the prestige of proximity to the core. Finally, well-developed transportation networks near neighboring city borders enhance accessibility, facilitating easier use of the services and amenities offered by these projects. Consequently, high-rise developments, and specifically UMPs, often go beyond functional planning, serving to reinforce the city's image and curated urban identity, reflecting neoliberal priorities like market-oriented growth and investment attraction.

Temporally, UMPs have become increasingly prominent across the Tel Aviv metropolitan area in recent decades, reflecting a growing preference for vertical urban development. Despite high costs, extended construction periods, and associated social and environmental challenges, they continue to serve as a central instrument in urban planning. This trend also reflects the global spread of neoliberal logics, whereby UMPs are deployed as a primary means to enhance urban value, attract private capital, and generate new densities, both in Israel and in cities worldwide.

Methodologically, this study presents, to the best of our knowledge, the first longitudinal quantitative analysis of UMPs. This framework allows for three main methodological applications central to the study: First, threshold values were established to distinguish UMPs from conventional projects based on defined characteristics such as size and functional diversity. Second, to address the rise in vertical development, we devised an urban intensity index to assess projects' intensity levels. Third, the quantitative approach enabled the mapping of UMPs across the study area, allowing for comprehensive spatial and temporal analysis, which can potentially shape urban planning policies by informing municipal decisions on resource allocation, thus promoting more just and efficient urban systems.

This study aims to achieve three main objectives: first, to define distinct types of UMPs and establish threshold values for each; second, to develop an urban-intensity index, highlighting the role of neoliberal, market-driven urban development in shaping the nature, location, and impact of these projects on the urban environment; and third, to analyze their temporal and spatial distribution patterns across the Tel Aviv metropolitan area.

This innovative approach lays the foundation for future research to define quantitative threshold values for additional UMP characteristics, such as project cost and the number of stakeholders involved. By introducing operational definitions, the study offers practical and transferable tools for assessing UMP locations within metropolitan regions. These tools and insights may be adapted and applied to different national contexts, accounting for variations in scale, population density, and urban structures. Extending this framework to international comparisons could reveal shared trends and regional variations in UMP dynamics, while its application in smaller urban settings may test its scalability and relevance for diverse contexts.

This study has several limitations that should be acknowledged: First, it focused exclusively on the Tel Aviv metropolitan area, and therefore the findings may not be generalizable to other Israeli regions or international contexts. Second, despite the use of clear operational criteria, the identification of UMPs may involve some subjectivity. Third, some projects may have been missing, particularly those that were still under discussion or not yet formalized at the time of data collection. Fourth, although media sources were consulted to track public reporting, the study relied primarily on official government records, which may have limited the inclusion of projects not formally recorded. Fifth, although this is a longitudinal study adopting a dynamic urban planning perspective, no tool was developed to predict the pace of UMP development beyond the study period, so the results reflect only the temporal and spatial conditions observed at this point in time.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

BC: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review and editing. NC: Conceptualization, Investigation, Methodology, Project administration, Supervision, Validation, Writing – review and editing. OR-M: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Supervision, Validation, Writing – review and editing.

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