Urban Expansion and Socio-Spatial Differentiation: A Spatial Analysis of New Residential Areas

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Over the past decades, medium-sized cities in the State of São Paulo, such as Ribeirão Preto and Jundiaí, have undergone significant processes of territorial expansion, reflecting broader transformations in Brazil's urban and regional structure. While historically overshadowed by the dynamics of the São Paulo metropolitan region, these cities have increasingly consolidated their roles as regional poles, attracting population, capital, and new residential developments. This expansion has unfolded through horizontal growth at the urban fringe, characterized by new subdivisions, gated communities, social housing complexes, and mixed-use developments extending into formerly rural or peri-urban land. Such patterns reflect not only demographic pressures but also land market dynamics, infrastructure investments, and changing locational preferences among households and developers.

The literature on urban expansion in Brazil has made substantial progress in documenting the physical enlargement of urban areas, particularly through advances in remote sensing and land-use classification systems (Igliori, D.; Nadalin, V., 2015), such as those developed by MapBiomas. These contributions have been essential in quantifying the magnitude and speed of land conversion, identifying urban sprawl patterns, and evaluating environmental impacts. However, much of this research remains concentrated on morphological and territorial aspects of expansion, often neglecting a systematic characterization of the socio-demographic composition of the populations occupying newly urbanized areas. As a result, analyses frequently describe where cities grow but fail to rigorously examine who inhabits these expanding frontiers and how their socio-economic profiles differ from those of consolidated urban áreas (Nazarnia, N.; Harding, C.; Jaeger, J. A., 2019).

This gap is analytically significant. Urban expansion is not merely a spatial reconfiguration of built form; it is a socially structured process embedded in relations of production, land valorization, and state intervention. Urban space is both a product and a medium of capital accumulation, shaped by uneven development and the selective

allocation of investments. Similarly, Milton Santos (1990, 2004) emphasized that the urban territory reflects differentiated uses of space, structured by technical systems, informational flows, and socio-economic hierarchies. From the perspective of regional and urban economics, the expansion of cities involves spatial sorting mechanisms, whereby households of different income levels and social characteristics locate according to housing prices, accessibility, and neighborhood atributes (Shao, Z.; Sumari, N. S., et all, 2021). Thus, without integrating socio-demographic analysis into the study of urban sprawl, one risks overlooking the processes of socio-spatial differentiation and emerging segregation embedded in territorial growth.

This study addresses this gap by analyzing recent urban expansion in medium-sized cities of São Paulo, focusing on the socio-demographic characteristics of households residing in newly urbanized areas. The central hypothesis is that expansion zones are not socially homogeneous nor randomly occupied; rather, they exhibit structured patterns of income distribution, household composition, gender of household head, and race/color, contributing to differentiated socio-spatial configurations. By quantifying these patterns, the research seeks to move beyond descriptive accounts of sprawl and provide a rigorous assessment of how urban growth reshapes social geography.

Methodologically, the study integrates land-use and land-cover data from MapBiomas with microdata from the Demographic Census conducted by IBGE. Urban expansion over the last decades is mapped through the comparison of built-up areas across temporal intervals, allowing the precise identification of newly urbanized polygons. These spatial delimitations are then combined with harmonized census sectors to characterize the socio-economic profiles of resident households. Variables include household income, family composition, gender of the household head, race/color self-identification, and selected housing conditions. The integration of geoprocessing techniques with spatial statistical methods—such as exploratory spatial data analysis, global and local measures of spatial autocorrelation, and cluster detection—ensures that observed patterns are statistically robust (Steurer, M. & Bayr, C., 2020)

The empirical results indicate sustained territorial growth in medium-sized cities of São Paulo, often at rates that exceed demographic growth, signaling declining average densities and increased per capita land consumption. Expansion frequently occurs along transportation corridors and peripheral axes, reinforcing discontinuous and fragmented urban fabrics (Sposito, M. E. B.; Góes, E. M., 2013). More importantly, the socio-

demographic analysis reveals clear patterns of differentiation between consolidated urban areas and newly urbanized zones. High-income households tend to cluster in specific expansion corridors, often associated with gated developments and high-standard housing, while lower-income groups are disproportionately represented in peripheral social housing projects or areas with limited infrastructure. Distinct racial and income concentrations are observed, with statistically significant clusters identified through spatial autocorrelation measures.

These findings point to the consolidation of socio-spatial differentiation at the urban fringe. Rather than functioning as neutral spaces of residential opportunity, expansion zones reflect selective land market dynamics and public policies that channel different social groups into distinct territories. This pattern resonates with the broader literature on urban segregation and spatial polarization, suggesting that medium-sized cities are reproducing, albeit at different scales, structural inequalities historically associated with large metropolitan regions. The resulting urban form is characterized by fragmentation, with enclaves of relative affluence coexisting alongside vulnerable peripheries lacking adequate infrastructure and services.

The study also identifies evidence of selective governmental action in expansion areas. Infrastructure provision, transport connectivity, and public facilities often follow uneven trajectories, sometimes prioritizing zones of higher real estate valorization while delaying investments in socially vulnerable areas. Such selectivity reinforces uneven development and may deepen spatial inequalities over time. In this sense, urban expansion becomes not only a reflection of market forces but also a terrain of political decision-making that shapes long-term patterns of territorial inclusion or exclusion.

From a planning perspective, the socio-demographic characterization of newly urbanized areas is crucial. Without precise knowledge of who inhabits expansion zones, municipal governments risk adopting reactive or generic approaches to infrastructure provision (Zhang, M.; Yue L; Rui G. E Yurui Y., 2022). If expansion areas predominantly house young families, educational facilities and childcare services must be anticipated. If income vulnerability is spatially concentrated, targeted social policies and improved access to public transport become priorities. By contrast, when high-income enclaves dominate certain corridors, issues of accessibility, land regulation, and spatial integration require attention to avoid reinforcing exclusive urban fragments.

Furthermore, early identification of socio-spatial clustering enables preventive action against entrenched segregation. Planning instruments—such as inclusive zoning, mixed-income housing policies, and strategic infrastructure allocation—can be designed to foster social mixing and territorial integration. In this regard, the study contributes to debates on whether urban growth should be contained or guided. While containment strategies seek to limit horizontal expansion, guidance strategies aim to shape expansion in ways that promote cohesion and equity. The evidence presented here suggests that, irrespective of the chosen approach, socio-demographic data must inform territorial management decisions.

By integrating land-use mapping with spatial statistical analysis of census microdata, this research offers a replicable methodological framework for examining socio-spatial differentiation in expanding cities. Its empirical findings underscore that urban sprawl in medium-sized Brazilian cities is not a neutral or purely morphological phenomenon but a socially structured process with implications for cohesion, inequality, and governance. The expansion of urban territory must therefore be treated with analytical rigor and policy seriousness. Failure to incorporate socio-demographic characterization into planning risks consolidating fragmented peripheries marked by inequality and limited integration. Conversely, evidence-based territorial management can contribute to shaping urban growth trajectories that are more cohesive, inclusive, and aligned with long-term regional development objectives.

In sum, the study demonstrates that understanding who occupies the urban fringe is as important as measuring how far the city expands. By linking spatial growth to socio-economic differentiation, it advances both the empirical understanding of contemporary urbanization in São Paulo and the methodological tools available to urban and regional scholars. More broadly, it reinforces the argument that urban expansion must be addressed not merely as a question of land consumption, but as a central dimension of socio-spatial justice and regional responses in an era of rapid socio-spatial transformations in Brazilian cities.

References

IGLIORI, D.; NADALIN, V. Urban sprawl and peripheralization of poverty in the metropolitan region of São Paulo: empirical evidence. In: Revista Latinoamerica de Estudios Urbanos Regionales EURE, v. 41, n.124, p. 91-111, 2015.

NAZARNIA, N.; HARDING, C.; JAEGER, J. A. How suitable is entropy as a measure of urban sprawl? Landscape and Urban Planning, 184, 32-43, 2019.

SANTOS, Milton. Fragmented Corporate Metropolis: The Case of São Paulo. São Paulo: Nobel, 1990.

SANTOS, Milton. Divided Space: The Two Circuits of the Urban Economy in Underdeveloped Countries. São Paulo: Edusp, 2004.

SHAO, Z.; SUMARI, N. S.; PORTNOV, A.; UJOH, F.; MUSAKWA, W. & MANDELA, P. J. Urban sprawl and its impact on sustainable urban development: a combination of

remote sensing and social media data. Geo-Spatial Information Science, 24(2), 241-255, 2021.

SPOSITO, Maria Encarnação B.; GÓES, Eda M. Closed spaces and cities: urban insecurity and socio-spatial fragmentation. São Paulo: Editora Unesp, 2013.

STEURER, M. & BAYR, C. Measuring urban sprawl using land use data. In: Land Use Policy, 97, 104799, 2020.

ZHANG, M.; YUE L; RUI G. e YURUI Y. Heterogeneous Effects of Urban Sprawl on Economic Development: Empirical Evidence from China. In: Sustainability 14, no. 3: 1582, 2022. https://doi.org/10.3390/su14031582