Urban Planning in Brazil Using Tableau Visualizations

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1. Introduction

This report presents a critical analysis of a Tableau dashboard developed using a comprehensive dataset on Brazilian cities. The dashboard explores various aspects of urban planning, including development indices, infrastructure, mobility, economy, and public services. It utilizes a diverse range of chart types, calculated fields, filters, and interactive actions to generate meaningful insights. The aim is to uncover patterns and disparities in urban development across Brazil while demonstrating visualization best practices. Tableau was chosen due to its capacity to build interactive, layered, and high-performance dashboards that support real-time exploration of multivariate urban datasets.

The overall goal of this project was to produce a visually appealing and analytically rigorous dashboard that could simulate the decision-making process used by city planners and public policy experts. Given the complexity of urban systems in Brazil, which has pronounced regional inequalities, it was essential to leverage visualizations that not only highlight differences but also allow exploration across multiple dimensions such as economic activity, service access, infrastructure, and development indicators.

2. Design Justification

The dashboard includes seven visualizations that are integrated into a modern, interactive layout. A variety of visual formats such as bar chart, scatter plot, donut chart, line chart, box plot, symbol map, and filled map are used to enrich the storytelling and analytical value. Each visualization was carefully selected to align with a specific analytical question related to urban planning, ensuring that visual form and function are harmonized.

2.1 GDP per Capita by State (Bar Chart)

A horizontal bar chart was used to present GDP per capita by state. This format allows for easy comparison and ranking across Brazil's states. Color encoding was applied using calculated IDHM values to provide dual insight on economic and human development levels. Bar charts were preferred over treemaps here to support precise value comparison, especially since GDP values span a wide range and users need to assess small differences. This visualization allows policymakers to immediately identify economic powerhouses and evaluate them against social metrics.

2.2 Rural Housing vs Human Development Index (Scatter Plot)

A scatter plot shows the relationship between rural housing and the IDHM. Color was used to represent development levels, with each dot representing a city. This visualization reveals whether rural housing availability correlates with better development outcomes. A scatter plot is ideal here due to the need to reveal clustering and outliers. As this chart shows a relatively weak correlation, it encourages further exploration into whether rural housing is prioritized differently across states or affected by budgetary disparities.

2.3 Hotels vs Beds by Tourism Regions (Dual-Axis Bar + Line Chart)

This chart uses bars for hotel counts and a line for bed availability. Dual-axis charts allow comparison of two related infrastructure metrics. Filters allow viewers to explore specific regions or tourism categories. This format was chosen for its ability to show scale differences across metrics. The pairing of bar and line forms supports different trends emerging simultaneously—for example, where a region has a small number of hotels but a large number of beds, indicating the presence of larger or higher-capacity accommodations.

2.4 Postal Services vs Development (Box Plot)

Box plots were used to show post office counts across development tiers. This chart type highlights both the central tendency and the spread of values, including outliers. This would not have been visible in a simple bar chart. It supports the narrative that development disparity affects service accessibility. The visualization is particularly strong in revealing how service availability becomes less predictable in lower development levels, which may require targeted infrastructure planning.

2.5 Economic Contribution by Sector (Donut Chart)

The donut chart visualizes economic contribution by sector, emphasizing the dominance of 'Other services'. A donut chart was chosen for its intuitive proportional comparison. Though a treemap was considered, the donut's simplicity was preferred to highlight top-level contributions. Given that 'Other services' occupy more than 70% of the economy in many cities, this visualization sets a strong foundation for follow-up analyses on what comprises this category and whether cities are overly dependent on it.

2.6 Vehicles vs Population (Symbol Map)

This bubble map displays the total number of vehicles by city overlaid on a geographic map. The size of the bubbles represents the vehicle count while color shows the state. This is supported by a calculated field summing cars and motorcycles. A map view was essential to detect spatial vehicle concentration patterns. The visual not only helps identify mobility hubs but also hints at environmental or traffic concerns in over-congested urban areas.

2.7 IDHM by City (Filled Map)

This filled map provides a geographical overview of the Human Development Index. Color is mapped to IDHM values, making regional disparities immediately apparent. Cities in southern Brazil show higher values. The map provides intuitive geographic insight and supports action filters. It is particularly effective for strategic planning and funding allocation, highlighting regions that may require urgent policy attention.

The layout was intentionally structured into thematic sections that allow for intuitive navigation from macroeconomic comparisons to service availability and development index trends. A consistent color palette of muted purples and pinks supports clarity and visual cohesion, while thoughtful spacing, container use, and labeling ensure a modern aesthetic that aligns with professional dashboarding standards.

3. Interactivity and User Experience

The dashboard includes several advanced interactivity features:

Action filter: Global filter is created to filter on every worksheet with selected attributes.

Tooltips: Custom tooltips display key statistics like GDP, population, vehicle count, etc.

Calculated fields:

Total Vehicles: Sum of cars and motorcycles

IDHM Band : Categorisation of Human Development Index

These interactive elements encourage user exploration and reveal relationships that may not be apparent in static views. The inclusion of action filters ensures a seamless user experience, allowing users to click on one visualization and see the impact across others. This interactivity

transforms the dashboard from a presentation tool into a true analytical workspace. Each dashboard was built with a "mobile-first" mindset as well, using responsive sizing and container-based layout to maintain accessibility across device sizes.

Moreover, tooltips were enriched with context-specific metrics, including calculated fields and derived KPIs. Users can hover over a city to see its development score, economic rank, and service availability, bringing contextual storytelling to the forefront. This approach supports both novice users—who benefit from guided visual analysis—and expert users who can conduct deep dives into specific regions or metrics.

4. Key Findings

4.1 Development Disparity Across Regions (IDHM and Postal Access Maps)
The IDHM map and box plot make it clear that cities in the South and Southeast are significantly more developed than those in the North and Northeast. This correlates with better infrastructure, service access, and economic indicators. Southern states like Santa Catarina (SC) and São Paulo (SP) consistently rank high in GDP per capita and IDHM scores, while Northern states lag behind. This insight supports known urban-rural divides and regional inequities in Brazil.

4.2 Economic Concentration in Few States (GDP and Sector Contribution Visuals)
The GDP chart shows a significant economic concentration in states like SP and RS. The donut chart reinforces this by showing the dominance of the services sector in contributing to urban economies. Despite Brazil's size and diversity, economic power remains clustered in a handful of urban-industrial hubs. This suggests that regional diversification strategies may be needed.

4.3 Service Accessibility Gaps (Postal Services by Development Levels)
The box plot on postal services shows that cities in more developed regions have better access to postal infrastructure, whereas less developed cities often have far fewer services. The variability across cities suggests inconsistent investment in essential services. Improving postal service distribution could be a proxy for broader public infrastructure improvement.

4.4 Infrastructure and Mobility Trends (Vehicles vs Population Map)

The vehicles vs population map indicates that larger urban centers have more vehicles, but vehicle access doesn't scale linearly with population, suggesting policy gaps or affordability issues. Some mid-sized cities show disproportionately low vehicle counts relative to their population, which may reflect lack of economic opportunity or inadequate transport funding.

4.5 Tourism Infrastructure Disparity (Hotels vs Beds Visualization)

While tourism-rich regions have more hotels and beds, the chart also reveals underutilized potential in mid-tier regions, indicating room for infrastructure development. This data could be used by tourism authorities to redirect investment or assess current marketing effectiveness.

4.6 Urban-Rural Divide in Housing (Scatter Plot: Rural Housing vs IDHM)

The rural housing scatter plot shows a weak correlation between rural infrastructure and IDHM, pointing to possible prioritization gaps in national development. It raises questions about whether rural housing investments are aligned with broader development goals.\

4.7 Interconnected Urban Patterns (Cross-Visualization Insight)

When combined, the maps and charts allow users to connect economic, geographic, and service-related insights. For example, selecting a high-GDP state in the bar chart immediately shows its advantage in vehicle ownership, hotel capacity, and IDHM scores. This multi-layered analysis confirms the utility of interactive dashboards for complex urban decision-making.

5. Conclusion

The dashboard showcases how interactive, well-designed visualizations can effectively uncover urban planning insights. By combining diverse chart types with calculated fields and action filters, the user experience is both informative and engaging. The visualization design was purpose-driven, with each chart selected based on the nature of the analytical question it addressed. Action filters and global filters were embedded to promote deeper investigation across interrelated urban domains. These techniques serve both narrative clarity and exploratory power.

Overall, this project highlights the importance of user-centered design in data visualization. Visual diversity, logical grouping, and clean formatting not only make the dashboard aesthetically pleasing but also improve data comprehension. By integrating calculated fields and filters strategically, the visualizations become adaptive and user-driven, which aligns well with the real-world demands of policy analysis and strategic planning. The Tableau dashboard can thus serve as a prototype for urban monitoring tools and supports decision-making processes that prioritize equity, accessibility, and growth.

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