THE CITY SHAPED BY REAL ESTATE MARKET: URBAN SPRAWL IN PLANALTINA DE GOIÁS, BRAZIL

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ABSTRACT

This paper discusses the impacts of urban expansion driven by real estate interests on the shape of the city. The rapid growth of urban sprawl in Brazilian cities, associated with the transformation of rural land into urban land, is a result of the power held by market agents (construction companies and contractors) over the urbanization process. In this context, we bring the example of Planaltina, a city located on the northern border of Brasilia and whose history is firmly intertwined with that of the federal capital. Founded in 1964, the city has been growing rapidly with legal and illegal settlements. We seek to understand the relationship between supply and demand for urbanized land in Planaltina, as well as the consequences of this way of expansion for the city in morphological terms. For that, an exploratory research was carried out, based on aerial images, urban projects and existing settlements, which allowed the comparison between the current situation and a projection of the future shape of the city. In addition, the Space Syntax Theory was applied in the elaboration of axial maps of the path networks observed at different times, aiming to reveal the existing connections, evaluating their permanence or finitude. The research uncovered the wide disparity between supply (large) and demand (small) for urban lots, as well as an urban fabric that, although fairly regular, is also excessively fragmented, as a result of the growth logic that has the main objective in profit, leaving the quality of space to the background.
Keywords: Urban morphology, Real estate Market, Space Syntax.

INTRODUCTION

This paper discusses the impacts of urban expansion driven by real estate interests on the shape of the city. The rapid growth of urban areas in Brazilian municipalities, associated with the transformation of rural land into urban land, is one of the results of the power exercised by market agents (construction companies, contractors and entrepreneurs in civil construction) over the urbanization process. In this context, we bring the example of Planaltina de Goiás, a city located on the northern border of Brasília and whose history is closely intertwined with that of the federal capital. Our exploratory research seeks to understand the relationship between supply and demand for urbanized land in Planaltina de Goiás, as well as the consequences of this way of growth, in morphological terms.

BACKGROUND

The urban issue and the need for urban planning has been the focus of several debates and research in Brazil since the 1960s, given the intense process of industrialization and, consequently, urbanization that was taking place in the country (Monte-Mór, 1981). Needless to say, the civil construction field has been highly favored by the development of whole neighborhoods and even whole cities. The transformation of rural land into urban land is a great part of this process, as well as the firm connection between capital and State regarding the city (Harvey, 2014).

It was in this context that the transfer of the capital of Brazil to a brand-new city occurred. Brasília sits in the middle of the big state of Goiás and much of the land that once belonged to the municipality of Planaltina belongs today to the Federal District - DF. The entire original administrative structure of Planaltina[1] (town hall, city council, jail and more) remained within the limits of the new DF. Therefore, there was a need to build new headquarters for the municipality.

Different from what might have been expected, the growth of the city did not happen after the consolidation of the area included in the original design. Concomitant to the occupation of the areas foreseen in the project, came lots of new allotments built by private agents (notably rural landowners), who fractioned originally rural lands. Aerial images from 1977 show a Planaltina composed of five blocks in the original area, in addition to two private allotments. Since then, the municipality's urbanized area has been growing in large proportions, reaching around 115 Km^2 in 2019, when 33 privately owned allotments could be found in the immediate limits of the city's original sector.

Added to this is the scarcity and difficulty of access to current urban legislation. Planaltina has a Masterplan approved in 2006, to which we were unable to gain access. Also approved in 2006, the city´s bill of land use and occupation is very superficial. It is important to mention that, according to this Bill, residential use in the municipality is restricted to single family housing, a typology of very low performance in terms of density and coherent use of urban infrastructure.

Thus, it is observed that the city has been developing rapidly through the action of private agents, in a process of valorization of urbanized land (Lefebvre, 2004) and transformation of rural land into urban land, by fractioning farms and creating new housing sectors. Although, apparently, this process takes place within legal parameters, its final result is not being evaluated by urban control agencies, given the lack of effective technical staff linked to the city hall.

In this context, three research questions were then elaborated, namely: 1) How does the relationship between supply and demand for urbanized land work in Planaltina de Goiás; 2) What are its consequences in morphological terms and 3) What is the expected scenario after the effective consolidation of the allotments. Our objective in this article is to demonstrate the mismatch between supply and demand for urbanized land in Planaltina.

METHODOLOGY

In terms of methodology, we started from a documental research, in which were gathered the urban plans of the consolidated areas and future developments for the urban perimeter of the city, as well as the current urban legislation. Then an exploratory research was carried out, comparing orthophotos and satellite images available in Google Earth for the period between 1977 and 2019 with the allotments surveyed in the previous stage. Finally, axial maps of existing road networks were elaborated for five different time slots (1977, 1984, 1995, 2010 and 2019), in addition to two reference maps (original design and future consolidation). The axial maps were prepared using the QGIS 2.18 Las Palmas software and processed with the Space Syntax Toolkit plugin in conjunction with the DepthmapX Net 35 software, which made it possible to analyze the configuration variables specific to the Space Syntax Theory.

[1] The original headquarters of the municipality of Planaltina became Administrative Region VI of the Federal District, keeping the name Planaltina. There are, therefore, two cities called Planaltina: the one within the limits of DF, which is the historic headquarters of the municipality of Goiás and Planaltina de Goiás, that is discussed in this paper.

Two other variables were defined for the assessment of the allotments: development of occupation and development of effective occupation. For the first variable, the consistency of the road system and the existence of buildings were adopted as a parameter; to assess the second, the lots belonging to each allotment were counted and the percentage that included some type of building was verified.

For the representation of path networks in axial maps, it was necessary to define a code of conduct, so as not to compromise the analysis. This is because it was found that the existing paths change a lot between time frames. This happens more often in the informal paths but it is also common in official roads: when the allotment stays empty for a long time and does not consolidate, new roads soon fade, until they disappear almost completely. Therefore, an evaluation system was defined, based on the comparison between Google Satellite images and Google Roads maps, both available as QGIS Quickmap plugins.

It is important to mention that, for the purpose of this paper, we consider the lot as the smallest land parcel. Therefore, the paths existing within the lots (condominiums, for example) were not represented on the axial maps. This choice was made due to the impossibility of predicting the cases of dismemberment of lots that may come to exist during the consolidation process of allotments, preventing an effective comparison between the selected time frames. We also chose not to represent paths less than 2.50m wide, which would be the minimum dimension for a car to pass through (Coelho, 2018).

Even with the definition and application of the aforementioned parameters and codes, it is of great importance to emphasize that the axial maps do not correspond exactly to reality; they consist in approximations elaborated from images. In any case, this does not diminish their role in the study of the city under a configurational point of view, as has been proven in several studies, according to Medeiros (2013), Loureiro (2017) and Coelho (2018), to mention some of the most recent elaborated at Universidade de Brasília.

FINDINGS

There are 35 allotments within the limits of the urban perimeter of Planaltina: two form the area of the original design and belong to the municipality; the rest of them are privately owned. Only 2 out of the 35 are not officially registered with the municipality.

Our analysis revealed that land occupation in Planaltina does not occur in a centrifugal and linear fashion. On the contrary, there were cases in which a new allotment was implemented far from the center, with nothing but empty areas between those two points. There were also several cases of imagens showing demarcated allotments that disappeared in more recent photos, without ever being actually occupied. In any case, it is noticeable that the urban perimeter is gradually expanded, even though the allotments do not show gradual evolution when individually evaluated.

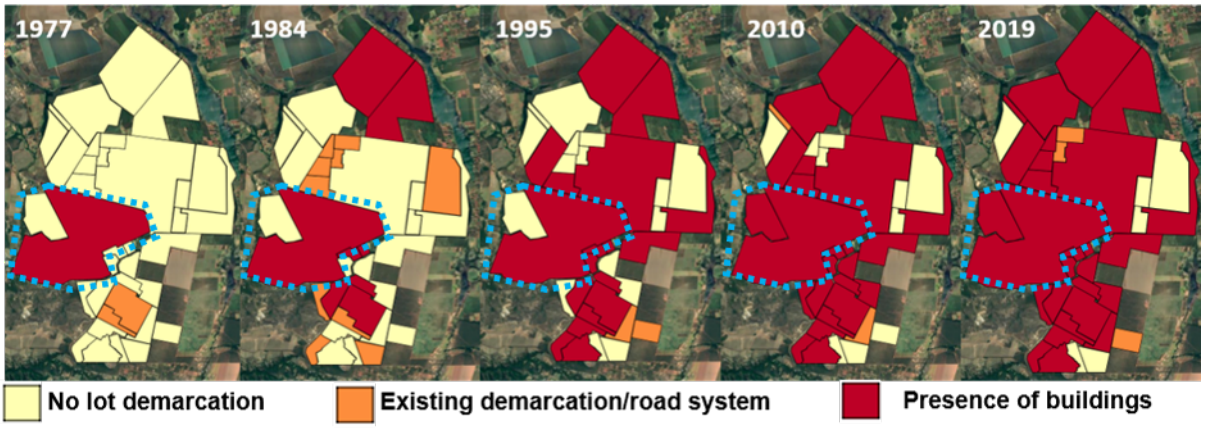

Figure 1: Development of land occupation in Planaltina. The blue line marks the original sector. Own authorship based on Google Satellite and QGIS.

Even though our analysis shows an expanding urban perimeter, it was necessary to qualify this occupation, in order to understand whether buildings are actually being built on the available lots. Our analysis shows that this does not happen. Of the 35 existing allotments in the city, just over half (54%) have more than 25% of the available lots occupied. More than 25% of the allotments are still completely empty (2019).

Another interesting fact is that the date of appearance does not determine the evolution of the allotments. Our analysis found allotments that were initially observed in 1984 and that are still empty today, whereas there are allotments that appeared twenty years later and that are already occupied. Distance from the original center seems to be a determining factor in the consolidation of the allotments: consolidated allotments tend to be closer to the area of the original design, regardless of the order in which they were launched. The overlapping of polygons representing the existing urban perimeter in each of the evaluated time frames corroborates this conclusion.

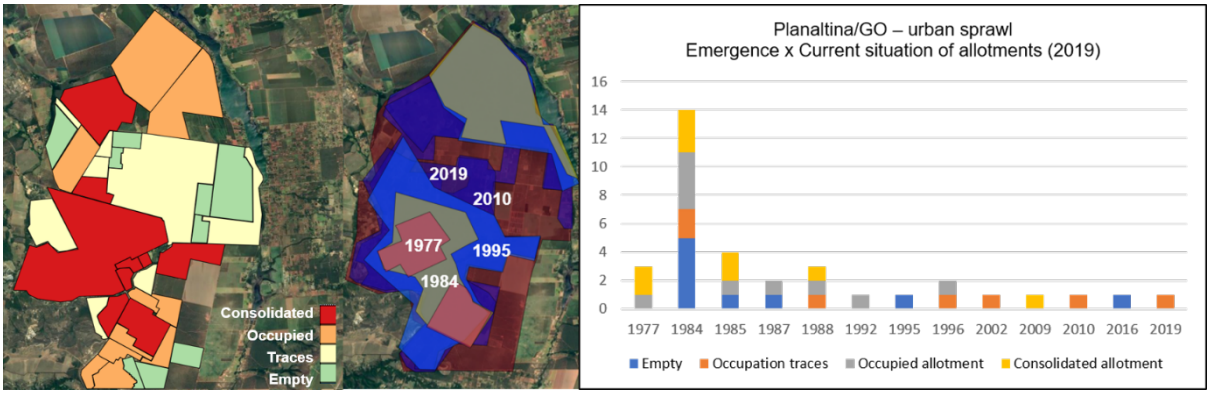

Figure 2: Current situation of effective occupation in Planaltina de Goiás (2019) and evolution of effectively occupied perimeter. Own authorship based on Google Satellite and QGIS.

But in terms of population growth, is this expansion justified? Our study shows that it is not. We observed that, although the growth of Planaltina's urban area is accompanied by an increase in population, it does not justify the dimensions that the city's urban perimeter assumed in such short time. According to the Brazilian Institute of Geography and Statistics - IBGE, the absolute population expected for 2019 in Planaltina was of 89,918 inhabitants. A comparison with other Brazilian municipalities with urban systems of similar dimensions shows that Planaltina de Goiás is, by far, the municipality with the lowest population density among those evaluated.

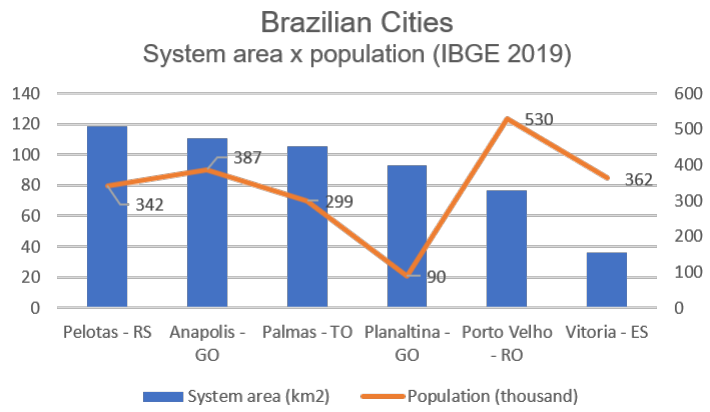

Figure 3: Comparison between Brazilian cities (density). Own authorship based on IBGE data (2019).

Therefore, it is safe to say that the launching and developing of new urban allotments is not based on demand for urban land. But what does this have to say about the consequences in terms of morphology for the city? As previously stated, Planaltina has been developing from the juxtaposition of allotments, which leads to the fact that the city's road network is residual. It is noticeable that, in addition to the larger access routes, any other road connection is the result of an effective need after implementation. In general, almost all of the allotments are made up of regular grid, with "X" connections. The exception is the Setor de Mansões, the only one with an organic "tree" road system (Alexander, 2006). The juxtaposition of allotments results in a fairly regular, but discontinuous, urban patch.

Figure 4: To the left, axial map of Planaltina in 2019, taking into account informal paths. To the right, axial map of consolidated scenario. Yellow marks the location of Setor de Mansoes. Own authorship based on QGIS.

The axial map for the consolidated scenario has 1,330 lines/axes, with an average length of about 720 meters. According to Medeiros (2013), it is common for planned cities to have more elongated axes, since they tend to have a regular shape. The value for Planaltina is well above that of other planned Brazilian cities, such as Palmas (410 meters) and Porto Velho (550 meters). But it is interesting to note that in this case, the longest axes have only a local function, a fact that is consistent with the "patchwork" expansion of the city.

On the other hand, the 2019 axial map has 1,614 axes with an average length of 494 meters. This difference is due to the current presence of several informal paths, which tend to be less straight and regular. It is also interesting to observe that the original design map has only 517 lines/axes, around 520 meters long. The difference between the original design and the future situation shows how much larger the Planaltina system will be in extension than the one initially planned when (and if) consolidated.

The data referring to the geometric variables Compactness A (number of axles per square kilometer) and Compactness B (length of axes per square kilometer) corroborate that the low

density of the city's urban system is not only in terms of population density or buildings, but also of road axes. Taking the survey of 44 Brazilian cities made by Medeiros (2013), we have that Planaltina would be one of the least compact cities in Brazil, if it were included in the sample selected by the author. For the axial map of 2019, Compactness A is 17.29 being only greater than that of Brasília, Rio de Janeiro and Porto Alegre. Compactness B is 5.29, being higher only than Brasília.

Moving on to the analysis of topological variables, we start with the global and local integration of Planaltina. The global integration demonstrates that, in addition to the main avenues of the original sector of the city, only the Chácaras / Santa Maria area (to the north and northwest of the original sector), tends to constitute a nucleus of system integration. Regarding local integration, we observed the existence of more integration axes in allotments such as Chácara de Recreio Bela Vista (extreme north of the map), Parque Itapuã I and II and Jardim Paquetá (south of the original sector). This is probably due to the urban "patchwork" fabric existing in Planaltina. Without global access routes, some routes of certain allotments end up exercising the function of access to other allotments.

Both the maps for NAIN (smallest angular path) and NACH (path chosen by the system user) confirm the centrality character of the area of the original design, as well as the probability of the appearance of a new centrality in the Chácaras / Santa Maria area, should it be consolidated in the future. The NACH maps also show routes with more choice for the route south of the original project area, in the older allotments (Jardim Paquetá and Itapuã II), probably because they serve as a gateway to other newer allotments.

Figure 5: Axial maps for future consolidated scenario in Planaltina. Global (1) and local (2) integration, NAIN (3), NACH (4). Own authorship on QGIS.

CONCLUSIONS

The present work aimed to demonstrate the mismatch between supply and demand for urbanized land in Planaltina de Goiás based on three research questions. We were able to observe that roads appear and fade in very short time; lots are demarcated and never occupied. Whole sectors of the city appear in a year just to be swallowed by vegetation in the next. The data collected show that the spatial growth of the city is not justified by demand (population increase); they also demonstrate that the shape of the city is the result of the juxtaposition of allotments without a guiding and systemic principle.

In relation to morphology, Planaltina, like many other Brazilian cities, is a paradox that associates a fairly regular road network with a very fragmented land occupation. The urban fabric becomes a patchwork, woven from the action of private landowners who work from the perspective of profit. Contrary to what happens in historic cities around the world, regularity in this case ends up revealing typological poverty and the fragility of city concept.

Finally, we cannot fail to mention the importance of configurational analysis as a tool to aid in the creation of urban legislation. The evaluation of future scenarios for Planaltina revealed important characteristics, such as ways of integration with global and local roles, in addition to the probability of appearance of new centralities in the process of consolidation of the city, which can be very relevant information for drafting new urban legislation, among other applications.

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