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URBAN CONFIGURATION AND PUBLIC SPACES VITALITY IN THE OLD CENTRE OF GOIÂNIA (BRAZIL)

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ABSTRACT

The paper explores the relationship between spatial configuration and public spaces vitality in the old centre of Goiânia (Brazil). The morphological approach evaluates barriers and permeability's in the city´s structure, based on the theory, methodology and tools of the Theory of the Social Logic of Space (Space Syntax), allowing the scrutiny of variables relating urban configuration and vitality in the selected area. The variables which influence people´s movement (therefore contributing to the use and vitality levels found in the old centre) and the correlation between configurational and non-configurational variables are explored and discussed to refine the comprehension of vitality, so that the role of configuration can be better understood. The two research questions posed in the study are: 1) how does urban configuration, in its global and local levels, affect vitality in the old centre of Goiânia?, and 2) which are the spatial mechanisms which allow the maintenance of urban vitality in old centres? Results have demonstrated that urban configuration affects people flow, reducing or promoting co-presence, in addition to interfering in the vitality and the creation of empty areas. Moreover, vitality is directly dependent on the number of doors that open onto the streets, sidewalks and squares. Land use also plays a major role in the top zones with high number of people according to counting strategies. Finally, vitality is also a product of the urban system as a role. Findings suggest how Space Syntax procedures are helpful to the comprehension of morphological features as promoters of a more diverse and dynamic public space.

KEYWORDS

Old centres, centrality, configuration, vitality, Brazilian cities

1. INTRODUCTION

The relation between spatial configuration and vitality in the old centre of Goiânia is analyzed from a configurational standpoint, which corresponds to the interpretation of relations arising from the arrangements between fulls (barriers) and voids (empty spaces) that constitute the structure of the city and that affect life in the public spaces. According to Trigueiro and Teixeira (2011, p.6):

Configuration is defined by the form and arrangement of barriers and accesses. Barriers are everything that prevent or hinder the passage between spaces or voids (blocks, buildings, etc.); access is what grants passage or permeability between barriers (roads, squares, plazas, empty spaces).

Holanda (2013) discusses the barriers and accesses - or permeabilities - applied to urban spaces, stating that the configuration of these elements can promote the encountering and create more usable spaces. The opposite may also occur, encouraging avoidances and generating idle or unusable spaces.

According to the author, the barriers and accesses interfere in the flow of people and generate patterns of movement, which can be interpreted and quantified by means of Theory of Social Logic of Space, also known as Spatial Syntax, in which Hillier et al. (1993) refer to as natural movement.

According to Saboya (2010), based on Hillier's studies, "configuration of the urban network", for example, "has the property of privileging some spaces in relation to others, with respect to the passing movement". Therefore, the layout of streets would be the main generator of these patterns. It is thus possible to infer that the layout of streets is of fundamental importance for locating uses, especially in central areas that depend on the flow of people.

Holanda (2013) adds that in the case of old centres, however, the layout is not enough to maintain the uses: it is necessary to employ "all incentive mechanisms, so that the occupation is not sporadic, either in space, or time". When such incentives are not applied, the space of old centres tend to be emptier in certain times of the day, or even completely 'dead' at night, as the author observed. He concludes that it is the continuous appropriation that fosters the vitality of the old centres.

Holanda (2014) defines the vitality of the centres as being the presence of the mixture of movement and activities, in space and time. Some authors such as Jane Jacobs and Jan Gehl are references on this topic of life in the spaces of the city. Particularly, the studies of Gehl (2013) are of special relevance because they detail tools or strategies that ensure vitality in public spaces. The urban planner prioritizes the human scale and describes planning measures to ensure the quality and use of spaces by people.

The studies of Tenório (2012) and Holanda (2013, 2014) contemplate these aspects and associate them to the strategies explored by Space Syntax. As previously stated, the configuration of spaces has social implications, that is, the way in which its structuring elements relate in space directly influences the appropriation of spaces by people. In her thesis on public spaces, Tenório (2012) points out mechanisms and develops a method to avoid the death of places. In the case of town centres - if the occupation by people is what promotes the vitality of these areas - both Tenório (2012) and Holanda (2013) discuss some mechanisms that ensure flow, such as: 1) street accessibility; 2) mixed uses and activities; 3) and visibility/permeability of commercial buildings.

Based on these premises, the study explores the urban dynamics that affect the old centre of Goiânia and its vitality, with focus on spatial configuration. To do so, the following research questions were posed: 1) how does urban configuration affect vitality in the old centre of Goiânia?, and 2) which are the spatial mechanisms which allow the maintenance of urban vitality in old centres?

The article, based on a Master Dissertation developed by Arrais (2015), is divided into three parts. The first introduces the theme. The second explains the methodology used. The third, finally, presents and discusses the case study, which anticipates the conclusions.

2. DATASETS AND METHODS

The study is based on the Theory of Social Logic of Space or Space Syntax. Proposed by Bill Hiller and Julienne Hanson in the 70s, Syntax encompasses a reflection on the set of rules and principles which structure the urban space, in order to explore the relations between space and society. Space here is understood based on the work of Holanda (2013), in which he states that "we organize it (space) in order to satisfy and reproduce systems of interpersonal encounters". The author adds that this perspective is based on the premise that "human spatial organization, be it in the form of settlements, or in the form of buildings, is the establishment of patterns of relations composed essentially of barriers and permeabilities of various kinds" (Holanda, 2002, P.96).

Barriers and permeabilities are the structuring elements of the urban system, which are also called fulls - buildings, blocks - and voids - roads, sidewalks, footpaths. From the point of view of the spatial configuration, these units that form the structure of the city articulate amongst themselves and are interdependent. As these elements are associated, they can favor the movement of people, foster encounters, provide attractions for specific areas, but also lead to avoidances and render some areas less attractive than others. These questions refer to the potential flow of movement of an urban system.

The Theory of Social Logic of Space works with this systemic perspective for the urban environment and considers that the parts affect the whole and vice versa, demonstrating the existence of an interdependence between the structuring elements of the urban space (Medeiros, 2013). In other words, if a change occurs in the spatial configuration of a certain location, it will affect the system as a whole, in one way or another.

For the present study, changes in spatial configuration that interfere with the flow of movement of the old centre were of special relevance because of the proposed problem. In this sense, Space Syntax was useful because it allowed us to interpret and quantify this movement.

Regarding the tools, axial maps were used and three categories/variables were explored: a) integration (global and local measures from the axial maps), b) permeability of buildings (presence of doors that open onto the streets) and c) land use. The collected data was then faced with d) counting (real movement flow), registered by means of the Gate Method (see "Space Syntax Observation Procedures Manual").

Procedures considered the counting of vehicles and pedestrians in gates distributed through the old centre of Goiânia (heritage site) (Figure 1), in three zones: Tocantins, Araguaia and Independência. Counting was collected in weekdays (Monday and Tuesdays) and weekends (Saturday and Sunday), in two periods: from 7:30am to 9:30am, and from 5:30pm to 7:30pm (for further details, see Arrais, 2015).
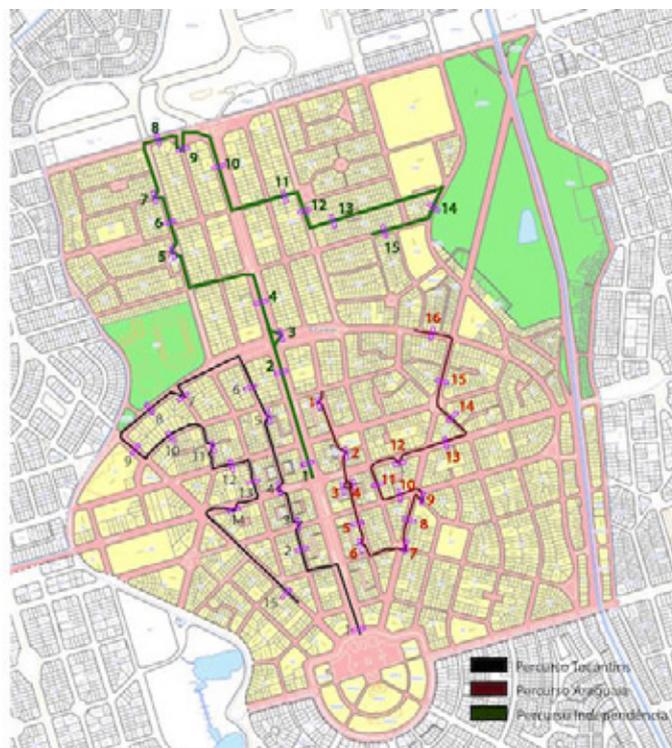

Figure 1 - Identification of gates (The Gate Method) in the old centre of Goiânia (counting procedures), according to specific zones (Tocantins, Araguaia and Independência).
Source: Arrais, 2015.

3. CASE STUDY: THE OLD CENTRE OF GOIÂNIA

3.1. BRIEF HISTORY

Goiânia, built to be the new capital of the state of Goiás, was founded in 1937 and its original layout was planned. Since its conception, the city already presented two main cores: Campinas (an already existing neighboring city to be integrated to the capital) and the area designed by Attílio Corrêa Lima. Before Goiânia was founded, Campinas already concentrated most of the commerce and services, and it was the main active core of the city, while *Setor Central* was still being consolidated. In the 30s, with the project being implemented, the configuration gradually shifts and Campinas becomes the secondary centre (Alarcón, 2004).

The project of Attílio Corrêa distributed the city in five sectors. The main sector was *Setor Central*, which concentrated administrative activities in a main square called *Praça Cívica* and commerce in *Avenida Goiás*, the main avenue. The streets parallel to the main avenue and *Avenida Anhanguera*, a transversal axis created by incorporating the old road that connected *Leopoldo de Bulhões* (another neighboring city) to the former town of Campinas were also mostly commercial. The other four sectors corresponded to their geographical location: Northern Sector, located below Paranaíba Avenue, with a more regular layout and where industrial activities were concentrated; The Southern Sector, destined for residential use; And the East and West Sectors, which in Attílio's plan are only outlined (Manso, 2001).

The urban expansion of Goiânia in the year 1939 remained within the limits foreseen in the first plan, since the government oversaw the settlement of new areas as a way of maintaining the planned occupation. In the year 1947, the new building code of the municipality made it possible the expansion into new areas headed by the private sector and Goiânia expanded beyond the limits of its original design. The growth took on even greater proportions when, in the early 50's, the government allowed the construction of neighborhoods without the requirement of a basic infrastructure, only with the establishment of roads. The result was the increase of the urban area, with settlements without basic infrastructure, disconnected and producing numerous urban voids; Constructions without restriction of uses; And invasions in valleys. The city lost its configuration (Ribeiro, 2004).

According to Alarcón (2004), with the increasing concentration of commerce, services and offices, the centre of the city was consolidated as the main core in the 70s. However, from 1980 onwards, the active centrality expanded from *Setor Central* to *Setor Oeste* (west), shifting towards the more integrated axes of the urban structure, that is, streets with greater topological accessibility.

According to Correa (2010), the changes that happened in the last decades in Goiânia pulverized some activities and produced new urban centralities. The higher income population of the city lives next to these centralities, namely *Setor Oeste*, *Bueno*, *Marista, Nova Suíça* and *Jardim Goiás.* Currently, the old centre of Goiânia still concentrates the main activities of commerce and service, despite the urban expansion (Alarcón, 2004). Some public agencies - formerly located in *Setor Central* - were transferred to other parts of the city, such as the City Hall. The old centre has thus lost its administrative function, but not its performance as an aggregator of various commercial activities and services.

The capital has followed a trend found in other old centres of Brazilian cities that experience the emptying of residential uses and activities and services with an elitist character. This is due to the fact that these centres are seen as degraded spaces and by the offer of areas that supposedly provide better spatial quality. The streets are extremely busy during the day, mostly with people of lower social strata, due to the diversity of activities and services provided, and by the direct contact of the stores with the most accessible streets. The absence of people flow is felt in more segregated streets, such as in alleys and in inner squares, and during the night.

3.2. ANALYSIS: RESULTS AND DISCUSSION

The analysis of the case study focused on the global aspects that involve the system as a whole, and on the local aspects that deal with its structuring elements, focusing on the research problem. At the global level, the study focused on the boundary between Goiânia and the conurbation of Aparecida de Goiânia, in which the aspects of the spatial configuration of the system that affect the old centre were considered. The limits of the old centre are the perimeter created by the buildings considered by the federal government as a historical heritage (Figure 2). Within this cut, routes with different configurations for the application of local variables were selected.
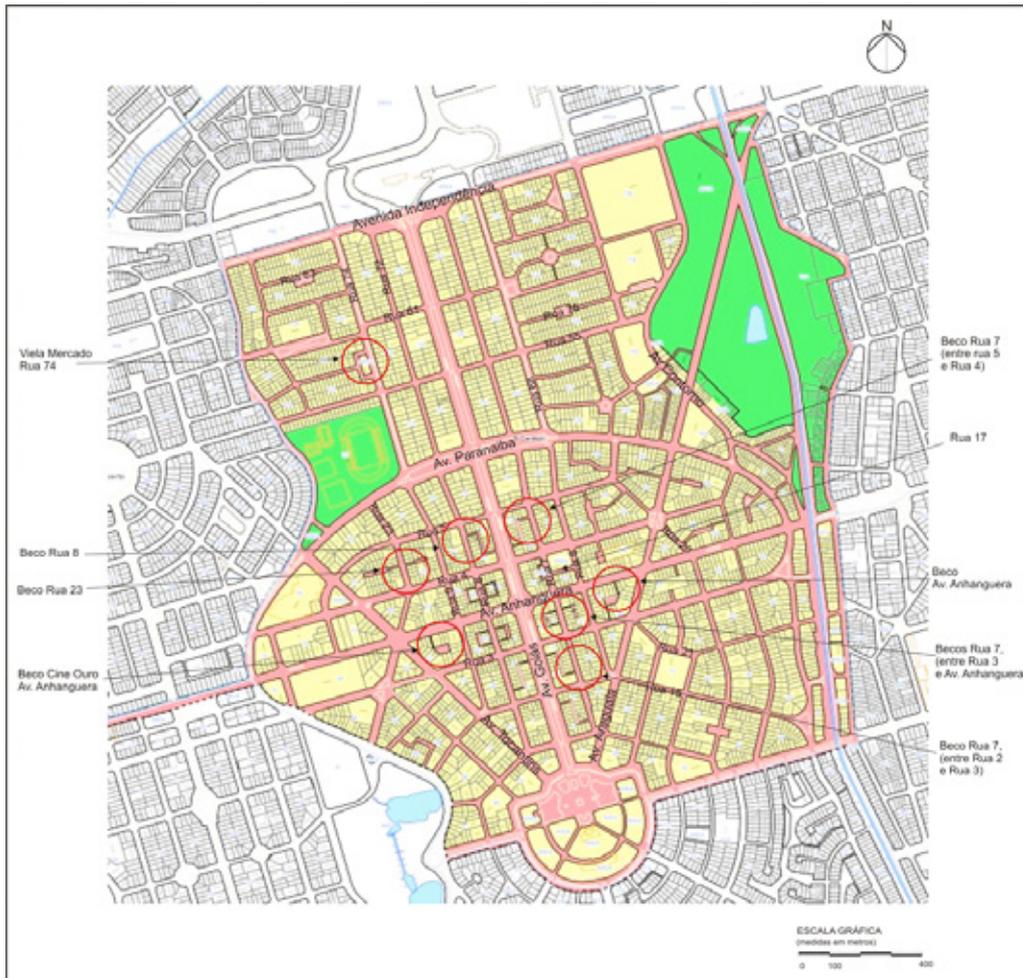

Figure 2 - Map of the old centre of Goiânia, highlighting the streets analyzed.
Source: Arrais, 2015.

Considering that the movement of people is one of the factors that allows the understanding of the vitality of the public spaces, the research variables were correlated with the real flow of people (pedestrians and vehicle), obtained by the Gate Method (co-presence variable).

The results were interpreted using the *Cohen scale*, adopted in the studies of Medeiros (2013), and complemented with the coefficient of determination R^2, according to the procedure suggested by Jacques (2006, *apud* Medeiros, 2013). According to the author (2013, p.329), this scale is "an auxiliary tool that explains the intensity of 'r' from the correspondence between the numerical value obtained (positive or negative) and a range of classifications spreading from 'nonexistent' to 'perfect'" (Table 1).

Category	r	R²
Inexistent	0,0 a 0,09	0,0 a 0,008
Low	0,1 a 0,29	0,1 a 0,08
Moderate	0,3 a 0,49	0,9 a 0,24
High	0,5 a 0,69	0,25 a 0,48
Very High	0,7 a 0,89	0,49 a 0,80
Almost perfect	0,9 a 0,99	0,81 a 0,99
Perfect	1	1

Table 1 - Evaluation of the values of r and R²

For the analysis, Medeiros (2006, p. 283) explains the use of "r" and "R²":

The value of "r", or Pearson's correlation, expresses the degree of relation and/or association between two or more variables. This can be positive (if directly proportional) or negative (if inversely proportional), with values between "1" and "-1" (the closer to "0", the more fragile the relation is; the closer to "1" or "-1", the stronger the relation is). R^2, or coefficient of determination, is obtained by means of a simple regression, which corresponds to the measure of the variability proportion of one variable explained by the variability of the other, being one of the variables independent and the other dependent (or explanatory). The measure is derived from Pearson's correlation, "r".

3.2.1 INTEGRATION

In the reading of the Axial Map of Goiânia (Figure 3), it can be observed that the set of more integrated streets (those with greater potential for accessibility - highlighted by the red hues) are distributed over the urban system, in a model called Deformed Wheel by Hillier and Hanson (1984) (*apud* Medeiros, 2013), in which more integrated streets come from all directions of the city. However, these streets are more evident in the south and southwest part of Goiânia. This set of integrated streets encompasses the old centre, which allows us to infer that the area remains the active centre, that is, where flows and different uses converge, in quantity and diversity. The statement is also reinforced with data on the global integration of its streets, which have shown significant accessibility, even considering the more segregated spaces such as alleys and culs-de-sac.
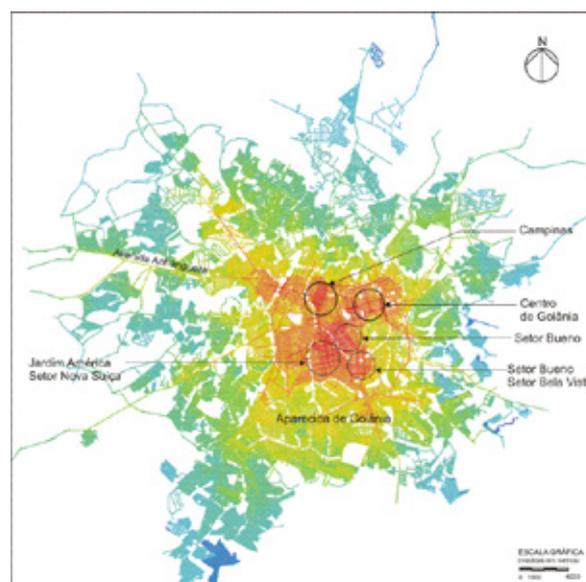

Figure 3. Axial map of Goiânia with the reading of global integration Rn for the year 2015.
Source: Arrais, 2015.

When correlating the integration data of the selected old centre streets with the people count, it possible to observe that the axes with the highest integration values, for the most part, are also those where the flow of people was more expressive (R² = 47%). Figure 4 shows the correlation between the global integration and the pedestrian movement in the centre during the week.
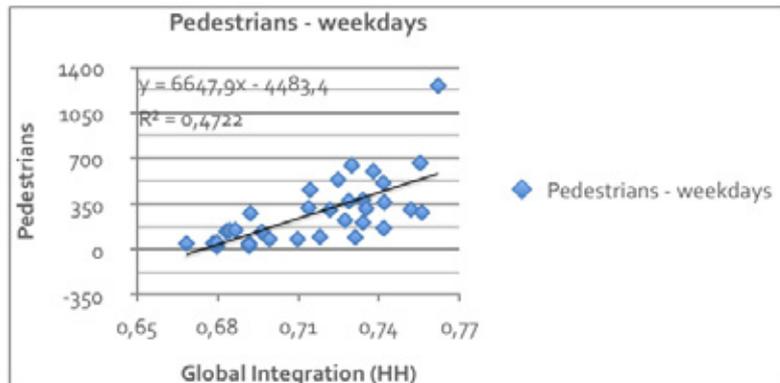

Figure 4 - Correlation between global integration and pedestrians, excluding Rua 21. Results for weekdays.

The data reinforce the importance of configuration to attract and sustain the flow of people on the streets. When the analysis is carried out locally, with local integration data, the results are similar (R² = 44%), as shown in figure 5.
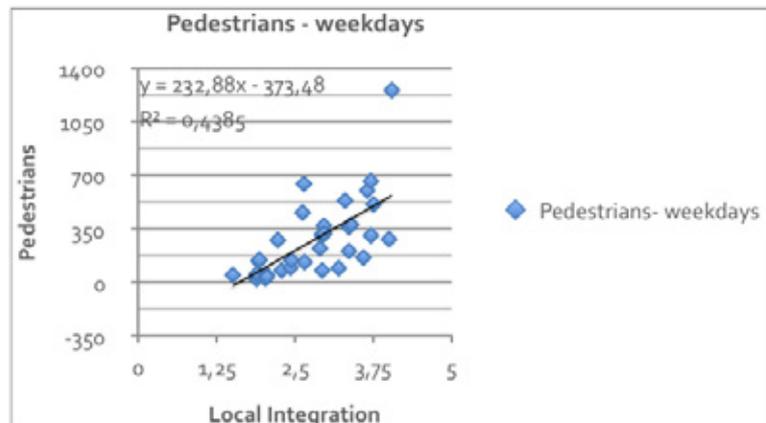

Figure 5 - Correlation between local integration and number of pedestrians on weekdays.

3.2.2 PERMEABILITY OF BUILDINGS

This variable analyzes the permeability of buildings made possible by the presence of doors that open onto the streets. These 'doors' can be defined as openings that provide direct passage to the streets. Jacobs (2001) considers these elements as the eyes of the street, fundamental to ensure safety and vitality of the spaces. Holanda (2013) adds that cities need buildings with more 'eyes' and less 'shoulders' and 'backs' to the streets, to favor the encounter between the people. The places of circulation with large blind walls, without 'eyes' or doors, are spaces to be avoided by pedestrians, especially due to the lack of safety they instill in people.

In each of the selected streets the number of doors was counted. Initially, the Google Street View© software was used. However, due to the difficulty in visualizing the doors caused by the presence of barriers such as trees and vehicles, the strategy was altered and the counting started to be carried out on site.

In general, considering the results expressed in Figure 6, it is possible to infer that the number of doors along a certain street positively influences the increase in pedestrian flow. Streets with higher number of doors are also those with the highest movement (R^2 = 59%). Studies show that the possibility of encounters or permeability allowed by these accesses generates a greater sense of security that favors the flow of people, even in situations of closed doors and windows (Barros, 2014).
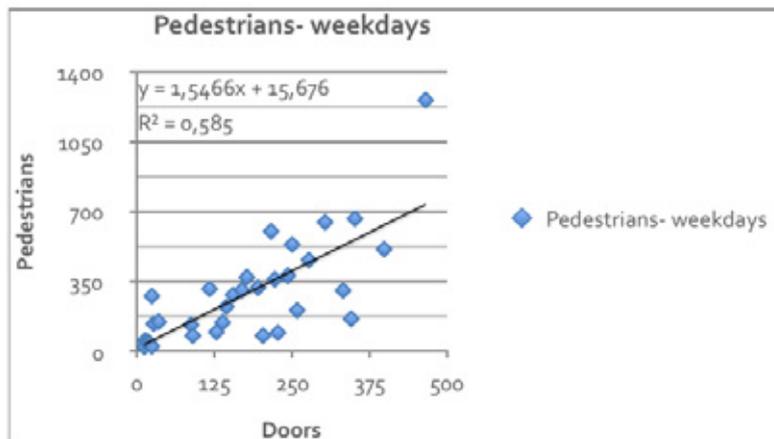

Figure 6 - Correlation, on weekdays, between doors and pedestrians

3.2.3 LAND USE

According to Jane Jacobs (2000) and Frederico de Holanda (2013, 2014), the mixing of uses is essential for maintaining life in public spaces. Considering this reference, the land uses present in each street selected were surveyed, which later allowed the correlation of the types (residential, commercial and mixed) with the number of pedestrians circulating.

Figures 7 to 9, for weekdays, indicate that the flow of people is greater in those streets where commercial use is predominant (R^2 = 70%). In the context of mixed use (commerce/services with residence), the results also pointed to a correlation that must be mentioned (R^2 = 27%). In the streets where residential use was prevalent, the movement of pedestrians was lower, with almost no correlation. The data allow us to conclude that for the vitality of the central areas, commercial and mixed use are fundamental. However, these activities must occur continuously in space and time in order to enable the flow of people even after business hours and prevent these areas from becoming completely empty at certain times of the day.
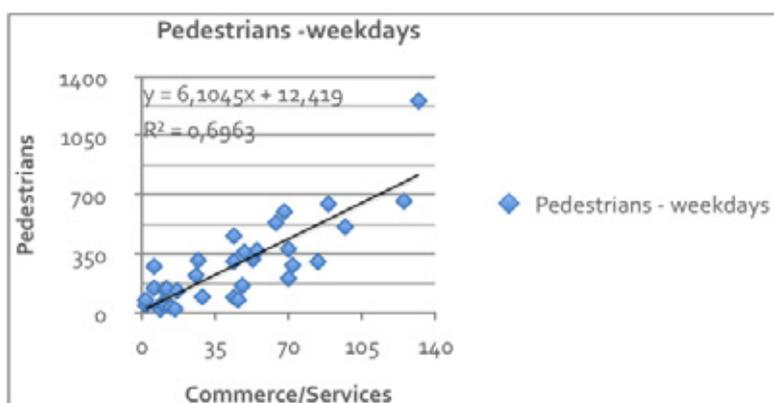

Figure 7 - Correlation, on weekdays, between intensity of commerce / services and pedestrian flow.
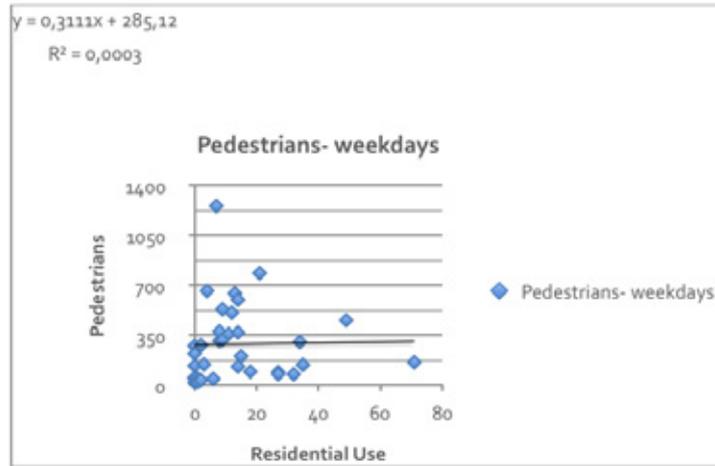
Figure 8 - Correlation, on weekdays, between number of residences and pedestrian flow.
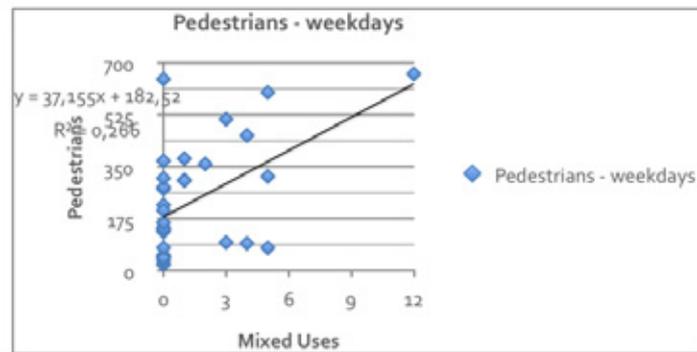

Figure 9 - Correlation, on weekdays, between number of mixed uses and pedestrian flow

4. CONCLUSIONS

The research sought to investigate the aspects that affect the vitality in the old centre, in the spatial configuration of Goiânia, based on the changes in the flow of people. Variables pertaining to configuration and land use were applied, which contributed to a better understanding of the problem outlined.

The correlations obtained showed that the variables of integration/accessibility (global and local), permeability of buildings/number of doors and land use tend to affect the number of people present in the centre. These findings, associated with the deeper results develop by Arrais (2015), can contribute to answer the research questions.

Results corroborate the role of the configuration in promoting or restricting a greater urban life (first question). Configuration directs the flow of movement, reduces or promotes the presence of people, which interferes with the vitality in the centre. The study showed that spaces with more integrated configuration (from the point of view of Space Syntax) tend to be more sought after and, therefore, with greater flow of people.

The findings show that the vitality, especially in the public spaces of the centres, is also dependent on the number of doors and the existence of accessible streets /sidewalks, where people also feel invited to stay (an aspect explored in detail in the study developed by Arrais, 2015). In addition, the presence of commerce/services and mixed use is essential to ensure a greater flow. These aspects suggest some spatial mechanisms which allow the maintenance of urban vitality in old centres (second question).

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