SIMPLIFICATION OF THE CADASTRE UPDATING FOR SMALL MUNICIPALITIES

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Abstract

With the growth in urban occupation and the concentration of the population in the big cities, it becomes increasingly necessary the urban planning, resorting to the use of tools that enable a quick and effective management. The most efficient tool that has been currently adopted in several cities is the Geographic Information Systems (GIS). So, this paper aims to present the steps of developing a system to control the urban area in order to mainly detect irregular buildings or enlargements. A neighbourhood of Holambra, a city in the state of São Paulo, Brazil, was used as study case, for it has been presenting a significant increase in the rate of urbanization. For the study implementation was used a 1:8,000 scale flight aero photogrammetric which generated the digital cartographic base compatible with the scale of 1:2,000, using the software DVP. For the development of GIS, it was necessary the introduction of the alphanumeric information with the use of ArcGIS (ESRI) software that enabled the cadastre of the information, through forms filled out in loco and a frontal photo of the property, for the further matching with the database in the city hall. In the municipality of Holambra it was possible to identify the high degree of downgrade existing in the city hall database, possibly causing a loss in municipal revenues and the low management capacity of the urban space. Thus, it is possible to conclude that GIS system becomes a tool of great value to the municipal ruler when supplied with correct and current data.

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1. INTRODUCTION

The information technology and communication have revolutionized the knowledge about the reality of the territory, as well as the the capacity to know and plan the cities. In Brazil, the lack of information and knowledge about this reality is characteristic of a large number of municipalities. To promote a good direction for public policies it is essential that managers have spatial and descriptive information about the geographic area to be intervened, since the municipal executive's decisions need to be based on transparent and reliable information. In this sense, the geotechnologies emerge as a valuable technological support to assist in work planning and management, as studies, assessments and cartographic representations of reality can be made with greater speed and accuracy. Currently the tool that has proved more efficient and been adopted in many cities are Geographic Information Systems (GISs), because allow the integration of data (geographic, cartographic, alphanumeric etc) via a Database Manager System- DBMS as well as a better spatial perception of the processes occurring in reality, not being only a partial representation (arising from specific sectors, such as economic, social, environmental) in fragmented spaces. Many city rulers have acquired unsuitable geotechnological products for aiming only the increase in the collection of property tax revenue. Thus, this paper aims to present the stages of developing of a system for controlling the Urban Area, targeting mainly to detect irregular buildings or extensions. It was used as a case study a neighborhood of the city of Holambra in São Paulo, Brazil, because it has shown significant growth in urbanization rate.

2. THE CITY OF HOLAMBRA

Holambra is a tourist city, settled by the Dutch after World War II, with 10,224 inhabitants (IBGE, 2009). The city has shown a significant increase in the urbanization rate, considering the increase of 111.53% in the period 2000-2007 (AGEMCAMP, 2010. Note that the opening of new allotments does not take into account the existence of empty lots, endowed with urban infrastructure. It is estimated that 35.48% of the urban area of Holambra is consisted urban voids. Given these factors, we developed a pilot project on a neighborhood containing approximately 100 lots in order to analyze the urban area.

3. WORKING METHOD

In this study we used data from a aerophotogrammetric survey with the approximate scale 1:8000, performed with Seneca II aircraft - Model: EMB 810C, Prefix PTEPN and Camera Carl ZEISS RMK TOP 15 with gyro stabilized platform of Intergraph. Scanning was performed in high accuracy photogrammetric scanners with geometric resolution of 16 microns (approximately 1588 dpi). For the selection of points to the adjustment of aerial triangulation (photo-identifiable points) was considered the distribution to better ensure the spatial rigidity between models and tracks. Planialtimetric coordinates were obtained by positioning satellite system (GNSS). SIRGAS 2000 - Geocentric Reference System for the Americas - was adopted as the reference system and the coordinates used were referenced to UTM projection. We used the analytical method in Photogrammetric System DVP for generation of orthophotos made from altimetry obtained by aerophotogrammetric restitution. The product resulting from this step were orthophotos with:

- Standard cartographic accuracy: Class A, for the scale 1:2,000;
- Spatial resolution: 20 cm. building

With AutoCAD software was made the restitution of the following features (on different levels): blocks, lots, buildings, hydrography, contours, free area, vegetation, roads, railways, elevation points and water levels. Then, the alphanumeric information was introduced on the system.

After the end of photogrammetry processes two basic products were obtained: digital orthophotos and vector files in Autocad format, with planialtimetric and altimetric information, however, for the development of GIS, it was necessary the introduction of alphanumeric information.

For this purpose, it was used the software ArcGIS, of ESRI where, through registration forms taken in the field and a frontal picture of the property, the registration information was performed for subsequent crossing with the existing database at City Hall (cf. Figure 01).

Figure 1: Example of a registered

Figure 02: List of items discussed

4. RESULTS

Comparing the information in the registration database of the Municipality of Holambra and the data obtained in the field, it was possible to analyze the items shown in Figure 02. Moreover, with the photo of the facade of the building, it was possible to evaluate the items in the registry (cf. Figure 03). The system allowed the visualization of 3,295 building facades assessing the items listed in the register as shown below. The result is shown in Table 01.

Figure 03: Photo of the facade that helped in the analysis

Table 01: Comparing the information in the registration database with the data obtained in the field

Items	registration of municipality	System data	current Differences
Built x lots			
in building	0	149	149
lots	1689	937	752
built	1606	2209	603
built up area (m2)	255819	442840	187021
901 cadastral registrations (27.34%) have changed			
The external cladding of buildings			
thin building mass	62	2	60
ceramic material	70	145	75
uninformed	1198	0	0
plaster	1810	2480	670
uncoated	155	25	130
marble stone	0	43	43
unidentified		37	37
ground		563	563
1578 cadastral registrations (47.89%) have changed the external cladding.			
Exterior paint			
whitewash	7	7	0
special / texture	34	571	537
latex	1523	1761	238
latex speckle	62	7	55
unidentified	1198	0	0
unpainted	441	349	122
unidentified		37	37
ground		563	563
1552 cadastral registrations (47.10%) altered the exterior paint			
Construction type			
home, shop, office	2081	2717	636
galpão/hangar	15	2	14
uninformed	1198	0	0
unidentified		563	563
ground		13	13
1226 cadastral registrations (37.21%) changed the type of construction.			
Preservation			
good	365	1547	1182
bad	2	29	27
uninformed	1198	0	0
new	1566	609	957
regular	164	500	336
unidentified		565	565
ground		45	45
3112 cadastral registrations (94.45%) changed the condition of preservation			

5. FINAL

The lack of right information can lead Public Administration to take wrong decisions, not only regarding the financial collection but also urban planning activities. The increase in collection undoubtedly is critical to improve the management capacity and municipal planning, however, several units or departments can be widely benefited from the spatial information that geotechnologies can provide.

In the municipality of Holambra was possible to identify the great degree of outdating of cadastral base previously used by the Municipality, possibly causing loss in municipal revenue and capacity management of urban space. Thus, it can conclude that the GIS system, when supplied with correct and current data, becomes a tool of great value for the city manager.