THE USE OF GIS IN ADDRESS SYSTEM A METHOD FOR PROGRESSIVE URBAN PLANNING AND DESIGN

Abstract

The purpose of the paper at hand is to present urban design through the use of geographic information system (GIS) for street and building addressing in Albania. Since the beginning of its design and implementation, address system aimed the identification of old and new urban areas, addressing of streets and buildings, connecting the respective address with citizens, etc. During the creation of digital data, aerial photographs, cadastral maps and existing digital maps were used, and the possibility that this system could be applied for other purposes which were not originally anticipated, was evaluated as well. Currently, in the planning offices of the communes and also in most of the municipalities, there are no other up to date data of digital format, and they are not in the same unique system

For this purpose the use of GIS in the address system seems to be a progress for urban planners and municipalities, giving them solutions of today's problems for progressive urban planning and design. Through this system urban planners can easily locate new urban areas, define existing degraded zones and reevaluate the priority ones for design purpose. GIS implementation in the address system was created through a central database with connection to each local government unit, which enables the urban planning office not only to refer to their area but to the entire territory of the Republic of Albania. Using the different layers such as roads, buildings, hydrography, streets addresses and aerial photographs, urban planners will possess a powerful tool for decision making and development of their duties in a progressive way.

1. GIS creation for the Address System

The ideation and implementation of the address system starts back in 2004, in the period when the legal basis was issued authorizing the local governments, more precisely the urban planning offices, to begin addressing the public spaces areas. This work practice which was started and promoted with the legal basis, continued until 2009 when with the legislation changed and the presence of international assistance in the development of the national address system project, it was concluded that the system would be based in the information technology and predominantly in the Geographic Information System (GIS).

1.1 Geospatial data creation

In the beginning the development of the data for this system was referred to the digital information in the format of aerial photographs and partial digital maps, made in 2009 by the Agency for Legalization, Urbanization and Integration of Informal Zones and Constructions (ALUIZNI). Certain inaccuracies were shown by the analyses made with these data for the development of the address system, which would bring to further works by creating a group of experts to quality control these data. An alternative source of information for areas that were not covered by aerial photographs, were the paper format cadastre maps.

The processing of various data and their approach to the initially defined standards for the development of the address system was accomplished through AutoCad Map and ArcGIS softwares. These processes were followed by modeling the respective layers for identifying public spaces, part of which were streets, buildings, parks, gardens, hydrography, etc.. Beside the title and counting, each of them would have a specific database where categorization attributes would be assigned, the type, the condition, the number of floors, the name of the respective institution, the name of the river or lake, etc. In a parallel line with the creation of these data, the connection of them with the national civil registry would become possible, thus enabling the identification of the address with the citizen and vice versa.

1.2 GIS based software creation

The realization of the address system was made possible through the development of GIS-based software with full efficiency of the requests and data generated for the address system. The address system software was set up to have a central database management (SQL Server), which would serve as a reference point for each urban office, online connection opportunity (.net applications), full access to the configuration of the relevant zone, the use of all GIS tools (ESRI softwares) and utilization of data through WFS and WMS.
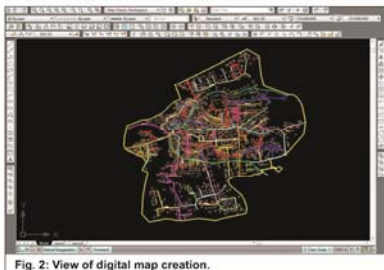

Fig. 1: View of geospatial data creation.

Fig. 2: View of digital map creation.

The system itself was created to make possible the evidence, creation and naming of streets and new buildings, the identification and completion of the deficiency of the existing ones, the distance calculation, the modification of the attributes in the database, the development of spatial analysis, etc.. All these, would be helpful for a complete recognition and management of the national address system from urban planners at municipalities and communes.

Meanwhile the development of the GIS-based system, the processing of digital data and relevant database were performed for the created layers, enabling the construction of a complete national address system for Albania. Currently, this system is available for the urban planning offices in the majority of municipalities and communes through an intranet network since 2011.

Fig. 3: View of the National Address System, GIS based.

Fig. 4: View of spatial queries on Address System.

2. The use of the address sytem GIS for urban planning and design

GIS-based softwares are used in many different fields of society, but in fact everywhere they have a common characteristic, the use of spatial data. From this point of view, the use of GIS in the address system may be a good starting point for its application in various fields such as urban planning and design. This form of application was not taken into consideration as a main purpose at the beginning of the creation of the address system, but based on the scope of the work and joint concepts that share these two areas, we conclude that the GIS based address system would be included and can beneficial serve in the initialization of a related project with the purpose of urban planning and design of municipal and communes urban planner officers.

To confirm the similarity among them, we examine their main requirements. In the planning and urban design process different analyzes based on the population and the existing infrastructure are needed. Simultaneously, spatial analyzes are among the main instruments of GIS used in the address system. These analyzes enable the determination of the number of residents in an area or street, of the kinds of facilities for an area, the kinds of streets for a zone, etc..

Continuing with the subject, the application of urban elements such as streets, their category and condition, buildings, their use and condition, parks and gardens, schools and hospitals, information on the number of residents, are part of the scheme of a urban planning and design. Based on these requirements and data, the address system disposes a wide range of data and attributes for each of the categories of public spaces and the possibility to connect with the national civil registry.

Last but not least, the development of an urban plan and design nowadays is mostly performed with a GIS based software, which simplifies the work of planners in decision making and progressive development of urban planning and design. For the actual implementation, now we have a GIS based system, integrated with up to date spatial data available online for planners in all municipalities and communes of the country.

By comparing the requirements of each area, we conclude that the majority of data used in the address system are an integral part in urban planning and design. These data consist of aerial photographs, objects polygons, streets, hydrography, green areas, etc. together with the relevant attributes, which constitute of essential elements for the urban plan and design. Thus these data and information represent their most updated form, becoming in this way an essential reference point for such studies.

In this way, we can now say that the use of GIS and its data for the address system represents one of the most widespread instruments for the field of urban planning and design. The available instruments in this system are completely accessible for other purposes as well, such as analysis of urban data, development of the existing areas, identification of new areas of development priority, creation of orientation maps or the integration of these data in alternative systems through WFS and WMS.

3. WMS and WFS connections

Web Map Service (WMS) and Web Feature Service (WFS), in the GIS language rapresent the online direct connection with another system´s data, enabling their aquisition in the GIS alternative systems. WMS itself represents an online connection for geospatial data exchange. which

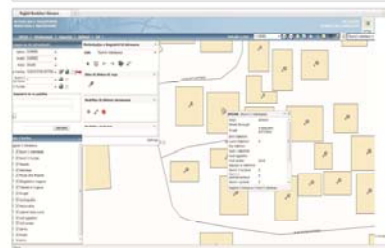Fig. 5: View of streets attributes.

Fig. 6: View of buildings attributes.

cannot be modified from platform which uses it. Meanwhile WFS unlike the first, enables the exchange of geospatial data enabling changes of data by itself.

Having these connections, the GIS based address system offers the possibility of online data exchange. From the urban planning and design point of view, we can understand that the actual database can be used in an alternative GIS platform different form the original one, where those data were created. On the other hand we must admit that even in those cases where the user, which aims the realization of an urban planning and design, for technical reasons cannot perform in the GIS platform of the address system, he has the opportunity to use for his purpose only the data of this system.

4. Conclusions

Starting from the experience, technical applications, the results from the data they use till the progress of GIS technology achieved for the creation and utilization of the address system and using its data for urban planning and design, we will search and find numerous similarities that help the interaction of each other in a progressive development. From the address system GIS platform utilization point of view for urban planning and design we must admit that the start of works and applications in this area would bring benefits.

Urban planning and design, actualized by municipalities and communes urban planners, but also by other private specialists, would be more complete if the address system data would be used. The latter, based on the fact that the two mentioned directions not only have common elements in the concept of necessary data to be used, but also because these data are the most up to date information of their kind nowadays .

In the end, it should be mentioned that the use of GIS platforms, which bring high benefits in urban planning and design, from the economic point of view would bring cost-effective reduction in case of the utilization of the address system.

Address System	Urban Planning & Design
☐ Buildings	☐ Buildings
☐ Streets	☐ Streets
☐ Public Spaces	☐ Public Spaces
☐ Hidrography	☐ Landscape
☐ Street Type	☐ Transport
☐ Digital Maps	☐ Urban Digital Maps
☐ Spatial Analysis	☐ Data for urban areas
☐ GIS Tools	☐ Analisys
☐ Citizens Register	☐ Softwares
☐ Urban Planner	☐ Design Tools
☐ Officer Users	
☐ Etc.	☐ Etc.

Fig. 7: Common and different elements between Address System and Urban planning and Design.

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- Pictures of this paper have been taken from National Address Register software and data, General Directorate of Civil Status, Ministry of Interior, Tirana –Albania. February 2012.

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