

GIS for Land-use and housing management



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This paper focuses on how GIS has been applied to establish, maintain, and analyse urban and land-use information to support the functions of local government in District 5, Hochiminh City (HCMC), Vietnam. The GIS model for District 5 is presented

As one of the central districts of Hochiminh City (HCMC), District 5 has a lot of schools, hospitals, and entertainment places. It has an area of 4.14 sq km. It is surrounded by District 1 on the east side, District 6 on the west side, District 10 and 11 on the north side, and District 8 on the south side. The Tau Hu canal passing District 5 and separating it with District 8 makes it more beautiful.

Its population is about 2,51,999 people and its population density is 60,869 people/sq km. There are 818 companies involved in various fields in District 5. It also gets over US\$ 1 billion per year for income and contributes about US\$ 20 million per year towards taxes.

With 15 wards, the District 5 governmental agencies encounter a lot of difficulty in urban management. The local government has increasingly seen the benefits of technology in executing many of their responsibilities. Computers have obviously changed the way most agencies do business. The processing, analytical and data storage capabilities of computers have given public agencies, that have invested in such systems, a great tool for accomplishing their duties. One example of how technology has changed the way governments do business is the development of Geographic Information Systems (GIS).

The ability of GIS to store, manage and manipulate large amounts of spatial data, provides urban managers with a powerful tool. GIS's ability to link tabular, non-spatial data to locational information is likewise a powerful analytic capability. Many different facets of government use GIS technology. GIS also provides ways of viewing and analyzing data that was previously impossible or impractical. With the aid of a GIS, a local planning and community development office can track zoning and site design plans that help form and shape a city.

Up to now, as many local governments in Vietnam,

the government of District 5 maintains land-use and housing information either on paper maps or in computerized cad-based databases. This issue causes data unsharing and uncommon problem which limits urban management authority of the local government.

Based on the urgent needs of the local government in managing urban activities especially land-use and housing management, the first GIS project for District 5 was implemented during the time from March, 2002 to June, 2003. Its name is District Geographic Information System or DIGIS. The two primary objectives of the DIGIS are:

- To design and implement the GIS database for land-use and housing within District 5. The objective helps to gather spatial and aspatial data stored on papers and in computerized database
- To establish some of the most important automatically functional procedures of the Department of Urban Management of District 5. They supports well for the local staff to exploit GIS data

The user of the system would be staff of District 5.

GIS MODEL OF DISTRICT 5 OF HCMC

In order to keep with an existing official management, the system should be a centralised one. This centralised system needs one server computer that stores all of GIS data in one geodatabase while other client computers connect to the server to exchange data through a backbone network.

In this model, the server should be located at the People's Committee Office of District 5 while other clients are located at their places in the committee precinct. In general, the GIS of District 5 will be a professional system with six components: Hardware, Software, Data, Procedure, Orgaware, and Humanware. However, in order to reuse effectively old land-use and housing information stored on paper maps, this project is considered as the first stage of implementing a professional system concentrated on building up a database and automating some necessary functional procedures.



Fig 1 The location of District 5 in Hochiminh City, Vietnam



Fig 2 The panorama of District 5

Consequently, the first version of DIGIS would:

- **Hardware:** Take full advantage of existing hardware including workstation computers, printers, and other devices.
- **Software:** Reuse operating software and be equipped with ArcView GIS 3.2.
- **Data:** Gather all of existing data, put them all together to be ready for updating and retrieving by any GISs. That was an important objective of this project. Data of DIGIS were designed into 2 types: basic data and thematic data. Thematic data could be created from paper or digital maps, statistical tables, or other documents. All of paper-based data were vectorized into computer as shapefile data. However, this issue could not be finished at an expected time because some data were being completed, especially the planning data, parallelly with the project. At the end of the project, over 15 spatial data layers and many non-spatial data tables were achieved for DIGIS.
- **Procedures:** Automate some principal business processes as automatic procedures. They have made the system more effective. Procedures were classified into five toolboxes: core applications toolbox, planning applications toolbox, land-use and housing's applications toolbox, public work's applications toolbox, and state house's applications toolbox.
- **Organisation:** Not be mentioned in this version of the project. A framework for the system is needed to make it more professional. However, due to the scope of this version of the project, this job will be done in the next project.
- **Training:** Train basic knowledge for the district's staffs. This is one of the important

issues to make the system available soon. The project got enthusiasm of the district's staffs. Over 15 people were taught the basic GIS and how to use DIGIS tools.

In summary, the aims of the project were established at 3 components of GIS: Data, Procedures, and Training. In the future projects, all of six components of GIS should be considered to build up a more professional system to help the local government improve their managing tasks and widen their services to the citizen.



Samples of the certificate of achievement for GIS officers from District 5

PROCEDURES TO BE IMPLEMENTED IN DISTRICT 5 OF HCMC

Although District 5 is one of the old and stable districts in HCMC, its government is responsible for managing thousands of houses, lands, and public works. They have a lot of business processes that need to be automated with the new generation of information technology, the geographic information technology to strengthen their managing capacity and authority. However, at the beginning of the use of GIS, District 5 wanted to be supported with GIS in managing land-use and housing. The tools, hence, were designed for updating ownership data, retrieving land-use and housing data, making reports, drawing planning boundaries, manipulating areas of planning-violated houses, managing public lavatories, and managing state houses. They were classified into five toolboxes as model in Figure 4.

Fig 3 The conceptual model of the GISystem of District 5

staffs to strengthen their managing capacity. They have to be familiar with working together on a procedure to serve people more effectively.

In conclusion, the project established a lot of tools to meet the needs of the local government. The DIGIS is expected to improve the managing capability of the People's Committee of District 5 to serve people more effectively.

TRAINING

Training was one of the critical issues of the project. The training programme was divided into two courses: Introduction to the GIS and Using the DIGIS 1.0. The first course gave trainees basic knowledge about GIS. The content of this course had 7 chapters: introduction, creating and editing spatial data, creating and editing attribute data, linking data, querying data, presenting data, and creating layout in ArcView GIS. Trainees were supported with textbooks. At the end of the course, they all had to complete a mini-test. The second course was started right after the mini-test. The course focused on giving district's staff skills to use DIGIS 1.0 in their actual activities. At the end of the second course, the final test was performed to help trainees to review all lessons. Now, with trained knowledge and detailed help documents, District 5's staffs are using the DIGIS 1.0 in their daily activities. Training result has distributed to the task of strengthening the managing capacity or managing skill of the local government. With equipped knowledge, district's staffs are able to treat citizen's problems much more quickly and precisely and to support decision making in time. Those problems can be solved conveniently and easily and people feels trustful in the government.

CONCLUSION

The project of the GIS for urban management in District 5 of HCMC, during 2002-2003, is now accomplished with over 15 spatial data layers and tabular data. The DIGIS 1.0 software has been produced to support well for the governmental staffs in their daily works. With most of land-use and housing information available in digital format and DIGIS software developed on ArcView GIS, the District 5 is on the verge of exponentially expanding its GIS capabilities and departmental applications.

The project is expected to develop a more professional geographic information system with 6 components including hardware, software, data, procedure, orgaware, and humanware for District 5 and other districts of HCMC, Vietnam.

The GIS has improved urban land-use and housing information management. The GIS has really improved the activities of district agencies in Hochiminh City to serve people better.

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The complete paper with detailed references can be seen at <http://www.GISdevelopment.net/magazine/gisdev/2004/April/index.shtml>