THE ROLE OF GIS IN THE MANAGEMENT OF LARGE RESIDENTIAL PROJECTS

Dr. Hassan Ahmed El-Zamly
Dr. Mohamed Soliman
Dr. Ibrahim Sharaf Eldin

ABSTRACT:

The potential of Geographic Information Systems, GIS, in various types of construction companies is immense. GIS technology helps the project and the construction manager to organize the data and relate them to their spatial associations (spatial imagery system). This provides a powerful means for analyzing, synthesizing information and producing high quality precision for calculation and graphic representation. The purpose of this paper is to shed light on the GIS applications in both the project and construction management at various stages. These stages are site preparation, following up of the project and its time schedule, marketing, and turning over of units and their maintenance. In fact this research recommends that both the construction and the project manager should take advantage of the GIS's salient features and tackle the impediments to its application.

INTRODUCTION:

Large residential projects are characterized by their various types of housing units, especially the new residential compounds in Cairo peripherals which have a huge number of units. These large scale projects have resulted in a massive amount of data related to the project units and the site itself. In fact, for a large engineering project to function effectively, it requires accurate and timely information. Thus, the need arises for computer-based data storage and retrieval technology. Recently a Geographic Information Management technology (CAD, AM/FM, and GIS) starts to contribute to the project management.

According to **Francis Hanigan (1988)**, a GIS is any information management system which can:

-collect, store, and retrieve information based on its spatial location;

Keywords: Management; Information; GIS; Residential Projects; Database.

-identify locations within a targeted environment which meet specific criteria;

-explore relationships among data sets within the environment;

-analyze the related data spatially as an aid to making decisions about that environment;

-display the selected environment both graphically and numerically either before or after analysis (Fig1).

Thus, it is apparent that GIS is a powerful tool with capabilities in handling spatial and non-spatial data, providing interactive information exchange, and high quality precision for calculation and graphic representation (Aronoff, S. 1989). GIS has been applied in many different urban planning and management activities.

The potential of GIS in various types of construction companies is immense. Large and small level companies may have the resources to adopt and implement GIS; but for the smaller companies, the impediments to GIS could limit the potential benefits that this innovation can bring to the company. To expand the horizon and the role of GIS in providing services, these impediments must be tackled.

According to **Wong (1993),** these impediments are the cost of hardware, the cost of the system, the creation of geographical data base, and the information system integration. However, if the benefit exceeds the cost of adopting and implementing a GIS, its implementation should gain support at the construction management level. GIS research has focused issues related to the adoption and implementation of GIS especially on implementing a successful GIS (Fig 2).

Stan Aronoff (1989) states that a GIS is a computer-based system that provides the following four sets of capabilities to handle geo-referenced data: 1-input; 2- data management (data storage and retrieval); 3- manipulation and analysis; and 4- output.

Mahoney, J. (1994) states that the computer-aided design CAD is a valuable tool for construction engineering to improve technical support of construction operations. The benefits obtained from CAD applications in the field include increased timelines and accuracy of field drawings, improved communication of technical information tailored to the specific needs of the user, and increased field productivity. Examples of using CAD to automate existing processes include planning survey layout, planning construction sequence and methods, analyzing concrete placements, and designing form work for concrete.

Eltahan, A. (1994) claims that the GIS relates the descriptive soil database to a display of corresponding locations of boreholes, and a graphical user interface to facilitate the input, query, and output of data. He adds that the GIS can relate descriptive project information to graphical displays showing geographic locations on digital maps on computer screen.

From the previous literature we can state that the use of the computer technology either CAD or GIS has not gone beyond using them as a drawing or a design technique which can help in construction processes.

So, **the purpose of this paper** is to shed light on the possibility of using GIS in large residential projects and the efficient management of their available database through classification and analysis.

This paper is divided into four sections representing the GIS applications in the project management field either for the contractors or the owners. The four sections are as follows:

1-Site preparation.

2-Following up of the project and its time schedule.

3-Marketing.

4-Housing units delivery and maintenance.

CONCLUSION:

It is apparent that GIS is a powerful tool with capabilities in handling spatial and non-spatial data, providing interactive information exchange and high quality precision for graphic representation. The construction manager should take advantages of GIS's salient features at the different stages of the project. GIS can be implemented in the site preparation stage, follow-up and time schedules tracking, turning over and maintenance, and finally at the marketing stage (if the contractor is the owner).

In this paper, we have described the possibility of implementing GIS in construction and project management at the various mentioned stages. The GIS and computerized mapping has brought about opportunities in analysis and presentation of spatial data that was not possible even as close as a decade ago. Taking full advantage of the potential benefits of GIS requires

experimentation to determine the applications that best fit the needs of the firm, projects, and training. The new construction engineering capabilities from effective use of GIS highlight the need to integrate technical information supplied and used by design firms and construction contractors.

REFERENCES:

Aronoff, S. (1989). *Geographic Information Systems: A Management Perspective.* Ottawa, Canada. WDL Publications.

Baralaz, E. (1993). Integration of GIS in Town Operations. In Proceedings of the Annual Conference of URISA '93. *Urban and Regional Information Systems Association.* Atlanta,Georgia. 3:129.

Hanigan, F. (1988). GIS by any Other Names is Still. *The GIS Forum.* 1: 6.

Mahoney, J. and C. Tatum. (1994). Construction Site Applications of CAD. *Journal of Construction Engineering and Management.* ASCE, 120 (3), 617-631.

Oloufa, A. and A. ElTahan. (1994). Integrated GIS for Construction Site Investigation. *Journal of Construction Engineering and Management.* ASCE,120 (1), 211- 222.

Onsrud, H. and J. K. Pinto. (1991). Diffusion of Geographic Information Innovations. *International Journal of Geographic Information Systems.* 5: 447-467.

Rourk, R. (1993). How Good is GIS? An Evaluation of GIS Operational Effectiveness in Local Government. In Proceedings of

the Annual Conference of URISA '93. *Urban and Regional Information Systems Association.* Atlanta, Georgia. 2:10.

Wong, D. (1993). Impediments to the adoption of GIS/ SDSS in Service Delivery. In Proceedings of the *Third Conference on Computers in Urban Planning and Urban Management.* Atlanta,Georgia1993. 3:452.