



Housing and Building National Research Center

HBRC Journal

<http://ees.elsevier.com/hbrcj>

## Towards an advanced mechanism to benefit from information systems in issuance of building permits

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Received 21 July 2011; accepted 20 November 2011

### KEYWORDS

Issuing permits;  
GIS;  
Local administration;  
Development control

**Abstract** Issuing building permits process in Egypt faces many problems and difficulties. These difficulties are a result of many causes which maybe lack of experience in examining documents, the municipal personnel are not suitable to the tasks assigned to them, multiplicity of agencies taking approval on building permits, lack of databases and using traditional methods of accomplishing the work. In order to overcome most of these difficulties, the local government should utilize the new technologies because it has many capabilities and advantages. Geographic information system is a powerful technology that can support the municipalities in implementing their duties. Many municipalities today are using this powerful technology to improve the quality of decision-making, facilitate information sharing among officials and with the public, making municipal information and transactions easily accessible via the internet and make dramatic change in public presentations, reports and municipal web sites. In order to implement and manage the GIS system, some steps must be done to insure the success of the information system. The key factor in developing management strategies for the introduction, implementation, integration, and operation of GIS in any organization is to determine the appropriate role of GIS in the organization and to understand the implications of that role. This paper will discuss and demonstrate the importance of urban development control, the difficulties facing the process of issuing building permits, the importance of GIS in issuing permits and finally importance of developing strategies for the success of implementing and managing GIS in the organization.

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Peer review under responsibility of Housing and Building National Research Center



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### Introduction

Implementation of urban development is a complex and difficult process, it involves multiple institutions, in some cases they may be of common interests, and in other cases they have different interests and this is in many cases. Without

organizing this process there will be a chance of a collision and conflicts between the owners of diverse interests. The urban development process and the process of issuing building permits face many problems and difficulties. The management of the implementation process could be successful by the presence of a powerful system for controlling the urban development process. Geographic information system is a powerful technology that can be utilized in controlling the urban development and issuing building permits.

### **Importance of urban development control**

#### *Achieve planned urban environment*

Urban Planning aims to provide a suitable level of life for human in its environment. There is no doubt that there are several factors that affect the quality of life including social, economic and cultural factors. Every citizen's wishes differ from the wishes of others. Diversity in the quantity and quality requirements cannot be multi-count.

To achieve the urban development to be identical to the dream in a city nearest to the ideal, minimum requirements should be decided in order to achieve the environment needed. To achieve a decent life for human being in all aspects of life, building and planning regulations and laws in this area should be set.

The occurrence of any defect in the application of the requirements of building and planning regulations and laws results in the failure of providing the minimum requirements of the planned urban environment.

#### *Achieve policies and urban strategies*

Urban planning is a means of urban development management, which in turn operates within a framework of policies. Although there is overlap between the management of the urban environment and the urban planning, but that the two processes are not similar in terms of the operational scope of each. The policies are developed either by the central government or the local administration.

Setting the policies is from the important starting points, regardless whether the policies are strong or weak, because the planning should not be immune from politics.

It is important to recognize that the implementation process and the development control do not exceed its effect as a means of implementing plans. Policies and plans are the two effective factors to achieve the objectives and the provision of needs.

#### *Evaluating policies and urban plans*

The urban experience is an untested experiment; it's not possible to measure the success of urban plan in achieving its objectives without implementation. It is not possible to build an urban model to be tested and undergoing various tests. This is because the implementation process passes through social, economic, environmental, ethical, political conditions, all of this affect the implementation process [1]. If there is no control on the implementation of plans under all those affecting conditions, then there is no guarantee to achieve the desired result. Implementation is the only source of experience which

managers can use to test and improve their programs. To determine the compatibility of programs with their environment, continuous assessment is needed. Learning is the base for both implementation and evaluation. We evaluate in order to know and learn and we learn to implement. Evaluation is a method for upgrade learning in an institution equipped to implementation. Not only those involved in the evaluation are the ones who are learning but the staffs responsible for implementation are also learning. In the absence of learning and when the evaluation is isolated from the implementation, the implementation becomes blind and evaluation becomes deaf, cannot change both to the better.

The implementation must be identical to the plans, and there should not be any changes or differences from the original plan during the implementation process, may be minor changes according to the real circumstances is possible and durable (called as built). Because any change in the implementation changes the policy, then how can we evaluate this policy if there are changes happened during implementation [2].

### **Difficulties facing issuing building permits process**

There are many factors and difficulties facing the process of issuing permits some of which are related to local administration and some of them related to legislation and laws and some of which are related to the available potentials.

#### *Difficulties related to physical potentials*

From the problems and difficulties that face the local administration in completing their tasks is the weakness of physical potentials which are supplies and equipment that enables the local administration staff to carry out the tasks assigned to them in accordance with the laws and regulations. From these tasks are regular visits to all areas within the jurisdiction of the local administration to make sure not to carry out any work without a license, to check whether the actions are in accordance with technical and legal regulations or not. Therefore these capabilities should be available to facilitate the implementation of these tasks, addition to the equipment of the local units headquarters that lack to a large extent the appropriate equipment to adjust the process of issuing permits.

#### *Lack of experience in examining documents*

Due to the multiplicity and the large number of legislation and regulations and parameters that govern the implementation process of urban projects, when reviewing the license documents, it is difficult for the staff reviewing them to know and deal with all these legislation and regulations in order to issue the permits [1].

#### *Local administration personnel are not suitable to the tasks assigned to them*

There are too many tasks assigned to the local administration personnel in the process of urban development control and laws enforcement organizing urban projects.

In order that the local administration being capable to implement the tasks assigned to them, there must be specific staff available capable of implementing these tasks. The

current status of local administrations is lack of proportionality in terms of quality in technical expertise and scientific qualification as well as the number of staff.

#### *Multiple tasks assigned to the local administration*

Many tasks are assigned to the local administration and the process of issuing permits is one of them. As a result of the multiplicity of these tasks and in addition to lack of number of personnel and expertise, this affects negatively on the process of issuing permits and other tasks.

These tasks can be divided into:

- Examine the permit application and its annexes.
- Tasks of monitoring the implementation of the licensed premises.
- Tasks after the completion of implementation and provision of infrastructure.
- Tasks dealing with violations.
- Other tasks assigned to the staff.

#### *Multiplicity of institutions participating in issuing building permits*

In some cases permits are located in a region that is subjected to more than one institution. There are specific institutions that are subjected in areas and not subjected in other areas, such as the Civil Aviation, Agriculture Authority, Archeology, Military Defense, Ministry of Environment and Tourism. In order to issue the building permit, the drawings must be according to the laws and regulations. This leads to loss of time in correspondence and taking approval from these institutions, causing a waste of time and prolonging the time of issuing the permits. Sometimes, these legislations are incompatible with each other.

#### *Lack of databases*

In some cases, local governments face a major problem in the lack of presence of data, laws and regulations to some areas and plots, this is because there are no urban plans for these areas. Therefore no building permits can be issued.

But in the case of presence of information system that stores all types of data for vacant land and existing buildings, it is now possible to know the characteristics of the vacant land it that's need to issue a permit and the surrounding buildings to. This is important to be able to make a planning decision and determine the appropriate regulations to it.

Availability of data is essential in the process of issuing permits, as the first step in the process of issuing permit is that the owner's request for a certificate of land authority. In order to issue this certificate, the local administration must have available data on the plot.

#### *Using traditional methods for accomplishing the work*

Currently most local administrations in Egypt work with traditional methods in saving plans and drawings in the form of paper, data for these plans are in the form of documents and tables in the form of paper. Using manual methods in saving

paper maps leads to its damage and loss, and the difficulty of querying for information [3].

Working in this manual way requires a lot of effort and a great time in order the local administration completes its work, from identifying a piece of land from the maps, and thus determine all the regulations and the laws of that land, archiving permit applications and saving and checking the documents of that permit.

A small number of local administrations that uses computers in their work and most of them are in the new communities, which have master plans and are saved in the computer in CAD format [3].

Traditional methods in applying and saving the permit applications make the process slow and difficult and sometimes lead to losing the permit applications, and when making any changes and updates the process is difficult and stressful.

#### **Importance of geographic information systems in the issuing building permits**

In light of tremendous pressure of rapid development while having no Local Plan to precisely guide the development control of many districts in Egypt, there is a need for an information system which not only keeps and displays data pertaining to planning applications for the purpose of administrative functions but is also designed to facilitate planning at a strategic level. The control of development, which involves the process of analyzing the appropriateness of planning applications, requires various data from the relevant agencies.

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. 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.

By implementing a GIS system in the local administration, the following will be achieved:

- Improving staff accountability.
- Increasing technical accuracy and reducing errors.
- Reducing processing times and increasing efficiency.
- Reducing customer wait times.
- Increasing customer service skills and improving employee attitudes.
- Reducing customer complaints.
- Improving business practices and processes.

#### *Database design*

Urban development management requires access to accurate information in an efficient way and in less time. In order that different organizations involved in the of development control process be more responsive to the needs of the community in performing their duties and responsibilities properly, they require an improved initiative of decision-making process preceding the knowledge and comprehensive understanding of the issue through correct database.

The process of making urban management decisions contains complex internal relations. Its success depends on the presence of correct information relevant to decision-making. To solve such complex problems, it is important that these decisions are the best, using the best information and tools available. Therefore, the availability of data on the level of local administrations facilitates administrative procedures, developing planning policy and implementation of plans.

Lack of data remains the main obstacle in developing countries. Most data available are data from remote sensing images. Therefore the data available in developing countries are data of the urban environment and land surface. There are insufficient data on the elements of urban development.

Economic and social data, which are essential to urban and regional planning, are not available and only limited data on population statistics are available. Economic and social data require a field survey and it is expensive and time consuming.

All data, regulations and laws of each region should be stored in the GIS program in the computer. When a permit is issued, just by referring to the site all the data of the site and also the surrounding sites are shown. This of course depends on the amount of information entered and stored in the GIS.

#### *Coordination between different institutions*

Many parties participate in the process of issuing permits whether this participation is direct or indirect. GIS have an important role in the coordination and communication between these parties.

Through information system, all spatial and tabular data for urban plans and plots, and the laws and regulations of each piece of land can be stored. Each institute enters its data and maps into the information system, so that other institute can explore these data to facilitate their work.

When all institutes enter their data and maps into the information system, the process of issuing permits becomes easier, all data are available in one place and quicker, no time consuming to get approvals from all different institutes.

Also through information system and the Internet that the owner can know all the requirements and procedures for issuing a building permit. Filling in the permit application and know the regulations and laws on the piece of land, making the issuance process easier to him and to the local administration and reduces time and effort. The owner also can follow-up the achievement in the process of issuing the permit. The top-level management also can monitor the day to day performance of its employees through the achievement done on the process of issuing building permits.

#### *Making analysis and queries*

GIS is a great tool dealing with spatial and tabular data. Data is saved in a digital format, in order to be in a physical form than paper maps and tables, or other normal types. It also have the capability to save large amounts of data and retrieve them more quickly.

GIS have many capabilities, one of these capabilities is complex spatial analysis done in quick time, addition to analysis and queries through the spatial data. What distinguishes between GIS and other systems such as CAD is the capability of spatial and tabular analysis.

And also from the advantages of GIS are the efficiency in the integration of large range of data sources and information in one form. One of the most important uses of GIS is helping in answering general questions.

#### **Developing GIS management strategies for an organization**

An organization's strategies for managing Geographic Information Systems (GIS) play a crucial role in the success of the technology within the organization. As with any technological innovation, the key factor in GIS success is how it is applied to solve the organization's business problems. Corporate wide strategies to introduce, implement, and operate the GIS determine how well it serves business needs [4].

The management issues related to introducing and implementing technology in an organization are often more crucial to success than the technological issues. This is the case for many technologies, and it is particularly relevant for Geographic Information Systems (GIS) [4].

The GIS in one organization could be very different from that in another. For some organizations, such as local governments, GIS may represent a data and operational framework that affects and ties together most activities of the organization. In other organizations, GIS may consist only of a simple tool used to complete a single task. The types of GIS implementations vary widely, involving different levels of technology, numbers of users, and impacts on operational tasks and organizations themselves. When GIS is introduced into an organization, the organizational impacts and implications must be addressed as carefully as the technological ones.

The key factor in developing management strategies for the introduction, implementation, integration, and operation of GIS in any organization is to determine the appropriate role of GIS in the organization and to understand the implications of that role. An organization's particular GIS management approach consists of an appropriate combination of a GIS organizational model and specific GIS management strategies.

Determination of the role and scope of GIS in the organization leads to the appropriate model for implementation and management.

#### *Establishing a GIS model for an organization*

The starting point in devising a GIS management strategy for an organization is the development of an appropriate organizational model, which establishes the basic character of GIS operations. The appropriate GIS organizational model for any organization is based on its intended role.

The guiding factor in determining the appropriate model for GIS operations in any organization is the role GIS will play in the organization. Other factors include [4]:

1. The scope and extent of GIS operations, including the number of users, applications, and GIS databases and their distribution throughout the organization.
2. The degree to which GIS is integrated into applications. GIS functionality may be tightly integrated into operations or serve as an add-on. (In the latter case, it may only be an optional part of an application.)
3. The frequency of GIS use, which is a combination of scope and integration.

4. Complexity of GIS tools, which determines the size of the GIS resources related to each business unit and the organization as a whole and also affects the sophistication of the operation and the skills and time needed to run GIS.
5. The operational structure of the organization: the operating, reporting, and responsibility structures and procedures that prevail also apply to GIS; the operation and autonomy of business units and profit centers is a major determinant of the cost of coordination.

#### *The GIS implementation process*

GIS implementation involves designing, acquiring, installing, and operationalizing the necessary components—including data, software, hardware, and people—to fulfill an organization's GIS needs. Although the characteristics of the final GIS implementation for each organization differ, some basic principles apply to most situations. The management challenge is to understand GIS, the principles of GIS implementation, the alternatives, the organization's needs, and how to put these components together.

The traditional GIS implementation process consists of a series of steps or activities. The first step, project planning, involves establishing the scope of the GIS, identifying the development team, acquiring the required background information, and developing a preliminary implementation plan. The next step, requirements analysis, involves determining the functional and data requirements for the GIS applications and users and assessing resources, opportunities, and constraints in the organizational and institutional environment.

The design step entails developing a conceptual design for the system, database, applications, and organizational components and confirming the design with respect to the requirements analysis results. The system acquisition and development phase involves developing software, hardware, and data specifications for system selection and acquisition and data acquisition or conversion. Implementation involves installing software, hardware, and databases; developing applications; and performing the organizational development required to support and use the GIS. Finally, the operations and maintenance phase consists of integrating GIS into the organization's operating environment, supporting users, and managing the ongoing process of data and system maintenance. This basic process is applicable to GIS of all sizes and applications, although the time and effort required for the steps may vary greatly [5].

Many organizations have failed in their implementation efforts because they blindly followed a process or advice that was used in another organization's situation but was not as well suited to theirs. Analysis and planning are critical activities that must be carefully completed before beginning GIS implementation.

Another key factor in GIS implementation management success is flexibility, which must be built into the process, maintained, and exercised as needed. Because the GIS implementation process can take a long time, particularly with respect to technology and environmental changes, flexibility is crucial to success. The GIS implementation manager must be able to adjust to arising constraints and problems and take advantage of new opportunities.

Finally, a critical, yet often overlooked, factor in GIS implementation is the handling of the transitions between the phases of the development process, which can be more difficult and more critical to success than the steps of implementation themselves [5].

#### *Developing an effective GIS implementation and management strategy*

Each organization's GIS management strategy is unique—or should be, in order to be successful. Because organizations have unique environments, characteristics, goals, GIS requirements and goals, and operations, they must develop their own GIS management strategies by drawing from the common GIS methodologies management components and fitting them to their own situations.

The first step in developing an effective GIS management strategy for an organization is to establish the strategic vision for GIS in the organization and define its role and scope. The result provides fairly clear guidance regarding the implementation approach and management strategies that will be most appropriate and effective and indicates the types of organizational issues that will be important. Although establishing a vision for GIS may be an obvious first step, a significant number of organizations either omit this step or perform it only superficially, often for similar reasons. Many organizations do not realize the importance of this step, consider it wasted time when they could be taking action, or do not know how to perform it effectively. Experience has shown, however, that time involved in specifying the role and scope of GIS in the organization is well spent and reduces problems, delays, and failures later in the implementation process [4].

#### **Conclusion**

The urban development in Egypt suffers from a lot of problems, that leads to unplanned and informal settlements. There are many factors that led to these problems. These factors may be because of lack of potentials and capabilities of the local administration, problems in the master plans itself, problems related to the social environment, problems related to financial issues, problems related to laws and regulations are not compatible and others.

In order to overcome most of these problems there must be a powerful system to control this urban development. GIS is a powerful system that has many capabilities and advantages that can overcome most of the problems facing urban development control and the process of issuing building permits. In order to implement and manage a GIS system in the organization there are important steps that must be taken to insure the success of this system.

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