ABSTRACT
The numbers of successful implementations of e-government projects in developing countries are noticeably low. Yet, there are few studies that focus on the long-term sustainability and success/failure factors of such projects. This paper analyzes the factors responsible for the initial success and subsequent sustainability or setback of a local-government project that was implemented in two sites in Egypt. The findings reveal that although technological, process, and structural factors play a distinctive role in the success or failure of e-government project, the main source of success lies within the management will and actions.

Categories and Subject Descriptors
H.4 [Information Systems Applications]

General Terms
Management, Measurement, Documentation, Performance, Human Factors

Keywords
GIS, Failure, Success, Local Government, Automation, Decision Support

1. INTRODUCTION
During the past two decades, many governments around the world have become aware of the potential of Information Technology (IT) in enhancing their service and increasing their efficiency. E-government programs are being carried out in a large number of developed and developing countries. Though a considerable number of articles have focused on the roles e-government programs can play to enhance public agencies’ and their services to citizens, there are relatively few studies, especially in developing countries, that focus on the impacts of these programs, their long term sustainability, and their success and failure factors. E-government systems in developing countries represent vast public interventions [3]. Unfortunately, only 15% of the e-government systems that were implemented in developing countries are successful cases, while the rest are either total failure (35%) in which a new system never gets implemented or partial failure (50%) in which the major goals are not fully attained [10].

Looking at the causes of such failures was the focus of a number of proposed theoretical models that tried to analyze the reasons for the failure of such a huge proportion of e-Government projects [3][11]. These models include ‘ITPOSMO model’ [9], ‘design-reality’ gaps [10], challenges for e-government initiatives [5], and e-projects challenges and barriers [2].

Egypt e-Government program, launched in 2001, is considered to be relatively successful, in view of the evolution of Egypt e-Government Readiness ranking from 140 in 2003 to 79 in 2008, where the web index evolved in the same period from the 162nd to the 28th position, according to the e-Government Readiness index issued by the UNPAN. Being closer to citizens and their interactions with the various levels of governments, local government is in a unique position to inform the public with the direction of future policy and to reflect the government's new vision and strategy. From such an understanding, local e-government initiatives were set off in Egypt as one of its e-government program axes.

This paper attempts to draw generic lessons from an Egyptian local e-government program. The paper studies the institutional factors responsible for the initial successes and subsequent sustainability or setback of a system (an e-government project) that was implemented in two sites. After the introduction section, the rest of the paper is organized as follows: Section 2 provides a brief overview of the context; Egypt, its local e-government program, and the two sites in which the system presented in this study is implemented. Section 3 provides a brief description of the system. Research design is given in Section 4 followed by findings in Section 5 and lessons learned in Section 6. Finally, conclusions are stated in Section 7.

2. CONTEXT
2.1 Egypt
The Arab Republic of Egypt (ARE or Egypt) is a unitary county comprised of 29 administrative sections - called governorates - of various sizes, populations, and resources. Governorates are,
further, administratively divided into cities and districts. Local governments - represented in governorates - manage their operations based on rules, regulations and legal requirements created by the central government. However, they have autonomy in how they provide their service to citizens and how they manage their processes. Consequently, different governorates might be organized in different ways.

The organizational structure of a governorate can be logically divided into four major sections: top management, internal services, external services, and administrative departments that provide service directly to citizens. The investment department, the focus of this paper, exists at the governorate level. The functions of this department can be summarized in: (1) preparing studies to promote investment in the governorate, (2) ensuring that investments projects are in the proper development track for the community, (3) the approval of investment projects proposed by investors, (4) assigning these projects the required lands to be implemented, and (5) tracking ongoing projects to ensure they abide by their original set targets and rules.

2.2 Local e-Government Program

Egypt has established its ICT strategy in 2001 in what has been known as the Egyptian Information Society Initiative (or simply EISI). EISI was built on seven pillars; one of them was e-Government. This initiative was put into action and, hence, in 2001 the e-government program in Egypt was started and managed by the Ministry of Communication and Information Technology (MCIT). In 2004, program ownership was transferred to the Ministry of State for Administrative Development (MSAD), where the former e-Government Program Director (Dr. Ahmed Darwish) was appointed as the minister. This reflects the Egyptian understanding of e-Government as a natural component of administrative development and reform. The e-government program in Egypt, thus, became one of the two mandates of MSAD, the other one being the public administration institutional reform.

Initially, the e-government program has consisted of 4 main subprograms: (1) e-government legislative and technical standards infrastructure; (2) e-government services delivery; (3) Enterprise Resource Planning (Accounting, Stock Control, Personnel,…); and (4) integration of national databases. The services program was later renamed as Egyptian Local Government Development Program (ELGDP).

ELGDP has three main projects. The first is related to service enhancement in municipalities and includes automation of services provided to citizens and the establishment of the so-called Smart “Citizen-Service-Centers”. The second is concerned with the development of web portals for the governorates. Finally, the most recent one has to do with citizen relationship management (CRM) systems. The present case falls within the scope of the first project.

ELGDP employs modern information technologies and state-of-the-art management systems to enhance both the quality and efficiency of government systems, to reduce time, and to overcome corruption at the workplace leading to the overall development of Egypt. However, as Egypt is a developing country, salaries of governmental employees are not high. This aligned with the need for opening new job vacancies, ELGDP projects do not aim to fully automate the services, but rather to enhance the operations by Information and Communication Technology (ICT) to reduce delivery time and to establish a monitoring and control system that provides better transparency and equity.

This paper examines the critical success – or failure – factors derived from the deployment of an integrated Management Information System and Geographical Information System (MIS-GIS) system in two different sites (governorates) in Egypt. The following subsection will, briefly, introduce and compare the two sites to familiarize the reader with the context. The paper builds on an earlier one published three years ago [1]. At that time, the system under consideration has just been brought into operation in one site with a successful implementation that led to plan for its roll-out in several other sites.

2.3 Two Sites

Figure (1) shows the locations of the governorates in Egypt where this project has been implemented. Project sites are the capital cities of three governorate, these are: Matrouh (governorate of Matrouh), Al Tor (governorate of South Sinai), and Port Said (governorate of Port Said). As the last one is still in its early phases of interaction with citizens, it will not be included in this study.

![Figure 1. Location of project sites.](Image)

2.3.1 Matrouh

Matrouh is one of the important governorates in Egypt. It is stretched for 450 km along the Mediterranean Sea that is administratively divided into 7 districts, which are in turn divided into 98 neighborhoods. The area of Matrouh governorate is 166563 km2 which forms 16.6 % of the total area of Egypt and its population is 323381 (0.44 % of Egypt population).

2.3.2 Al Tor

South Sinai is one of the most historical and holy governorate in Egypt since it contains many historical places like Al Tor mountain and St. Catherine's Monastery, so it attracts the investors to establish the tourist projects like hotels and resorts where it represent 14.7% of the total number of hotels in Egypt.
the cumbersome research and evaluation process that previously service and allows staff to process investors' requests bypassing on the governorate level. The system covers a governorate-wide not have been able to properly plan nor administrate investment Without the information technology, the local authorities would management in government with a strong institutional impact [4]. Work performed in this project supports the view as the fundamental transition and redefinition of information management in government with a strong institutional impact [4]. Without the information technology, the local authorities would not have been able to properly plan nor administrate investment on the governorate level. The system covers a governorate-wide service and allows staff to process investors’ requests bypassing the cumbersome research and evaluation process that previously involved multiple paper-based sources.

3.2 System Description
Most of the investment department activities require human intervention and insight. The computerized system, thus, does not completely replace the manual system, but rather complements it.

The GIS implemented in this project contains layers representing the land topology (altitude, nature, dunes, beaches, ...), usage (housing, administration, ...), the available utilities and services (schools, hospitals, gas stations, ...), the current and contracted projects and their types (industrial, touristic, commercial, ...). The GIS overlays a satellite image of the region to provide the viewer with a natural feeling of the land topology and usage.

The GIS represents a central component in enhancing decision making. It plays a significant part in the day-to-day operation of the Investment Management Department. While information is gathered and managed through the GIS unit, this information is distributed to other department and is disseminated to the public. Using the system running on the desktop, it is simple for department staff and decision makers on different levels to identify vacant investment lands. Queries using the query builder are performed allowing for the identification of all attributes within a specific acreage and location. With the GIS, information is (attributes) linked to location data (on a map). Information can then be layered to provide a better understanding of how it all works together. Layers can be combined to answer specific questions. Data from different departments is integrated with those of the GIS so as to be analyzed as a whole and leverage it to make critical business and planning decisions.

The system also integrates the GIS features with the administrative functions of land allocation for investment projects. It also enables the administration to track the project progress as well as the installments status, allowing proper monitoring of the local resources of the governorate.

3.3 Partnership/Intervention Model
Development-wise, work in ELGDP projects involves three main stakeholders: (1) governorate management and employees; (2) an outsourced contractor who is responsible for systems analysis, design, development, and deployment; and (3) MSAD as a coordinator between the first two stakeholder and responsible for project management and quality.

This project is developed using a collaborative approach between MSAD and the contractor (Global Geobits), where the contractor engaged his GIS experience with MSAD workflow experience into developing the required software application. The GIS component uses open source technology. The contractor thus acquires a new type of experience and a software tool that serves his future customers, and MSAD acquires a GIS based workflow system at virtually no cost. The model has originally been applied in Matrouh where it was successfully implemented under the supervision of the Governor, until a change of top management occurred, resulting in the decline of the operation. After the first free implementation in Matrouh, MSAD decided to adopt the software for other similar sites in Egypt, namely South Sinai and Port Said.

4. RESEARCH DESIGN
4.1 Research Methods
This study uses qualitative research techniques. Particularly, it uses a comparative case study method for analyzing the two sites of the project. The study aims to draw general lessons that can be useful for planning and successful implementation of similar projects in developing countries. Sources for secondary data are unpublished technical reports on the project. These are obtained
from newspapers, MSAD and Global Geobits. Primary data is collected during field research for investigating different facets of this project during 2010. This data comes from detailed semi-structured interviews with different stakeholders involved in the project. Eight governmental officials are interviewed representing a sample of 100% of the population (officials of direct interaction with the system). On the governorate level in both sites, those include the managers and senior employees in the investment department, and in the information and decision support department. From MSAD, ELGDP director is interviewed along with project managers responsible for both sites. Finally, project manager and senior technical manager from Global Geobits are interviewed.

4.2 Theoretical Model
This study uses the ITPOSMO model [9] that consists of seven key dimensions. Each of these dimensions has, in turn, a set of Critical Success/Failure Factors that were drawn for analyzing e-government projects in different countries. These dimensions are: (1) Information (factors related to quality and prerequisites of system inputs and outputs); (2) Technology (factors such as the availability and compatibility of hardware and software); (3) Processes (alignment and integration between the system and existing/new processes to achieve stated objectives); (4) Objectives, Values, and Motivation (e.g. organization culture, guiding values); (5) Staffing and Skills (factors such as the availability of skilled personnel and adequacy of training provided for using the system); (6) Management and Structures (factors such as managerial practice and flexibility of organizational structures); and (7) Other Resources (money and time).

This model has been one of the bases of several studies; e.g. successful and sustainable e-government projects in India [11], Sustainable Community Information Systems [8], and Electronic and Mobile Government Service Delivery Success Factors [7].

5. FINDINGS
This section discusses experiences from the implementation of the project in both sites. The current status subsection (5.1) is followed by seven subsections aligned with the ITPOSMO model.

5.1 Current Project Status
Drawing on Wilson and Howcroft [12], Goldfinch [6] summarizes three types of failure: (1) Project failure: the project does not meet the specification agreed upon, including the functional requirements, budget, or completion deadline; (2) System failure: the system does not work properly, including expected performance, not being used in the way intended, or used as intended but does not deliver the expected benefits, or (3) User failure: the system is not used in the face of user resistance because of such things as recalcitrance, lack of training and ability of staff, and the complexity of the new system [12].

Implementation in Matrouh has originally been functional and remained so for several months. After that, the system went out of operation until recently when officials of Matrouh collaborate with MSAD to bring it back to life. The case, thus, can be classified as a ‘user failure’. The case of Matrouh basically demonstrates that technology is not the immediate reason of the setback. As will be discussed in the following sub-sections, the staff and top management can be the main reason behind the setback.

On the contrary, the implementation in Al-Tor is successful as it is, after more than one year, still running under the management that requested and established it. Consequently, the driving force behind the system still exists and this drives the staff to properly manage the system to avoid failures, and remedy any problem as soon as it occurs.

5.2 Information
This dimension seeks to assess the information content quality which matches user’s needs and guarantees providing a sufficient content in quality. Data and information as a critical factor can be looked at from two angles; the first is concerned with the availability, accuracy, and quality of data to be fed to the system and the other is concerned with the nature and quality of data resulting from the system.

The data required for this system are two-fold: basic geographic data and land allocation data. Maps have already been made available at the initial phases of the project, and the system administrators have added the land utilization to the GIS layers. Data related to lands allocation and corresponding payments and projects progress are the direct responsibility of the departments using the system.

As for the outputs, the system efficiently delivers accurate and up-to-date information to all users and beneficiaries; administrative staff, decision makers, and citizens (investors). The developed system supports different involved stakeholders. For the governorate top management, the system supports them in different ways; approve or disapprove investment requests and provide policy recommendations to legislative authorities. For potential investors, the system helps determine the suitability of a particular piece of land for a particular project and determine what development projects should be opposed or supported. The system is used to identify and classify land pieces available for investment, to select the best areas for specific investment activities, to list available lands and corresponding suitable projects, and to select a specific area for a new project and analyzing other projects available with a certain diameter.

In the light of the above findings, despite the fact that data and information have represented a success factor for system implementation in Al Tor, it will be shown later that this availability of accurate online information has been a failure factor in Matrouh as it led to reduction of potential corruption.

5.3 Technology
The existence of sufficient required hardware and software is the base of success for any automation project. Bearing this in mind, MSAD is keen to provide the proper combination of hardware and software which provides users with accurate, fast, and cheap service delivery. The developed applications and all components to be installed have been tested by users before deploying the system. This was a success factor in Al-Tor, as it was originally in Matrouh.

However, in Matrouh, hardware and software have eventually become outdated and there was no information technology department that can provide needed maintenance. Despite the fact that the application has been designed for the existing hardware
with no real need for any upgrade, it is the deterioration of the status of the equipment and the lack of proper maintenance that partially resulted in the deterioration of the performance. Therefore the technology factors can be considered as a failure factor in Matrouh.

The setback can also be attributed to the equipment being vulnerable to malicious media that is the lack of technology management software that would prevent the tampering of ICT equipment by the users or even the use of thin clients instead of the standard PCs used. Thus, the use of thin clients or intelligent terminals might reduce the hassle resulting from obsolete antivirus lists, the introduction of malicious software, the bad utilization and mechanical failures in hard-drives.

5.4 Processes
The developed information system has been designed to organize the investment process and make it faster, more accurate, and transparent. The system allows the staff and decision makers to be properly and instantaneously informed about the investment projects at hand and to determine the current stage, assisting them to properly manage their implementations. So the process factor is considered a success factor in both sites.

5.5 Objectives and Values
The general objectives of the system are to provide better utilization of the allocated land and achieve better control on the investors. The values of the local community might be in contradiction with these objectives. Local Bedouins consider that any piece of land on which they set foot is theirs as long as it does not belong to “other Bedouins”. In their tradition, the government is not an owner of the land. This generates a lot of friction between the Bedouins on one side and the government and investors on the other. So community values are considered a source of failure.

Also, some of the staff has individual interests in concealing information so as to acquire personal benefits and/or power (corruption). The discrepancy between staff values and organization values is considered to be a failure factor.

Recently, a new governor has been appointed and was surprised to know (through MSAD and not his staff) that such a system existed but not in use. He showed interest in the system and requested the re-establishment of the operation. A visit to the site by the research team has revealed that the staff has been totally reluctant to cooperate in the analysis and implementation of the system. Mainly, they refused to provide analysts with the needed information because they believed that ICT would replace them and cause them to lose their jobs. Hence, the people factor in Matrouh can be considered a failure factor.

The selection of staff is a major issue in the implementation of ICT based projects. In both Matrouh and Al-Tor, the staff was actually the existing staff, who was used to (and benefit from) existing manual procedures. It takes a long training period to prepare them to the new technologies. It is almost impossible to adjust the work ethics of existing staff, as long as they are kept in the same work environment. Staff is considered to be a failure factor. It is advisable to introduce “new blood” for such systems to be sustainable.

Also, the lack of real IT professionals to provide support is a major failure factor. Existing IT support personnel are clerks upgraded through more intensive training. In spite of this, the trained staff was transferred to other functions without actually relaying the knowledge to the following teams. This is definitely a failure factor.

5.7 Management and Structures
Staff in municipal offices may have personal interests in maintaining property and utilization information ill-defined. In Egypt, top municipal officials are appointed by the central government. Usually, in border-governorates like these, the officials are preferably ex-military personnel. The main concern for such officials is to maintain order in rather delicate conditions and to settle any conflict between the official government and the tribal traditions.

It is also important to point out that the change of governors is a big success and failure factor. The change of top management involves lack of hand-over of the administration and also involves a change of vision. The new management relies on the staff to inform them of the different existing functions, and the staff is not always quite honest in narrating the status, depending on its own values. Moreover, the new top management is usually interested in demonstrating his “own deeds”. Consequently the improper hand-over between managements is definitely the key failure factor.

5.8 Other Resources
The community representatives in a well illuminated democracy are the protectors of its wealth. Unfortunately, in less educated communities, they perceive their role as providing individual services to their supporters, irrespective of the legitimacy of these services or its impact on the entire community. The lack of community education and enlightenment is definitely a failure feature.

6. LESSONS LEARNED
The present case allows us to draw some important lessons and to provide recommendations for policymakers and public IT managers to be considered in other similar e-government future development projects.

The project in both sites has great initial potential success due to the strong political and top management support which is a critical factor in successfully introducing IT solutions in public
organizations. Although the system has been well received by all levels of local government in Matrouh, this example reveals that political support should never replace rational strategic planning. Successful deployment of IT solutions relies, among other factors, on the presence of clear IT strategic goals and on the efficient integration of IT into organizational development. Therefore, political and management support is a critical factor for the initial success of such systems. However, to minimize the effect of top management change, these systems must be implemented as parts of a well defined information strategy of the local government. Having such strategy will oblige new management to pursue the road started by the predecessor rather than starting all over and abandoning existing systems.

As in any other organization, proper training for system users on different administrative levels plays an important role in the success of ICT projects in local governments. In the present project, training has been sufficiently provided which led to the initial success of the system in both sites. However, the subsequent setback in Matrouh reveals that two related factors must be given higher priority to guarantee the sustainability of the system: (1) availability of specialized personnel for IT support either from within the government or outsourced, and (2) establishing and maintaining in-action policies for peer-to-peer (coworkers) training and knowledge transfer.

Needless to say that successful IT solutions are assumed to fully fulfill users’ requirements including support of business processes. However, unless these solutions (systems) are implemented as part of the day-to-day operations, they are doomed to failure. In local government, ICT solutions must be integrated within the work of employees in a way that makes it inevitable to complete their work without using the systems.

7. CONCLUSIONS
It is important to analyze and understand the different factors behind the success/failure of e-government projects. Hence, their sustainability becomes a critical issue with the increased rate of failure of these projects. This paper presents a case study of a local e-government in Egypt that has been implemented in two similar governorates but unfortunately, with different ends; success of one and setback of the other.

The case is analyzed using ITPOSMO model [9] and the findings indicate clearly that the success or failure of such projects is caused by the role of top management rather than the technological issues. Currently, as the system starts to work in a third site, and remedy actions are taken in the first site (Matrouh) to bring it back into action, another extended analysis is taking place to compare the three sites’ experiences.

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9. REFERENCES