

## The Role of ICT in Sustainable Development: Some Challenges for Developing Countries

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### Abstract

This paper addresses the need for sustainable development taking the wide definition of sustainability into consideration. This includes but is not limited to maintaining a delicate balance between the human need to improve lifestyles and feeling of well-being on one hand, and preserving natural resources and ecosystems, on which we and future generations depend. In the last few years there has been extensive use of the Information and Communication Technology (ICT) and different types of systems such as e-government, g-government for the purpose of sustainability. This paper addresses the need for and challenges of intergovernmental integration (G2G) including possible solutions for developing countries utilizing the case of Egypt as an example, as a step towards sustainable development. The ecosystem being taken as an example here is integrated coastal zone management (ICZM).

**Keywords:** e-government, sustainable development, integrated coastal zone management (ICZM), inter-government integration

### 1. Introduction

The concept of integrated coastal management as one of the emerging issues in sustainability has evolved in the last few years as one of the latest research issues that although widely

discussed, yet still needs lots of integrated research efforts from multidisciplinary perspectives. One of the main challenges of ICZM is integration among: 1) different coastal and marine sectors, 2) land and ocean sides, 3) science-management, 4) different nations (international), and 5) inter-government. The latter integration type is the main focus of this paper. One of the main challenges that face Egypt in adopting ICZM is its governmental agencies structure. This structure is based on the sectorial management rather than the concept of integrated management to support sustainability. However, lack of co-operation between those agencies is one of the challenges as this is far beyond the concept of integrated management. There have been some efforts concerning the adoption of systems supporting intergovernmental integration such as e-government. Based on multiple case studies, on some ministries in Egypt, we are going to highlight the necessity and challenges for adopting e-government for the purpose of sustainability in one of the domains related to sustainable development, namely integrated coastal zone management (ICZM). Thus this paper is structured as follows: Section 2 introduces the concept of sustainable development and its relationship to ICZM, while section 3 discusses ICZM managerial challenges. Section 3 highlights the problem definition highlighting the need for inter-organizational integration and thus section 4 discusses e-government as a tool for inter-government integration and its relationship to

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ICZM. This includes the challenges of e-government and G2G sector as the main sector related to ICZM. Section 5 explains the case study of Egypt in the context of ICZM and applying some prior case studies results related to inter-organizational integration and its challenges. This paper concludes with a set of recommendations that highlight the importance as well as the challenges of G2G for ICZM support, which adds to its complexity.

## **2. Sustainable Development and ICZM**

Based on United Nations, The World Commission on Environment and Development (Brundtland Commission) (1987) sustainable development is definition emphasizes on the concept that current generations should meet their needs without compromising the ability of future generations to meet theirs, and the debates of the Millennium Summit as presented by The United Nations Development Program (2001). Hughes and Johnston (2005) have recognized that sustainable development is now as much about social equity—for current generations—as about efficient resource-use and conservation of natural resources for future ones. Thus, sustained growth is the key to greater social equity. We need economic growth that does not leave large segments of humanity behind. Non-inflationary growth of about 2–3% per year in OECD countries is needed to maintain high-levels of employment. To enable substantial convergence with the developed countries, most developing countries will need to sustain GDP growth of 6–8% per year over the next 3–4 decades. China has succeeded in this since 1990 and India is now getting on track.

Vallega (2001) explains that sustainability is intended as the result of the contextual pursuit of (i) the integrity of ecosystem, (ii) the efficiency of the economy, and (iii) social equity, including the rights of future generations. This approach is undoubtedly consistent with the definition of sustainable development enunciated by the World Commission on Environment and Development (1987) and supporting the Rio Declaration (1992). Nevertheless, it should also be recognized that in some countries like Italy, the political and social context is still far from

embracing this broad principle. Similarly Hughes and Johnston (2005) address sustainability through three major components: continued economic growth and human development, protection and extension of social capital with a special emphasis on social equity, and protection of the natural environment. In this paper, we are going to focus on the latter component through investigating the concept of integrated zone management (ICZM), as an example of the efforts for sustainable development.

The term sustainable development has been frequently associated with ICZM in the literature (e.g. (Dyer and Millard, 2002). As Lopez et al. (2002) specify, sustainable development has become a leading target of scientific research and policy agendas. In the context of natural resource management, understanding and evaluating the performance of complex socio-environmental systems has become a challenge and the development of more sustainable alternatives is a driving need. Operating sustainability requires new, qualitatively distinct, evaluation schemas and enable an integrated assessment of the ecological, social, and economic features and implications of a given project, technology or agro-ecosystem through the use of appropriate indicators.

The concept of ICZM (Cicin-Sain et al., 2000) was embraced by nations around the world as a central concept in the management of coastal zones and ocean areas under national jurisdiction. As Carney and Boyd (1999) identify, coastal areas and their resources are critically important to the development and future of coastal people and nations. Almost half the world's population lives in coastal areas and depends directly on coastal resources for both agriculture and seafood. People also depend critically but indirectly on the services provided by coastal ecosystems, such as protection against climate change-induced sea level rise, storm damage and nutrient regulation. Sound management of coastal systems is therefore vital for the enhancement of the livelihoods of coastal people (including those involved in commercial fisheries, boat building, trade, tourism, agriculture and coastal city dwellers). It will also protect economic investments in coastal areas,

encouraging a positive contribution to local livelihood development while minimizing adverse environmental impacts.

According to the Center for the Study of Marine Policy (no date) the interest in integrated coastal zone management or ICZM is high following a number of international meetings such as the 1992 "Earth Summit" the 1993 World Coast Conference, and the U.N. Global Conference on the Sustainable Development of Small Island Developing States. All of these meetings have concluded that ICZM is the appropriate approach with which to manage the diverse problems of coastal areas, from the pressing problems of coastal pollution and habitat degradation to the long-term implications of changing sea level. Additional impetus to create a "new" integrated paradigm for coastal management is added by renewed interest, in many countries, in "watershed" and/ or "ecosystem" management.

Cicin-Sain, et al. (2000) adopted one of the comprehensive Integrated Coastal Management definitions that show its relationship to sustainability. They regard it as a continuous and dynamic process by which decisions are taken for the sustainable use, development, and protection of coastal and marine areas and resources. It acknowledges the interrelationships that exist among coastal and ocean uses and the environments they potentially affect, and is designed to overcome the fragmentation inherent in the sectorial management approach.

Another scope for ICZM is the one explained by Dyer and Millard (2002) regarding it as a *holistic management technique*, which recognizes that the coastal zone contains finite set of resources that support the numerous sectorial activities taking place there. Competition between these sectors has resulted in unsuitable resource use and environmental degradation. Accordingly the initial focus in the development of ICZM has been set as a framework for institutional co-operation. Thus it requires a mechanism for co-coordinated information provision. As a *holistic management technique* ICZM requires data on many different issues and phenomena that can be broadly

classified as *environmental data*. Environmental data is concerned with geo-physical parameters such as water temperature, pollution concentrations, and river flow. The main point here is that the data relates to the representation of the environment, generally required for the protection of human health and avoidance of ecological disasters, etc. This type of data is dissimilar from socio-economic data (e.g. population distributions, social groupings, etc.) even though it should be noted that such data are also needed to support ICZM. Over recent years a number of initiatives have considered ICZM data management issues. These have included among others, best practice guidelines for data exchange, telemetric techniques to improve both data distribution and metadata approaches to improve both data distribution and information generation (based on Houstis et al., 1999).

The importance of coastal zones is justified by Isobe (1998) as they contain unique, irreversible ecosystems. At the same time, coastal zones are subject to intense by humans: for transportation activities, resources and energy extraction, industrial uses, and recreation. Moreover, coastal zones are the first line of defense against the ravages of tsunamis through waves, flooding and erosion. Thus there are three functional aspects which are part of the human relationship in coastal zones, namely 1) provision of ecological services, 2) disaster prevention, and 3) human utilization. ICZM will seek to integrate these three aspects. Each of these three aspects are intricately links. Consequently, humans must monitor and manage each facet in an integrated manner to ensure that the human relationship to coastal zones remains harmonious.

From the above definitions and explanations we can see that we can look at the issue of ICZM for sustainable development as a problem that needs the integration between different sectors. The question that we pose here is how can we integrate these different efforts, whether from the technological, managerial, and transdisciplinary point of view? In this context, we are going to focus on the governmental agencies and ministries, which lead us to the introduction of the use of ICT and e-government

initiatives to support such integration needs, which are going to be discussed in section 5.

### 3. ICZM Managerial Challenges

From our point of view, ICZM include managerial issues that are beyond the scope of traditional management. Although some fragmented ICZM challenges are being discussed in the literature, they have not been classified in particular categories. In the following section we are going to classify the most important ICZM challenges, from our perspective.

#### a. Integration

As discussed, central aspect of ICZM is the concept of "**integration**". *The concept of integrated coastal management is far more complex than IT integration.* For example according to (Cicin-Sain and Knecht, 1998), several dimensions of integration are involved in ICZM: (1) *intersect oral integration* (integration among different coastal and marine sectors, such as fisheries, oil and gas development, coastal fisheries); (2) *intergovernmental integration* (integration among different levels of government — national, provincial, local); (3) *spatial integration* (integration between the land and ocean sides of the coastal zone); (4) *science-management integration* (integration among the different disciplines important in coastal and ocean management (the natural sciences, the social sciences, and engineering), and the management entities); and (5) *international integration* (when a nation borders enclosed or semi-enclosed seas or there are international disputes over fishing activities, trans-boundary pollution, establishment of maritime boundaries, passage of ships, and other issues)

*Achieving integrated management* along the dimensions referred to is perhaps the **most difficult challenge in managing oceans and coasts**. Bringing together and harmonizing the perspectives of divergent sectorial government agencies, of different levels of government (each with their own interests, mandates, and perspectives), and of different disciplines (each with different outlooks, language, and methodologies) represents a most challenging

set of tasks. As Cicin-Sain and Knecht (1998) emphasize, to achieve integrated management, it is very important to have incentives that promote continued collaboration among ICM entities. Similarly it is important to provide training and education programs which emphasize the interrelationships among coastal and ocean activities, uses, natural systems, and physical processes, and which develop the appropriate mindsets and skills that coastal managers will need in their work. Integration can be seen as one of the tool or methodologies for realizing the goal of holism. As discussed earlier, we see the need for at least five different dimensions of integration — between sectors, between levels of government, across the land–water interface, between disciplines, and between nations (especially when nations share an enclosed or semi-enclosed water body). (Cicin-Sain et al., 2000)

#### b. Sectorial Management versus Sustainable Development

Shi et al. (2001) provides some of the ICZM managerial problems in his case under investigation, namely Shanghai. From his point of view, management plays a significant role in maintaining a healthy coastal zone ecosystem. The existing management structure of the coastal zone in Shanghai is still sectorial. In addition to the supervision of the State Oceanic Administration at the national level, there are about 20 different agencies at the local level responsible for all kind of activities in the coastal zone without a higher-level decision-making organization. This results in two possible malpractices: overlapping jurisdiction and poor cooperation. Many adverse consequences have been caused by the lack of integrated planning and management. Resources have been abused; many development activities have been limited in their immediate interests; frequent conflicts have arisen between different agencies with different development goals; funds have been wasted because of duplicated work. *Poor coordination among government departments and weak integrated management capacity has greatly hampered the development of the coastal zone.*

**c. Lack of Public Participation**

As Shi et al. (2001) discuss, another challenge concerning coastal zone management is the lack of public participation. The whole process of resource and environmental management decision-making invariably only involves special groups such as government officers and certain experts. Local people have almost no opportunity to become involved in the management system of the areas where they are resident. The same situation happens in the EIA process, although the involvement of local residents is stipulated. Only a few EIA reports have included public participation, which has greatly affected the effectiveness of this environmental management measure. Certainly poor public awareness is also an obstacle to effective public involvement. Insufficiency of public participation hampers the exchange of views between officials and local people and finally cripples the management capacity of the government. It is also a great waste of human resources.

**d. Coastal Conflicts**

As discussed at the beginning of this paper there are several coastal conflicts in the domain of ICZM. Vallega (2001) sums up some of these conflicts as presented in Table 1.

**Table 1: The framework of coastal conflicts (Vallega, 2001)**

Geographical Scales	Aspects of Reference	
	Uses	Users
International at national level	Conflict between marine uses	Conflicts between states
National	Conflict between resource uses at national level	Conflict between actors at national level
Local	Conflicts between uses relevant to local economy and social context	Conflicts between local users, stakeholders and groups

**e. Natural Resources Management Problems**

Although not explicitly specified by authors in the domain of ICZM, we argue that this is one of the main challenges of ICZM. According to (Ravenborg and Westermann 2002), who discuss this issue in the context of agricultural problems. However, we find that managing natural resources in the context he discusses is similar to the domain of ICZM. Nevertheless in managing resources of ICZM the domain is broader.

As Ravenborg and Westermann (2002) argue many natural resource management (NRM) problems transcend farm boundaries. For example, cultivating riverbanks and valley bottoms can cause erosion, water depletion and pollution downstream; crop damage caused by crop pests and diseases may suddenly escalate due either to the occurrence of new pests and diseases or to the sudden escalation of existing ones. The complex biophysical interdependency of many natural resource management problems is, however, not the only factor complicating improved natural resource management (NRM). In hilly regions especially, landscapes are fragmented among many farmers and other resource users, all of whom are individual decision-makers. Improved NRM therefore requires the individual farmer or resource user not only to recognize biophysical interdependencies, but also to coordinate his or her resource management with that of neighboring farmers. Yet there are many diverse and potentially conflicting perceptions and interests which shape individual farmer's resource management strategies. Many participatory approaches, while aiming to deal with trans-boundary NRM do not pay sufficient attention to the existence of such diverging perceptions and whether and how these get to shape group processes and outcomes.

Ravnborg and Westermann (2002) sum up that NRM problems implies the coordination of the management decisions of diverse resource users among whom complex social interdependencies are likely to exist. He also argues that joint learning about the social and biophysical

interdependencies existing among users and between the resources they manage is a valuable and often essential element in efforts to improve NRM.

#### 4. Problem Definition

Based on a report produced by Center for the Study of Marine Policy (no date), management of coastal areas involves multiple problems and sources of those problems, multiple objectives to produce desired (and often conflicting) outputs from the use of coastal resources, different productive capacities over space and time, greater or lesser linkages to upstream areas and beyond (pressures on the resources of a coastal area may be greater from activities outside the coastal area than from activities within it), multiple constituencies, stakeholders, and institutions with varying responsibilities for different elements of management. Social demands for outputs from a coastal area usually exceed the capacity of the area to meet all of the demands simultaneously. Because not all of the outputs from coastal areas can be expressed in monetary terms, free markets cannot perform the allocation task.

Integrated management as a continuous, interactive, adaptive, participatory, consensus-building process consists of a related set of tasks, all of which must be carried out to achieve a desired set of goals and objectives, however they are specified. The various tasks of management can be subsumed under the following elements: (1) analysis, including problem identification, specification of objectives, delineation of analytic and management boundaries; (2) design of alternative management strategies; (3) research and long-term data collection; (4) installation of management practices or technologies; (5) operation and maintenance of the management strategies; (6) enforcement; (7) monitoring; (8) evaluation; and (9) financing. Elements 1-3 are generally classified as "planning" activities; elements 4-8 as "implementation." None of these elements can be conducted without adequate financing over time. (Bower et al., 1994)

If ICZM is to be achieved, a common framework must exist across coastal planning

sectors for making economic and demographic projections, developing future scenarios, and using similar analytical techniques for analyzing benefits and costs of alternative management strategies. Achieving such a common framework is difficult, since rarely does a single institution exist--at any level of government--with overall responsibility for integrated planning and development of action programs across the various sectors of coastal economies. In other words as mentioned above, poor coordination among government departments and weak integrated management capacity has greatly hampered the development of the coastal zone.

To sum up: the problem of integrated coastal management can be viewed, from our point of view as:

1. Integration/ collaboration problem. This problem has been partly covered in the literature e.g. (Cicin-Sain et al., 2000; Earth Summit, 2002).
2. Management problem (multidisciplinary, infrastructure, conflict resolution). This problem is has been hardly covered in depth. This includes but is not limited to:

Although that there are several writings and research efforts in the area of ICZM, both the integration and management problems have not been resolved, not only in developing countries but also some well developed countries such as Japan. Although there are some laws for some aspects of ICZM (Isobe, 2002) such as disaster prevention, for example, there is no law that serves to coordinate all the relevant aspects of each of these separate laws. The different laws result in differing responsibilities by different government agencies. The coastal zone is classified into, for instance, harbors, fishing ports, and reclaimed agricultural lands. Each classified area is overseen by different ministry such as the Ministry of Transportation, the Ministry of Agriculture, Forest Fisheries, or Ministry of Construction.

One of the main questions here is: Can ICT resolve some of its challenges and support inter-organizational integration? This issue is going to be clarified in the next section introducing e-

government role as one of the ICT and information systems tools for ICZM support, from our perspective. This shows the challenges of one of its sectors, namely G2G, which adds to ICZM challenges although being its backbone.

## 5. E-Government & ICZM

In the last few years, due to the Internet and networking revolution, the scope of information systems has been widening crossing organizational boundaries (O'Brien, 2003). Consequently, some trends have evolved such as e-business, e-commerce, and e-government. (Laudon and Laudon 2004) Concerning the area of e-government in particular, Joia (2004) highlights that various governments have seized the moment provided by ICT as the ideal opportunity to rethink and reformulate their administrative *praxis*. This restructuring concentrates not only on the internal aspects involved, but also on those related to the relationship between government and other organizations, social groups, and/or citizens. In other words, similar to the domain of e-business at government level, as Bonham et al. (2003) present e-government, might be viewed in the context of three sectors: government to business (G2B), government to government (G2G), and government to citizen (G2C).

To fulfill the e-government services, one of the most challenging e-government sectors is the digitally-enabled collaboration and cooperation among different government agencies (G2G) (Joia, 2004). As mentioned above, in the context of ICZM, we are going to focus on the use of e-government for cross-organizational integration involved in that issue. Thus, this is the sector we are going to focus on. According to Relani (2004) the study of Government-to-Government collaboration is a young domain. The short experience accumulated in the recent years does not seem enough for the extrapolation of widely accepted theoretical frameworks on the subject. Many studies are only concerned with the technical aspect of intergovernmental cooperation, others; on the contrary, try to give a broader vision including organizational and cultural issues. There are a few studies today in

the domain of cross-organizational integration in the context of governmental applications. For example Beaumont (2005) introduces the arrival of geoportals in many areas of public service delivery, which entails inter-agency collaboration and the pooling of information resources. Another example is the UK Inland Revenue case (Beynon-Davies, 2004). Joia (2004) also presents some key success factors associated with the implementation of inter-governmental collaboration projects in the Brazilian market. However, few studies reported the role of G2G in ICZM.

Although being a support for ICZM, E-government projects have to face a number of technological and organizational problems. Large scale projects involve many stakeholders and create many interactions among them with issues of coordination becoming essential for the success of the project. E-Government projects are subject to indirect bounds not easily identified problems that emerge when organizations start to exchange information across traditional organizational borders. According to Homburg and Bekkers (2002) in order to avoid these problems, a radical change in an institution has to be considered. In the next sections we highlight some of those barriers as discussed in the literature including:

- **Legislation**

One of the objectives of most e-Government projects is the integration of the information and services across different administrative functions in order to set up a unique virtual counter where the citizens can have access to. To carry out this process, legislators have to adapt many current laws to fit the special requirements of the virtual government, which in many cases jeopardizes the roots of basic democratic principles (Jaeger, 2002). The e-Government policies have to be planned with respect for the autonomy and individuality of legislative, executive and judiciary powers as facilitating the sharing accessibility of information to every branch of the public administration could reduce the autonomy

and independence of the three powers (Jaeger, 2002) and consequently, restrict individual liberty. Setting up E-Government solutions without changing the current legislation is a utopian way of thinking. The success of e-government initiatives is highly dependent on the government's role in ensuring a proper legal framework for their operation (OECD, 2003). Leitner (2003) suggests that an appropriate regulatory framework is necessary if E-Government is to become a key factor in facilitating the transition to a knowledge-driven economy. A typical example of regulatory adaptation comes out of the long debated introduction of the digital signature. After many years, almost every developed country has adopted a digital signature code. Other countries are about to introduce new legislation, while most developing countries have not yet found a clear solution to digital signature (Courtney, 1997).

- **Security**

During everyday transactions, all public administration officers receive exchange and collect the personal information of citizens (Cyert et. al., 1993). The importance of data protection increase for services involving information sharing among many different agencies. Government has the responsibility to develop a culture of privacy protection and security (OECD, 2003). Privacy protection is not just a technical issue; it also involves issues such as educating and training government officials for privacy and limiting the access to personality identifiable information and not automatically allowing employees to tap into databases including such data (Rainer, 2004). As listed in The European Parliament and The Council of the European Union, many countries and intergovernmental organizations have issued protection policies and have established working groups and commissions to grant and improve the fundamental right of privacy. Moreover, the European Union has recognized the need to create a common set of rules for privacy in order to consolidate the information society and to simplify the exchange of information among different offices. Following the existing European and national data protection

legislation, the European Commission for Interchange of Data between Administrations has elaborated privacy policies to uniform Pan-European e-Government (Duck, 1998).

- **Limited Resources**

Budgeting of human and financial resources is the Achilles' heel of many e-government projects. The provision of the required resources for the e-government adoption can be one of the most problematic issues. In addition, the difficulty to evaluate the expenses and the return of the investments make it harder for e-government project managers to call for funds (Riedel, 2004). These resources so also include some long term preparations such as having skilled staff to accomplish technical and organizational projects depends on the presence of educational institutes in the region. Unfortunately, not every region has its own educational institutes and the workers are often reluctant to change their living place (Riedl, 2001). Most penalized in this case are the rural and developing countries, which have difficulty recruiting competent staff. Moreover, according to OECD (2003), the resource allocation problem intensifies in intergovernmental projects between two or more countries. The vertical funding system used by most countries is a real obstacle to inter-governmental projects.

- **Culture**

As mentioned above, e-government may include not collaboration between different public departments but also the cooperation between governments from different countries. As Riedel (2004) discusses, culture makes a country unique. The cultural identity of a country comes from its history, religion and traditions. Each culture offers a great potential for every single country for economic creativity. At the same time, these differences represent an obstacle to cross-border cooperation: the cultural gap between different administrations often means the failure of international cooperation. (Riedel, 2001)

- **Coordination**

E-Government projects involve many stakeholders. The coordination of everyone in such a project is a difficult task. The differences mostly come from the different points of view of the different categories of specialists involved in the implementation of Electronic Government systems, deriving partly from the egoism of the stakeholders and partly from their ignorance. For example, IT consultants have little idea about the public sector while proponents of public governance reform continue to ignore much of potential of IT (Lenk, 2004).

- **Standardization**

Information Systems integration and standardization in private business has become a widely discussed subject. Mergers and alliances within the public sector have engaged many IT experts to homogenize legacy systems and to develop interfaces able to join different data structures. Technical aspects of E-Government become very important in horizontal and vertical integration of different agencies (Layne, 2001). There are many difficulties and lack of standards at the moment that make the implementation of e-government challenging. Standardization From the paper format to the first digital information, every government has developed individual semantic formats. These differences, in the form of ad hoc developed and proprietary data representation, prevent the introduction of a widespread accepted semantic. In most of the cases, knowledge of employees can compensate for the lack of a well defined semantic (Riedel, 2004).

- **Legacy systems**

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Although many public administrations have upgraded their applications during the Y2K crisis, many legacy systems still remain (Leitner, 2003). These systems are often inflexible and the incompatibility among them makes it hard to develop middleware applications. Legacy system can increase costs (OECD, 2003), for instance for data transfer, maintenance, development of new modules or functions

upgrading and lack of common standards. Those responsible for G2G implementation can't ignore the investments public administrations have already made in Information Technology and consider including the existent systems in their architecture. How the modern Information System (IS) is integrated in the existing one has a tremendous impact on the success of the project.

- **Organizational Structure**

Osterloh and Frost (2003) support that most governments have been organized by function-oriented division of responsibilities, which creates a vertical structure divided by different hierarchies. Personal contact is very rare and most employees know only their specific part of the entire process. The relationships between different hierarchy levels are regulated through inflexible processes, codes and laws that are an obstacle to the fluidity of information and they create a real bottleneck. The operative costs of function-oriented offices are very high and not easy justifiable. The need for a transition from an office-oriented to a customer-oriented system has increased with the use of IT. To fully exploit the benefit of IT the public administration has to change their process organization: from a vertical to a flat structure.

- **Information and knowledge Integration**

As Relani (2004) argues, one of the most ambitious tasks G2G tries to achieve is the national and international exchange of information between different public offices. The transmission of information involves many variables and many knotty problems to solve. Organization, culture, language and many others are the obstacles to overcome. The reorganization of back-offices is the basis to enable a seamless government organization. For a strictly functional organization, IT can help transform back-offices to become process-oriented and more customer-centric. Moreover, the correct use and interchange of information can reduce the administration costs and the length of processes. A complete integrated and networked intra and inter-governmental organization is the basis for a fluid and

boundless interchange of information and knowledge.

- **Resistance to Change**

The eRevolution has to deal not only with external difficulties, but also with the internal resistance to change, which can be an obstacle for the modernization of the public offices. In fact, many employees do not see e-government as an opportunity, but as a threat for their future. The employees may refuse to adopt the new working methodologies or continue to work in the same manner they worked before behind the administrators' backs. An organized management of change has to be established. The organizational change has to be discussed with the people involved and they have to be well informed of what is going on (Rainer, 2004).

In summary, we can view the challenges of e-government collaboration as problems of integration related to technical and non-technical issues. Thus, we believe it has to be identified what level of integration are we aiming? And before answering this question what kind of G2G are we willing to adopt? Is it a backbone to support other sectors? Is it citizen centered or process centered? Or is it used to support a strategic process by nature? For example Klischewski (2004) distinguishes the two types of integration information and process integration. Information integration aims at facilitating information flow, i.e. providing access to structured informational resources across technical and organizational borders in order to enable new services based on a virtually shared information environment. Process integration on the other hand, centres around interrelating steps and stages of process performance across technical and organizational borders in order to enable new services based on an overarching monitoring and control of process flow. To investigate these challenges and others along with the type of integration we are going to investigate the case study after presenting the research approach.

In the following section, we are going to investigate the case of Egypt, as an example of a developing country to highlight additional needs

and challenges of G2G in the context integration for sustainability in general and ICZM in particular.

## 6. The Case Study

### a. Overview

The case of Egypt has been selected as an example of one of the developing countries, surrounded by coastal areas. According to Coastal Management Center (no date) Coastal Management Center (no date), the Mediterranean and Red Sea coastline of Egypt extend for about 3,500 km. The offshore shelf area (with water depth of less than 200m) covers 374,000 km<sup>2</sup> and the area of exclusive economic zone (EEZ) is 1,735,000 km<sup>2</sup>. The Egyptian coast is characterized by its beautiful appearance, owing to a diversity of natural coastal subsystems and ecology. This natural beauty varies from; the coastal lakes, salt marshes, mud flats, beaches and dune complexes along the Mediterranean coast; to the mangroves and coral reefs in the Red Sea area, and the related coastal and marine biodiversity. Four main issues facing the coastal zone on Egypt has been identified:

(1) shoreline erosion and flooding, (2) irrational land use, (3) water pollution, (4) deterioration of natural resources and habitats.

As Abouel Azm (2002) states, according to the Environment Law 4/1994 the Environmental Affairs Authority, which is a subset of the Ministry of Environmental Affairs, coordinates the ICZM activities. And is responsible for the ICZM strategic plan. Different Ministries are involved in managerial level plans.

*At the strategic level:* the National Authority for Integrated Coastal Management coordinates between the different contributors. The Governorates are the main responsible entities in this context within their geographical regions.

*At the regional level:* more than one Governorate is involved, as each of those geographical sectors include more than one Governorate.

*At the local level:* the implementation is the responsibility of the Governorate. Depending on the nature of the integrated coastal management

at that Governorate, there are some implementation roles for some Ministries at that level.

The following procedures shall be followed in respect of permits for the construction of these establishments in the coastal zones:

The application shall be submitted in writing to the coastal governorate concerned (the licensing authority), indicating the type of establishment to be constructed within the prohibited zone, together with an attached study assessing the environmental impact of the project or of new works requiring to be carried out, including their effect on the environmental balance of the coastal area, and on the shore line, and in particular on factors such as 1) *Erosion*, 2) *Sedimentation*, 3) *Coastal currents*, 4) *Pollution resulting from the project or works*. The application shall include a detailed statement of precautions proposed to avoid or treat these effects, if any. The coastal governorate shall forward the application to the Egyptian Authority for the Protection of Beaches to express its technical opinion on the project, in coordination with the EEAA. The coastal governorate shall also forward the study assessing the environmental impact of the project to the EEAA to review same and render its opinion thereon within sixty days from the date of receiving the said study. The Egyptian Authority for the Protection of Beaches may charge the applicant with the costs of the surveys and studies it carries out. The Minister for Environmental Affairs, after consulting the competent administrative authorities and the governorates concerned, shall issue the conditions for granting a building permit to construct the establishment within the prohibited zone, or to modify the shoreline.

#### **b. Organizational Problems**

According to Coastal Management Center (no date) conflicts arise mainly from absence of ICZM strategy, lack of horizontal and vertical integration as well as lack of institutional arrangement. ICZM, as mentioned above, necessitates the integration between organizations, whether ministries or

governorates. Thus, in the context of inter-government integration, we are going to present the results of one strategic process of Egypt crossing different ministries by nature being investigated by Ezz (2003), in the context of inter-governmental integration. It is considered as an embedded case study that was applied on the one of the strategic processes of Egypt involving several ministries and governmental agencies. We are aware that the results and experiences of case studies are only generalizable to the research prepositions. Thus we referred to this study as we are discussing the organizational issues in the same country, for the similar governmental agencies at the same strategic level. Similar to ICZM several organizations are involved in the foreign financing process. Thus this process at the strategic level of the country was selected due its inter-organizational nature and importance of smooth collaboration between different governmental and non governmental institutions. The process is that of managing foreign financial resources at country level, in Egypt. While investigating this process for the purpose of building system integration (c.f. Ezz, 2003), the investigator came across some additional primary data, that we believe that it is a rich material that can be fulfilling the empirical needs of this study and forthcoming studies in the area of e-government collaboration.

The investigation of foreign financing decision process is this study is made for the purpose of demonstrating inter-governmental collaboration challenges. Thus no details will be provided, except those directly related to the purpose of the case. Understanding the overall process decision making process was challenging. For example, due to the vagueness of the process, we had to refine our understanding of the foreign financing decision making process through interviews and clarify which organization is involved at each phase. As there was no documentation about this issue we had to build our conclusions based on interviews (several iterations) and the most relevant documentation available. During some stages of the empirical work it seemed impossible to know the global view at a macro level as interviewees did not know the relationships to other organizations,

talked at different levels of detail, or provided us with a detailed micro view, or even described each phase in totally different way (c.f. Ezz, 2003). It therefore became obvious that the process is messy and the roles of the involved organizations are not clear (at least to others). This has been already supported by previous literature as Pouloudi (1997) argues that identifying stakeholders in inter-organizational systems becomes very difficult. In addition, there are lots of tasks; some of them overlap, which makes the process more complex. However, as can be seen from this process the interrelationship and co-ordination is highly important, as lots of decisions depend on co-ordination between organizations (cf. El Samalouty, 1999).

One of the challenges facing the process is that the strategic environment is very dynamic. For example, not only ministers and executives have been changed but also the roles of the ministries as well. Some ministries have been merged with others as well. This issue caused several barriers to system use, as some of the contributors were not well informed about system capabilities.

In addition to general problems facing strategic decision making, institutionalization and the development of strategic systems, there are other problems associated with the foreign financing process and its supporting computerized system in particular. Some of these are the uncoordinated foreign financing data sources, the complexity of the foreign financing environment as a result of restructuring, the complexity of the legal framework, and outdated decision making audit process. Added to these problems, there is a low level of foreign financing function, including skilled and trained manpower in the government hierarchy (Kaddah, no date). Also, several ministers are involved in the process with no sufficient link between them. Furthermore, the top management is overloaded with tasks, most of which are ad hoc. Some of these challenges have been also discussed by El Sherif and Gray (1994), as they mention that the involvement of different organizations and different departments in each organization makes the process more

complex and the communication between organizations more difficult.

In addition, there is an absence of the accurate user requirements, as well as the lack of a coordinated plan for foreign financing information management. There is also a duplication of effort within and across the offices in the different institutions. Furthermore, there is a little or no data interface between computer-based systems carrying the same complementary information. Last but not least, there are inadequate human and material resources. We can also add that there is duplication of IT support efforts, as some ministries are trying to have their own IT support.

Our review of tasks also showed that some of the decision making phases are iterative, and others are not necessarily executed sequentially. Some of the tasks are performed in parallel as they are executed by some ministries, whereas other ministries might be performing other tasks. Other tasks depend on each other's results so they have to be performed in a particular sequence. So, the strategic decision making process overall is very complex and can be regarded as a set of tasks that often include other decision making process phases.

In summary, in addition to being ill-structured, as noted in previous research as well (e.g., El Sherif and El Sawy, 1988), the strategic processes at country level are inherently complex. There are several contributing organizations, where some tasks of the processes are performed by more than one organization. The decision making process consists of a set of sub-processes or tasks, some of them are overlapping, parallel, or others are dependent on other processes. Our experience with this research has been that any seemingly technical problems could be attributed to organizational issues or problems in inter-organizational coordination amongst the stakeholders of the process. Conversely, the technology did not act as a facilitator for rich coordination, partly due to the limited use of network technology.

Analyzing the foreign financing decision making process highlighted the high complexity of the decision making process at the strategic level of the country. By nature, the decision making process crosses the boundaries of one ministry to several ministries. Analyzing the decision making process in the context of e-government adoption in general and inter-government collaboration in particular is very challenging. However, this analysis shows that it is necessary to adopt the concept of inter-government collaboration to facilitate the interaction between isolated ministries involved in the same decision making process and thus to overcome some organizational problems such as isolation and duplication of work. Supporting the idea of integration at government level, the preliminary results of Themistocleous et. al. (2004) concerning the case of integrating one of the local governments, already anticipate a reduction of data redundancy and internal information. In addition, they estimate that the integrated system will lead to the reallocation of a number of employees and consequently to the organizational changes. Although that their study is still in some early stages and it is too early to say what would be the overall financial benefits to the organization; it is already obvious that the integration will lead to a significant cost reduction.

Although the Egyptian Cabinet is sectorial by nature, we need to look at some issues related to resources management in particular from the process oriented view. At the same time, some challenges have been detected to be a barrier for achieving this integrated management. Although technology could be used to reengineer the decision making processes (Galliers, 1998), the process at the initial stages, has to be ready for technology adoption in general and e-government adoption in particular (c.f. Ezz, 2003). In this case the integration could be far more complex than simply information and process integration. In summary, the problem of inter-government collaboration could be regarded as an integration problem, which includes several issues along with technology.

In the context of the process under investigation, although challenging yet beneficial, we believe

that technology adoption in general and e-government technologies in particular, are recommended for the foreign financing process in Egypt or any similar strategic processes taken at government level. We believe that any system support without solving major organisational problems may not be useful. Thus, we propose, that the foreign financing process would be reorganised, documented and some organisation should be responsible for the co-ordination between the involved ministries.

## **Conclusions**

The main challenges of ICZM, from our point of view have been presented in this paper. ICZM is a management and collaboration problem as we argue. It needs extraordinary management approach to deal with it. Some experiences of organizational governmental problems have been addressed. Although technical integration in the form of G2G is strongly recommended for such strategic processes that are inter-organizational by nature, we argue that technology adoption may be impossible or having limited impact unless the decision making process is better understood and the related organizational problems are addressed. The empirical investigation results of strategic process in Egypt suggest that there is some scope for a better organization, documentation and inter-organizational co-ordination between the contributing organizations. This would result in reducing duplication of work as well. We argue that collaboration research efforts should be extended to the process centered view to manage country's resources, in the context of sustainability in general and ICZM in particular. Our work therefore makes a significant contribution in broadening the research agenda in the context of organizational barriers and e-government infrastructure in developing countries and exploring the importance of e-government adoption in another context rather than those extensively discussed in the literature. The issue of e-government in general is not isolated but tightly related to other information systems topics such as BPR. Further, as mentioned e-government encompasses the other information systems stand alone or integrated, yet crosses organization boundaries. Future

research is going to investigate further ministries and governorates involved in ICZM to identify more challenges aiming to suggest proposed framework for G2G integration in the context of sustainability and ICZM support in addition to investigating the necessity as well as the risk and benefits of some of the new trends such as the integration of geographical information systems (GIS) experiences in the context of e-government: g-government (or geoportals) and of u-government.

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