IT Diffusion & Socio Economic Change In Egypt

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Although new information handling technologies have recently been widely disseminated as tools for socio-economic development, they cannot be used in the same ways as in the industrialized countries for which they were designed. Three things at least distinguish the experience of developing countries. The first is the context of their bureaucratic, administrative, managerial and political systems and the differing expectations of users. The second is attitude towards information technology and the resources which must be used to implement ambitious systems. The third is the content of information analysis and use in developing countries, where both application areas and interpretive assumptions are likely to be radically different from the experiences of managers and administrators in industrialized countries.

This paper describes and analyses the experience of the Egyptian government in spreading the awareness of information technology and its use in managing development planning for socio-economic change. The experience has been one of building multiple information handling and decision support systems in very messy, turbulent and changing environments. The successes over the past eight years by the Cabinet in implementing and sustaining state of the art decision support systems in Egypt's governorates [local administrations] as well as for central governmental decision making holds many lessons for the implementation of sophisticated systems under conditions of extreme difficulty.

The analysis of these experiences offers insight into a variety of problems for designers, implementors and users of information and decision support systems for managing socio-economic change. This paper concludes with analytical methods and guidelines for the future implementation of similar projects in developing countries which may with to benefit from the successes of Egypt's Cabinet Information and Decision Support Center.

Egypt's history dates back to around 5000 years BC. It is the largest country in the middle east with 60 million inhabitants sharing Arabic as the common language. The population of Egypt is growing at a rate of about 2.8 percent annually. The majority of the population is concentrated in 6 percent of the land which has a total of 1 million km2. Most of the population reside on the two banks of the river Nile which extends from the south of the country in the borders with Sudan to the north on the Mediterranean representing a length of over 1000 km. The urbanization is about 45 percent with only three large cities of over 2 million population which are Giza, Alexandria in addition to Cairo which has a total population of about 12 million.

Egypt is considered one of the developing countries. Its gross domestic product has been 35 billion US dollars in 1992. The gross domestic product has been growing for the last decade at a rate of 2-3 percent. The GDP is divided mainly among industry and agriculture where the first account for about 40 percent and the later accounts for 15 percent. Egypt has a rather low per capita income on the international scale due to the ever increasing population rate which accounts for around US$ 610. The major sources of finance of the Egyptian economy reside in four main aspects. They include: the remittances of the Egyptians working abroad mainly in the Arab countries, the tourism sector, earnings from the Suez Canal and Oil. However, Egypt faces a number of economic problems that could be characterized by a wide trade deficit that is currently estimated to be around US$ 4 billion. Moreover, Egypt has a large international debt totalling around US$ 33 billion.

The decision making process at the strategic level addresses a variety of socio-economic development issues. It is characterized by ill-structured and messy issues, interdependent, complex, multi-sectoral, and operates within

a turbulent and dynamic environment (El Sherif and El Sawy 1988). Moreover, it involves conflict resolution (Gray 1988), crisis management (Mason and Mitroff 1981) and fast response. Therefore, the level of information needs for the design and development of information systems and/or decision support systems at that strategic level represents a challenge since the nature of information needs is mostly qualitative, lacks documentation, and gathered from an unlimited number of sources. This usually leads to an information overload to different decision makers (Zmud 1986). Hence, the information collected needs to be well integrated across multiple sources and should be well defined in terms of format and quality requirements that should be determined and related to the decision making process (Mintzberg and Waters 1985).

Decision support systems, since their inception in the 1970s, were differently defined and conceptualized by vendors, researchers as well as academicians (Bonczek, Holsapple and Whinston 1981). However, there were general guidelines and interpretations defining them as computer-based systems that help decision makers confront ill-structured problems through direct interaction with data and analysis models. The literature show that the focus of research and applications of decision support systems is to a large extent on studying the individual and organizational decision processes. Decision support systems represent a set of opportunities directed towards improving the effectiveness and productivity of managers and professionals, boosting the competitive edge, and rationalizing the decision making process within an organizational context. They aim at realizing the desire for accurate, timely and relevant information to help support various organizations to deal with an increasingly turbulent economic environment and stronger competition pressures. The focus during the last two decades at both the research and application levels was on the effect of decision support systems on the management's role of various profit-oriented organizations. These systems were mostly related to issues such as organizational planning, organizational competitive advantage and administering client's portfolios. In that respect, most of the literature on decision support systems developed during the last two decades were focusing on their uses in organizational contexts (King 1981). However, much less emphasis was given to their use in socio-economic development planning issues and introducing change into to the society.

A literature review has shown that increasing demands have been placed on public administration in developing countries (Conyers and Hills 1984). The need for socio-economic and development planning have been behind the administrative reform programs implemented in these countries aiming at providing more accurate, timely and relevant information about the local needs and conditions (Rondinelli and Cheema 1983). This has also contributed to the rising demand for decentralization for development planning in developing countries. However, most of the attempts of decentralization for development planning were faced by lack of coordination, lack of financial resources, lack of technical infrastructure and trained human resources. Others were affected by the social and political structure prevailing both at the country level as well at the local level.

In that respect, a number of developing countries have engaged in large information technology and computerization programs to promote administrative reform and to realize development planning at the local level. However, most of these attempts were using a top-down approach to understand the dynamics, functioning and causes of inefficiencies at the local level (Waema and Walsham 1990). The paper in this area tackled a number of issues such as the lack of human resources, financial resources, technical infrastructure with a focus on the socio-political factors involved. In the mid 1980's, the government of India started a computerised rural information systems project known as CRISP, to promote decentralized rural development in the state of Gujarat (Odedra and Madon 1993). Here the paper builds on the findings of the CRISP project and explores more issues related to decentralization, administrative reform and development planning through the diffusion of information technology at the local level in Egypt. There were a number of similarities between the CRISP and the GIDSCs project that relate to the availability of the technological infrastructure build-up, the information infrastructure development, the problems faced in data collection, compilation and processing. However, there was also a number of differences that will be highlighted more in the paper and that relate to the continuous participation of both the governorate authorities and the federal government, the full coordination and the important role played by the Cabinet IDSC and the continuous upgrading of the training and human resources development programs and the development of different incentives schemes to improve organizational performance and staff satisfaction. To sum up, the CRISP project was very influential in setting guidelines for information systems practitioners in developing countries in how to effectively mobilize the available resources for socio-economic development.

The study of the GIDSC as a new form of information-based organization considers the impacts of the implementation of information technology at the local level (Robey 1987). Unlike many researchers who claim that the impacts of information systems sought universal patterns of change (Leavitt and Whisler 1958), this paper shows that the introduction of information technology at the local level in Egypt has had varying impacts that relates to centralization and decentralization of authority, job responsibilities, and development planning (Markus and Robey 1986).

The use of information technology and their impacts on the organization are often affected by social and political constraints (Straub and Wetherbe 1989). The conditions in local administration in Egypt, the power over information and the distribution of authority and responsibilities between the federal government and the local authorities reflected political differences between participants of the decision making process and advocated bargaining and negotiation in conflict resolution. The paper defines information systems as having an effect on the distribution of power by virtue of their impact on information: a vital political source (Waema and Walsham 1990). Information systems increase the power and influence

of those who possesses it and understand its use. Therefore, it was important to study the views of the governors with regard to the social and political contexts in which the GIDSCs were to be utilised in addition to their technical features to be able to comprehend how they perceived the role of the GIDSC.

Public administration in developing countries usually operates in a turbulent and dynamic environment (El Sherif 1990). Information systems based on manual processing have proved to have a considerable degree of flexibility and adapt rapidly to changing needs. However, computer-based systems have been known to be inherently less flexible and much more costly whenever subjected to unforseen changes (Land 1982). Consequently, the paper focuses on the role of the GIDSCs in adapting to possible changes in the user requirements as well as changes occurring to the technology. This relates to how flexible systems were built with changeable software applications, portability of the system across different platforms, and flexibility in the design allowing possible expansion in scope and components both vertically and horizontally. The paper will show how the GIDSCs project accommodated the changes that occurred since its early development phases in terms of information systems by forecasting the horizon through proper planning and design (Land 1982). It will also demonstrate how the build-up of robust GIDSCs have helped throughout the different phases of the project in adapting to the changing circumstances in the environment and changing needs of the users.

In that respect, this paper provides new grounds and research opportunities for one of the advanced techniques of information technology: decision support systems research and application through the demonstration of their use by a non-profit organization: the government of Egypt in rationalizing the decision making process, better allocating the scarce resources, and for introducing socio-economic change for development planning purposes. The focus of the paper is one of the national projects developed and implemented by the government of Egypt, Information and Decision Support Center (IDSC) and aiming at introducing and diffusing the use of state of the art information technology tools and techniques at the governorates level to realize socio-economic change and development.

The Cabinet Information & Decision Support Center (IDSC)

Egypt, faced with the classical problems of developing countries such as heavy foreign debt, balance of payment deficit, high illiteracy rate, poor technological infrastructure, lack of financial resources and unemployment has been striving to implement a nation-wide strategy to support the realization of its targeted socio-economic development program. In that respect, the government of Egypt adopted in the mid 1980s a far reaching supply-push strategy for the introduction, implementation and institutionalization of large information and decision support systems projects aiming to improve top level decision making at the Cabinet level with respect to socio-economic development planning. The strategy had to be tailor-made to the decision making needs at the Cabinet level which addresses a variety of socio-economic development issues. These issues include public sector reform, administrative reform, balance of payment deficit, debt management, and privatization. The concept of information needs and decision making at the Cabinet level was defined in terms of the following aspect; data rich and information poor, DSS/OR/MS specialists and experts were isolated from the decision makers, and the use and application of computer systems were viewed as end means rather than information technology tools that can support in decision making. Moreover, the focus was more on technical issues rather than decision outcomes. Therefore, the urgency and criticality of the decision making level necessitated the importance of providing information and decision support services to support the decision making process through the use of the most appropriate state of the art information technology tools and techniques.

In this respect, the government of Egypt has realized the importance of establishing a comprehensive information base which can provide support for the Cabinet and top policy and decision making requirements. To achieve such a strategic objective, the Cabinet of Egypt, late in 1985 has initiated a program that was designed for the optimum goal of improving the strategic decision making process at the Cabinet level. It consisted of a number of projects namely the information and decision support systems projects. The number of projects have reached 428 projects in September 1993 covering an expansive variety of major economic, social, managerial and technological domains that are of vital importance to Egypt. Among the projects were; the debt management project, the national resources project, the education reform project, the legislation project, the international trade project and the governorates information and decision support centers project.

The objectives of the program included; the establishment of a center for information and decision support systems for the Cabinet in addition to supporting the establishment of decision support systems in different ministries, sectors and governorates and to assist in making more efficient and effective use of the available informatics resources. Therefore, the idea of the Cabinet Information & Decision Support Center (IDSC) was initiated to provide the Cabinet with both information and decision support. Thus, in 1985, the Cabinet of Egypt established the Information & Decision Support Center (IDSC). Its mission is to provide information and decision support services to the Cabinet for socio-economic development planning. The objectives of IDSC include: firstly, to develop information and decision support systems for the Cabinet and top policy makers in Egypt. Secondly, to support the establishment of decision support systems/centers in different ministries and make more efficient and effective use of the available information resources. Thirdly, to initiate, encourage and support informatics projects that could accelerate managerial and technological development of Egyptian ministries, sectors and governorates. Finally, to participate in international cooperation activities in the areas of information and decision support.

The framework of IDSC is divided into three levels. The first level represents the Cabinet base where information and decision support systems projects are developed to support the strategic policy and decision making processes in development planning. The second level represents the national nodes where IDSC links the Cabinet with existing information sources within the ministries, national organizations and agencies and academic institutions and research centers. The third level represents the international nodes where IDSC extends its activities by accessing major databases worldwide through state-of-the-art information technology and telecommunications facilities.

The role of IDSC differs according to its four operational levels; the Cabinet, sectoral, national and international. Firstly; on the cabinet level, IDSC provides information and decision support, crisis management support, modelling and analysis and multi-sectoral information and databases. Secondly; on the sectoral level, IDSC provides assistance in the development of decision support centers, advisory and consultancy, sectoral database development and project financing and support. Thirdly; on the national level, IDSC provides assistance in policy formulation and drafting, legislative reform support and in the infrastructure development. Finally; on the international level, IDSC provides the facilities for technology transfer to Egypt, the establishment of a DSS model for developing countries and it also supports establishing cooperation link and opening communication channels with international information agencies.

The areas of scope of IDSC projects covered is grouped along four dimensions which encompass the activities of IDSC; decision support systems for strategic issues, building sectoral decision support centers, information infrastructure development and management and technological development. It is within the scope of this paper to cover one of the largest projects implemented by the Cabinet IDSC within the information infrastructure development programme which is the governorates information and decision support centers project (GIDSC).

The GIDSCs Project

The interest of the strategic, executive and political power in information technology and its impacts on socio-economic development in Egypt, especially at the Cabinet level has started over a decade ago. The idea of enhancing the decision making process at the governorates level might have been there well before that date but it had only been materialized with the initiation and development of the governorates information and decision support centers project which took place during 1987 through a project implemented by the Cabinet IDSC and supported by the ministry for local administration.

The idea of improving the decision making process at the governorates level through the provision of relevant and timely data had started in 1981 when a presidential decree was officially announced which necessitated the establishment in each of Egypt's 26 governorates of a Governorate Information

& Documentation Center (GIDC). The role of the GIDCs was mainly the collection of data from different sources in the governorate which includes the local administration offices i.e the representatives of the central ministries. This period lasted from 1981 until mid 1987 and was characterized by the lack of systematic steps and procedures and where each local administration office staff strongly rejected the dissemination of data as their source of power. Thus, the role of the GIDCs was minimal in terms of development planning. In that respect, the role of the GIDCs was insignificant and of minimal value to the governorates development programs as well as to the decision making process at the governorates level. Moreover, in various occasions the data flow from different local administration offices lacked smoothness, relevancy, timeliness and accuracy. Moreover, the GIDCs did not provide any support in upgrading and enhancing the follow-up and evaluation mechanisms within the governorates nor they introduced change to the administrative systems as it was planned as being one of the main activities of the GIDCs. On the contrary, some of the GIDCs became the resort to some of the governorates' employees that were known for being unproductive and worthless in other central and local government agencies. Hence, they were transferred to these newly emerging GIDCs since their role was visioned as of having secondary significance even at the governorates level. In that respect, one could see that not only the GIDCs did not produce the desired objectives but moreover, they were not given the chance to realize their targeted goals and fulfil their mandated obligations since the staff of the GIDCs were not trained or had the knowledge and/or experience of handling various types of data to be provided to the decision makers at the right time and in the right way to use them in their decision making processes. The failing role of the GIDCs and the need for managerial, administrative and technological development at the local level, in addition to the need to make better use of the available resources mainly information aiming at the rationalization of the decision making process necessitated the move towards a better solution and a concrete action.

Therefore, in April 1987, the ministry of local administration in cooperation with the Cabinet IDSC have initiated the idea of an informatics project namely the Governorates Information & Decision Support Centers (GIDSCs). The mission of the project was to develop information and decision support systems focusing on socio-economic high priority issues at the governorates level. The aim of which was to introduce socio-economic change using state of the art information technology. One major characteristic of the project was that it was the first time in Egypt that an information technology project would be implemented outside Cairo: the capital. The changing focus from Cairo to the rest of the country through the introduction of information technology tools and techniques within the 26 governorates and the use of computer technology in local governorates where some of them are rural and others are urban have presented a large and significant set of challenges to the Cabinet IDSC in the implementation of the project. These challenges were formulated due to managerial, administrative,

technological and cultural aspects.

The planned intention of the project and the initial plan was to start with the Governorates Information & Documentation Centers (GIDCs). This was done to avoid any duplication in the efforts that were already exerted, although minimal, during the implementation of the GIDCs. The aim was to support the GIDSCs in performing their leading role in providing information and effective decision support services besides providing support in the follow-up and evaluation of the impacts of such information/decision support services at the governorates level. The project is financed jointly between the ministry of local administration through the Cabinet IDSC and the 26 governorates. The planned time-schedule of the project was four years from 1988 until 1992 to be able to cover all of Egypt's 26 governorates through a phased implementation plan that started with a pilot project in June 1988 with one governorate, Suez. After the full implementation of the first phase and the establishment of the Suez GIDSC, the second phase was launched with the establishment of 6 GIDSCs. Next, the third phase started with a massive and parallel establishment of 20 GIDSCs to cover all remaining governorates and the city of Luxor GIDSC.

Objectives

The objectives of the GIDSCs project aim for socio-economic development that falls within the scope of the governorates level in Egypt. These objectives include:

• To contribute in enhancing and improving the effectiveness of administrative development at the regional level through the development of information and decision support systems to support the decision making process at the top policy and managerial levels in the governorates.
• To upgrade the level of services and increase both the level and value of production at the regional level through the provision of information and decision support systems capable to rationalise decisions at the governorates level together with the related local administrative departments.
• To contribute in diminishing the pressure off the constituency and decrease the waste from the different production and service operations at the regional level through the provision of effective systems to follow-up, control, evaluate and determine decision making indicators.
• To provide socio-economic information related to both products and services in the different governorates for the purpose of building a national information system based in the Cabinet IDSC and linked through a governorates-wide information network linking all GIDSCs.

From the above mentioned objectives, we could conclude that the overall objective of the GIDSCs project is to try, backed by and through the efforts of the GIDSCs staff in various governorates, to support the establishment and the development of the governorates information and decision support systems in the different governorates aiming at introducing socio-economic change.

Framework

The framework of the GIDSCs project is divided into three major parts according to both its geographical and sectoral dimensions. The geographical framework of the project covers all of Egypt's 26 governorates and the city of Luxor. The coverage of the governorates include all the cities, areas, villages and districts with a focus on the economic, social and political priority issues to the governor at the local level and to the Cabinet at the national level. The sectoral framework of the project represents the major sectors in the economy that are determined by the Cabinet IDSC and included in the GIDSCs project document. These sectors represent the major sectors in the comprehensive sectoral information system that is designed and developed by the Cabinet IDSC and located in each GIDSC. The framework of operations includes all laws and decrees that guarantee the effective, efficient and timely flow of information into the GIDSCs from different data sources within the governorate's boundaries as well as from outside agencies and organizations both regionally and centrally.

Moreover, the data items in the different sectors are selected and built according to a priority list which defines the level of data types which at the same time defines the depth and the level of comprehensiveness of such data. In that respect, a time plan and an agenda for the steps and procedures is usually determined by the governor for data collection and data updating. The time and contents of each sector in each governorate might be slightly different than in other governorates depending on the needs of the governor and the type of data being updated. One should note that the changes in the sectoral information system from one governorate to the other is minimal which was intended to provide macro level indicators at the national level based on the aggregation of the data produced from the 27 GIDSCs. In that respect and following the framework of responsibilities, the relationship between the Cabinet IDSC and the GIDSCs passed through two major phases. The first phase included setting the plan for development, its implementation and ended with the inauguration of the GIDSCs. This phase was highly characterised by in-depth cooperation and support by the Cabinet IDSC as an implementing and executing agency through a time plan and fixed agreements between the Cabinet IDSC and each GIDSC. The second phase included the post-implementation phase of the GIDSCs which was characterised by extensive cooperation and support by the Cabinet IDSC to the GIDSCs through periodical assessment and evaluation of performance and monthly field visits according to a planned schedule to get the feedback from the GIDSCs staff as well as the GIDSCs users.

Duties & responsibilities

The framework of cooperation and the support provided by the Cabinet IDSC to the different GIDSCs could be illustrated as follows:

- The provision of technical and practical expertise presented to the governorates to transform and develop the GIDCs to become GIDSCs.
- The provision of information technology tools and techniques that guarantee the provision of an effective information and decision support services to decision makers at the governorates level.
- The provision of documented systems for gathering and controlling the channels of data from various sources to ensure their proper flow into the GIDSC.
- The design and production of application programs which represent the governorates' information system installed in the GIDSCs.
- The planning, financing and implementation of training and human resource development programs for the GIDSCs staff as well as information officers in the governorate's offices and departments.
- The provision of the technical infrastructure from hardware and software needed to establish the GIDSC.
- The transfer and dissemination of expertise gained from the application of various informatics projects in an attempt to draw generalizations and learn from the experiences occurring in similar projects.

Development phases

The development of the GIDSCs project given the limited financial and technical resources necessitated a phased development and implementation approach. Thus, the development of the project passed through a set of phases in the design and development of its different applications and through the development of prototypes. The sectoral database was easy to develop due to the similarity of the basic needs across the different governorates. One of the major characteristics of the sectoral database is that it is developed in a transferable/portable manner so that what applies on one governorate would apply to the others. The sectoral database programs and applications were developed through a phased development plan using the technical and managerial expertise of the Information Resource Management department in the Cabinet IDSC.

The design and development of the systems applications took a period of nine months including the testing and the analysis of the users needs through continuous interaction with the users and the development and alteration of the programs and applications based on their needs. The first phase included seven applications: housing and construction, health, agriculture and irrigation, infrastructure, youth and sports, labor and tourism. The second phase included two applications: industry and education and it lasted for three months. The third phase included four applications: administration and organization, internal supply, population and social insurance. The data sources in the governorates included the departments of the governorate's general administration, the specialized technical and experts departments and offices affiliated with the governorate's general administration in addition to the local administration offices that exist on different levels in the governorates such as the areas, cities and the villages.

Although in each GIDSC the sectoral database includes the data related to the governorate only, the comprehensive database available in the Cabinet IDSC covers the aggregated model of all 27 GIDSCs. The aim of which is to support the Cabinet on national socio-economic issues and priorities at the national level. This represents in a sense the ultimate objective of the project which is to develop national socio-economic indicators. For example, the data developed regarding the local administration for education in each governorate represents the level of data available in the GIDSC which, gathered together with other governorates, would produce indicators for the ministry of education at the national level which represents the level of data available in the Cabinet IDSC. Thus, the comprehensive sectoral database was designed to fit both the national domain and the local domain baring in mind the importance of keeping standardization and systemization of the different components and the logical structure of the sectoral database along the 27 GIDSCs to serve two purposes. Firstly, to be able to develop local indicators as a first step to develop nation-wide indicators related to the various important issues to the society to be able to serve higher policy making levels such as the ministers and the Cabinet in the national planning programs. Secondly, to work as a first step in the formulation of a nation-wide information-base network linking all the GIDSC databases together having as a main-hub the Cabinet IDSC.

The flow of data through the development of the GIDSC takes three modules. The first data flow takes place from different data sources and local administration offices and ends at the statistics unit in the GIDSC. The second data flow takes place within the GIDSC itself between its internal units (the statistics, decision support, computer resource, publications and documentation & library units) and the Cabinet IDSC. The third data flow takes place after the analysis, processing and formulation of decision support cases between the GIDSCs and the different users. In the first data flow, the data collection process begins at the local administration offices then it is transferred into the information units newly installed in the governorate's general administration. These information units have direct access to the GIDSCs and act as feeding units to the GIDSC's statistics unit. Moreover, these information units have direct access and links with the ministry's information systems and they also feed them with data. The data is then transferred from each ministry's information system into the different departments of that ministry and to the ministry for local administration. The ministry for local administration is fed with the data for the purpose of updating its governorates-wide indicators regarding each sector. As for the ministries, each ministry is updated for the purpose of updating its files and records regarding the related issue. Finally, each ministry feeds the Cabinet IDSC with the newest updates regarding its related issues.

The second data flow takes place within the GIDSCs

where data after being collected from the different data sources through the statistics unit is cross-checked and verified with various sources such as the local administration offices and the ministry in concern at the central level. The next step within the GIDSC is that data are transferred to the computer resources unit where the data is entered into the GIDSC sectoral database and the updating of the governorates system is done. Upon requests coming into the GIDSC data is transferred to the decision support unit for the analysis, issue formulation and problems identification in addition to the development of alternatives and solutions regarding the issues in hand. Finally, the last step in the data flow within the GIDSC is that upon the completion of a certain information and/or a decision support case, a copy of the final report is kept in the library and documentation unit for future reference. Moreover, another copy of the report goes in the form of a case to be published in the monthly newsletter to be distributed among other GIDSCs which is produced by the publications unit.

The third data flow occurs post to the GIDSC phase which takes the information after its processing and feeds it into the ministry for local administration comprehensive database which is working as the main-hub for the governorates-wide information-base network covering the 27 GIDSCs. Next, the ministry for local administration feeds the Cabinet IDSC with information for its use in supporting the Cabinet and top policy makers in their decision making processes.

The GIDSC Project Implementation Phases

The GIDSC project followed a phased implementation approach which was developed including four major phases: initiation, base building, institutionalization and sustained growth phases.

The initiation phase

In the initiation phase, the project team spent nine months in 1987 and early 1988 studying the decision making environment in the 26 governorates in details, evaluating and assessing the available resources and opportunities for the establishment of the GIDSCs. The Suez governorate located in the Canal region was selected for the establishment of the first GIDSC which would be the pilot project. There were defined successful criteria for the selection of the Suez governorate which was selected due to the following reasons:

• The governor had expressed strong interest and belief in the use of information technology and decision support in introducing socio-economic change and development planning in the governorates level.
• Suez comprises a mix of rural and urban populations which would provide the project team with a variety of experiences from various fields.
• Suez is close to Cairo which made it easier to get access to the GIDSC for maintenance and follow-up in both the implementation and institutionalization phases. Moreover,

it provided more opportunities for the staff to get them trained in the Cabinet IDSC and to live the experience in its different departments.
• Suez is considered one of the strategic governorates both economically and politically; hence, the model of the Suez governorate serves the need in defining the role of the GIDSC.

Strategies

The strategies implemented during the initiation phase are characterized as being mainly dependent on a supply-push strategy. The use of information technology and computers was almost non-existent in local administration in Egypt. The bulk of information technology is concentrated in Egypt in the governorates of Cairo, Giza and Alexandria. It was very difficult for the constituency in the local governorates to identify the needs and requirements from information technology while their comprehension of the whole technology environment was merely minimal. The awareness of the benefits and outcomes of the use of information and computer technology on the socio-economic development programs in the governorates level was also minimal or even non-existent. Following this illiterate and opposing constituency by nature due to the resistance to change and fear of losing jobs to automated machines, the Cabinet IDSC had to implement a supply-push strategy through the establishment of the GIDSC and actively show its uses with its information and decision support systems in high priority issues related to the governorates development programs and to show the GIDSC's actual impact on the decision making process and the better allocation and use of the scarce resources. During the initiation phase the sectoral database along with its different applications and programs could be characterized as of having a portability character. This portability aspect was due to the transfer of the system from one GIDSC to the others to develop standardization. This is because the information system in Suez comprised the sectors of population, industry and education and while the GIDSC collected data from local sources covering the education sector, the project team collected data from the local sources covering the population and the industry sector which represented the division of data collection in this phase.

The organizational structure and the internal steps and procedures of the GIDSC in that phase were prototyped and still evolving. Therefore, the specifications of the GIDSC units and the clear defined steps, procedures and services especially those of the decision support and publication units were evolving and under amendments and changes according to the needs of the various users. Moreover, the GIDSC's information system was prototyped including the GIDSC's database applications, framework, structure, and outputs. The prototype developed and used in the governorate of Suez in the initiation phase became the model for future implementation in the next phases in the establishment of the other GIDSCs. It is very important to note that the prototype of the GIDSC information system, the amendments and the changes in the

organizational structure, steps and procedures and the success of demonstrating the experience of the Suez GIDSC had a positive impact in the future development and implementation of other GIDSCs.

Therefore, the project team was under severe pressure by the Cabinet IDSC management levels to quickly demonstrate the benefits of the use of information technology in the Suez GIDSC in attempt to do the following:

• To prove to the governor of Suez that his initial trust and belief in information technology was worth the time and effort invested which was very important because the conviction of the governor was essential for guaranteeing his continuous support.
• To set the example for other governorates to proceed with implementing the GIDSC project in other governorates.
• To meet the pressure of the Cabinet IDSC's top management considering that the GIDSCs project is one of the largest and most important information and decision support systems projects implemented by the Cabinet IDSC.

To overcome these issues, the project team developed model reports that had the fastest and strongest impacts on the governor and that encouraged him to continuously support the GIDSC. These reports usually covered very important and sensitive sectors to the constituency such as education and health. Moreover, the project team tried to bridge the technological gap and to impress the governor by the least and simplest hardware such as stand-alone personal computers, standard and user friendly software applications such as database and spreadsheet packages that are easy to be taught and used. The inauguration of the GIDSC in the governorate of Suez represented the marketing and the promotion of the organization as well as the organizational visibility at the local, regional and national levels. In that respect, and as a strategy set by the project team which was inspired from other projects developed and implemented by the Cabinet IDSC, the project team adopted a strategy were the inauguration of the GIDSC was organized to become a local event where all major organizations, agencies and authorities attend it. The inauguration of the GIDSC was presented as a highly supportive tool to its beneficiaries which included, the governor, the secretary general of the governorate, the councils and the business sector in the governorate. Moreover, the inauguration of the Suez GIDSC was attended by the prime minister and a number of ministers such as the minister for local administration and other key positions. This has given the inauguration both the social and political weight in addition to the proper mass-media and promotion needed to promote its objectives and diffuse its awareness. The organization of the inauguration of the GIDSC led to an excellent marketing and public relations opportunity. Moreover, it led to the feeling among the constituency that there could be an organization in the governorate that is close and supportive to them as individuals. The event also led to drawing the public attention to the GIDSCs' activities and rendered their existence legitimate which led to the formulation of a constituency at the local level

that represented the users of the GIDSC.

Impacts

The impacts of the Suez GIDSC were felt even before its inauguration which took place in June 1988. It represented a significant take-off phase of the GIDSCs project since it was the first breed of a whole year of initiation, planning, design, development, prototyping and implementation. The experience was to be witnessed through the decision making process which differed dramatically in comparison with the previous approach used in the collection of data and its representation upon request to the governor by the GIDC. The change induced by the GIDSC relative to the GIDC affected the basic and grounded ingredients such as the mechanisms and structure for data collection, analysis and information dissemination within the GIDSC and the GIDSC's continuous interaction with its different users. Through the GIDSC, the statistics unit began to systematically collect data from various local administration offices through following the structured steps and procedures defined by the GIDSCs project document. The role of the statistics unit, through gathering the data from various sources had its direct and positive effect which was felt at the governor level in the sense that nowadays the governor deals with one entity which is the GIDSC for information access instead of dealing with up to 30 local administration offices prior to the implementation of the GIDSCs project. Moreover, the library and documentation unit through the collection of reports and studies related to the governorate's issues and socio-economic development needs served as an institutional memory and at the same time minimized the duplication of time, effort and cost when conducting new studies. There were a number of challenges faced by the project team during the initiation phase which included:

• The definition and representation of outputs in the form that would trigger the interest of the governor in order to encourage him to use the GIDSC services.
• The definition of the areas of focus of the GIDSC which should be inspired by two major aspects: the issues of interest to the governor and the issues of interest to the constituency which were developed in a way to tackle major sectors such as education, health and infrastructure.
• The definition and design of information systems was one of the concerns of the project team in the sense of knowing how to develop easy and user friendly systems that would trigger the interest of the users as well as to deliver the objectives of such information systems.
• The ability to obtain data from different sources within the governorate of Suez was originally dealt with through personal interactions. However, nowadays there is a set of steps and procedures that are developed to systemize the access to data that would be used in the services provided by the GIDSC.
• The access to the governor and the governorate's offices was easy in the case of the governorate of Suez. However, for the future implementation of other GIDSCs, there was a clear

need to develop a proper interaction with the governors to be able to approach them and convince them with the idea of the GIDSC.

- The selection of the GIDSC director and how to understand the mission of the GIDSC and transmit it to his staff and being able to meet the requests of the governor.
- The definition of the proper organizational structure of the GIDSC was dealt with through the implementation of the organizational structure developed by the project team.
- The definition of the GIDSC human and technical infrastructure and how to select the proper human resources qualified to meet the needs and the objectives of the GIDSC.

The Base Building

The second phase represented the model building phase which began immediately after the success that occurred with the inauguration of the Suez GIDSC. The phase began during early 1989 with the construction and establishment of 6 GIDSCs. These GIDSCs were in the governorates of Sharkeya, Port-Said, South Sinai, North Sinai, Ismailia and Red Sea. They were all selected because they shared the social, political and economical problems and issues. The implementation of the base building phase changed from the one that occurred during the initiation phase which was attributed to the following:

- The governorates are now aware of the GIDSCs project and are anxious and keen to follow the experiences that has proved to be successful and promising through the implementation of the Suez GIDSC.
- Within the project team, the staff became more aware of the methods and techniques to use while dealing with the staff at the governorates level which has led to the changing vision across time.
- The structure of the project team was changed by adding the concept of the account executives whose main job is to conduct periodical visits to the GIDSCs, meet the requirements of the staff.
- The inclusion of additional and more advanced courses.
- The concept a refreshment program was introduced that represents a continuation of the training program and aims at continuously update the GIDSC staff with the latest advances in information technology.
- The initiation of a prize presented to the best achievements in the courses in the form of a monetary reward.
- The design of the sectoral database, windows and menus of options in addition to the depth of data included were changed to introduce more simplicity to the uses of the system.

Strategies

The strategies implemented were mostly the same as in the initiation phase in addition to a number of new strategies that were introduced in the base building phase. The new strategies were developed and drawn from the experiences and lessons learnt from the initiation phase. The emerging strategies of the base building phase included the increasing interest and investment both in time and effort in training and human resource development and the priority given to these programs in shaping the skills and knowledge of the GIDSC staff besides improving the quality of the performance of the GIDSC staff. The strategies implemented affected the quantity and quality of the training and human resource development programs in terms of training hours in addition to the depth and level of the programs given which passed the level of simple applications related to the computer usage to advanced courses in statistical analysis, systems analysis and design and courses in information systems management. The systems implemented and prototyped in the governorate of Suez were amended after the experiences witnessed in the application of different information and decision support cases and the observations made explicit by the project team and the needs that were developed and requested from the GIDSCs staff. This process of learning from the experience of the Suez GIDSC and the transfer of these lessons to the implementation of the project in the following GIDSCs led to the development of version #2 of the GIDSC's software application. The new version not only included changes in the design of the databases themselves but also it witnessed the expansion both vertically and horizontally in the size and scope of these databases which was possible since the project management team from the inception of the project and since the initial design and development phases of the governorates systems have put into account both levels of development since there was a general feeling among the project team that if the project proves to be successful additional sectors will be added.

The expansion in the databases were tailor-made to the application environment i.e. to the governorates. Example of which is the case of the governor of Sharkeya, later on minister for local administration and the Cabinet member responsible for the GIDSC project. He is originally a surgeon; hence, he had requested from the GIDSC of the governorate and through his personal relationship with the GIDSC project manager as well as his close friendship with the Cabinet IDSC Chairman of the board to focus and expand the details in the database that concern and are related to the health sector. In that respect, the level of details in the health sector database were expanded much more than in other GIDSC's systems. Later on and through learning from other GIDSC's experience exchange program developed and encouraged by the Cabinet IDSC, other previously established GIDSCs were required to add the new additions on the health application.

The expansion strategy has touched not only the magnitude and level of the GIDSCs system but also the scope of users of the GIDSCs. The strategy used for promoting the existing operation, uses and benefits of the GIDSC which represented the organizational visibility was increased during the base building phase and the result of the strategy was more awareness of the GIDSC as a concept which was seen and felt in all governorates. This was achieved through the formulation of local and regional seminars covering various issues related to the GIDSC's scope, role, activities and plans for the future.

The level of the presentation was also expanded at the governorates level to include other public and private entities interested in the activities of the GIDSCs. With the expansion of the number of GIDSCs inaugurated, the project team had to develop a strategy to monitor and control the activities, performance and outcomes of the GIDSCs. In that respect, the concept of account executives inspired from the marketing and advertising fields was used through the development of periodical and upon request visits on a monthly basis to the GIDSCs to assess their performance and to maintain the systems, answer the requests and inquiries of the GIDSCs staff.

Impacts

By the end of 1989, the new 6 GIDSCs in addition to the Suez GIDSC established in the initial phase were intact. This represented 26% of the total scope of the GIDSC project. Yet, it could be seen that the phase to which the GIDSCs project have reached through the systematic collection of data could be easily defined as being accurate, timely and efficient. However, this did not yet show the shift to the ultimate and strategic goal of providing information that is analyzed, prepared and presented in a manner that could be positively used in the decision making process of the governor. This could be due to factors such as:

• The inability of the GIDSCs staff to provide such a service probably due to the lack or inadequacy of the training and human resource development required. Or that the experience and culture of information and decision support was new at the governorates level.
• The lack of comprehensiveness of most of the key decision makers in the governorates i.e. the governors, to the uses of information technology in the decision making process and how to depend on the output of a machine as an input to their decisions.

The second phase, the base building phase, witnessed the fall of the success previously achieved by the first phase i.e. the pilot GIDSC in the governorate of Suez. The continuous inflow and information support provided by the Suez GIDSC was provided but at the same time the deep analysis of information and the problems faced by the governorates were not properly met due to the capabilities available in the GIDSC. The change in the success story of the Suez GIDSC was due to the change of the governor of Suez into a governor who was not interested in the idea of the project which had its negative and drastic impacts on the concept, image and the performance of the GIDSC. The GIDSC due to not being on the priority list of the governor led to a change in the user definition of the GIDSC. Thus, the focus was switched to other priorities rather than using the GIDSC in development and in rationalizing the decision making process.

Institutionalization/Diffusion

The third phase leads us to the confusion of choosing a title for whether it is diffusion, expansion and/or institutionalization. The actual definition of the phase includes the three components. During the third phase the remaining governors were jealous and eager to establish their own GIDSCs after the remarkable, although initial and growing, success of the already established GIDSCs. The chairman of the board of the Cabinet IDSC with the consultation of the project team developed a plan to expand the project on a parallel strategy to inaugurate the remaining 20 GIDSCs including the city of Luxor. The strategy was backed and advocated by the minister for local administration, previously the governor of Sharkeya. The plan was set to establish 20 GIDSCs within 1 year.

Strategies

The strategies that were implemented during the institutionalization/diffusion phase included in addition to the already carried out strategies from both the first and the second phases. Some of them were amended according to the prevailing circumstances and needs and some were newly developed to meet the expanding establishment of the 20 GIDSCs remaining. Among these strategies were the better selection and staffing of the GIDSCs where a newly developed decree necessitated a minimum level of both managerial and technical skills that was set for the recruitment of the GIDSC staff. Another strategy that was implemented was the extensive training and human resource development programs that were developed and enforced both by the project team at the Cabinet IDSC and also by the governors themselves. Moreover, the training programs included for the first time courses for the pre-selection of the staff in addition to the continuous programs that were presented to the GIDSCs staff as part of their job and represented on the job training. The reason behind this was to try, through the human resources available which represent the most precious resource available, to reach the level of efficiency and effectiveness of use of the GIDSCs capabilities and produce the quality outcomes, planned, targeted and required. The capacity building programs; thus, were much more advocated and encouraged. Therefore, the plan was intensified by the project team in coordination with the Cabinet IDSC training and human resource development experts. The program was added to the Dbase 3+, spreadsheet, word processors, in addition to the advanced programs and applications in software development. This included rapid application development and advanced 4th generation languages generation in addition to newly developed courses in management functions and selected topics in sociology, economics and environments. Moreover, there were courses in systems analysis and design and skills development. But at the same time, the decision support domain was not yet emphasized. There was no theoretical background that was provided which had to do mainly with cultural problems which

faced the Cabinet IDSC in many of its informatics projects throughout the country.

Another strategy implemented by the project team is the cross-fertilization that was taking place through the organization of brainstorming sessions between the GIDSCs staff. The documentation of the cases applied and the sharing of the decision support cases implemented were among the main characteristics of this phase. The presentation of remarkable as well as failure cases is organized so as to diffuse the experience of the GIDSCs and both the success and failure reasons through the formulation of seminars and workshops on an annual basis to be attended by the GIDSCs staff and the experts from the Cabinet IDSC together with information systems analysts and experts from various Egyptian universities. The sharing of some applications developed across more than one governorate with the support of the Cabinet IDSC also led to the innovation, development and exchange of ideas across different GIDSCs. Finally, one of the very successful strategies that was developed in this phase and that had enormous impacts on the GIDSCs staff and performance was the development of incentives from the Cabinet IDSC to the GIDSCs staff other than the incentives presented from the governorate itself. The fact that the salaries of the government staff is low and therefore the GIDSCs staff used to be paid low rates led them to look for other jobs after their working hours in the GIDSCs which extends from 09:00 a.m. until 02:30. This has proven during the first and second phase that it leads to the lack of concentration of the GIDSCs staff in their quality of work developed and produced. This represented a barrier to the governors because even at the government regulations level, the law ensured a low ceiling on the bonuses paid by the governor to his employees. Thus, the project team at the Cabinet IDSC developed an incentives scheme to increase the GIDSCs staff salaries and to enhance their motivation.

The incentives were presented on a set of conditions that could be categorized either according to the best performance by the GIDSC and/or by the production of the best newsletter per month. In that respect, the best newsletter every month was presented an award in addition to the publications unit staff were presented with monetary motivations. On the other hand, the GIDSC based on their performance and presentation of reports covering decision support cases were presented with monetary incentives based upon their monthly performance. Finally, the best performance and grades in the training and human resource development programs were presented with extra monetary incentives.

Impacts

The impacts of the third phase which witnessed the inauguration of the remaining 20 GIDSCs was greatly felt throughout the country. By the end of this phase, a whole stage of the GIDSC project was completed. This phase also witnessed the inclusion of three additional sectoral databases. Moreover, the support presented by each governor was easier to obtain due to the fact of the establishment of the GIDSCs in all

governorates which created a kind of competition among the governors. Therefore, each governor wanted that his own GIDSC would perform better than the others. The impacts of this phase were more concentrated on the development of the human resources through the training and human resource development programs. This phase showed the need of the project team at the Cabinet IDSC to develop the skills and capabilities of the GIDSCs in various related aspects. In that respect, a more thorough institutionalization plan needed to be developed in order to develop the GIDSC in a way to serve the community at the local level as it was planned and designed but unfortunately the implementation did not deliver the expected outcomes.

Sustained growth

The focus in the fourth phase was the sustainability of the growth, development and institutionalization of the GIDSCs. This included more focusing on the training and development of the human resources, better formulation of links and connections with the various data sources, agencies and local administrations office at the local level. Moreover, it included boosting the morale of the GIDSC staff, try to build career path development for each and every position in the GIDSC and finally ensuring the diffusion of the GIDSC's services across the different users in the governorate.

Strategies

The strategies of the fourth phase included a number of newly developed concepts that are described as follows. The formal establishment of the concept of the account executives where five account executives were assigned from the Cabinet IDSC to work in the project in order to establish monthly visits to the different governorates to inspect the databases for data verification, regular updating, assure the quality of the reports and ensure the efficiency and the effectiveness of both information and decision support services. Moreover, the account executives are responsible for visiting the GIDSCs whenever required by the GIDSC staff. The stress on the monetary motivation was more emphasized during the fourth phase especially regarding the production of the newsletter, the quality of the contents of the databases and the issues analyzed and formulated in the GIDSCs which has led the Cabinet IDSC to give awards in cash every month for the best performing five GIDSCs. To market the services of the GIDSC and to diffuse its technology among the constituency in the governorates and to increase the number of users of the GIDSCs especially among the business sector, the production of the monthly newsletter and the control and the assessment of the contents of the newsletter was clearly emphasized as one of the basic marketing tools to be used in the institutionalization of the GIDSCs within the governorate and to spread the knowledge of its services.

Managing institutionalization and the strategy implemented regarding this issue was inspired from the experiences learnt from the implementation of other

information technology projects in Egypt developed and implemented by the Cabinet IDSC. The institutionalization process is managed beyond the development and implementation of the GIDSCs in the sense that it includes information technology transfer, adaptation, diffusion, adoption, value assessment and evaluation in addition to the continuous monitoring, tracking and implementation of state of the art technologies. In other words, it includes:

- The cultural interface represented the adaptation aspect of the society and the implementation of decision support systems to meet the context needs. Adaptation dealt with various modifications to fit both contextual and cultural characteristics of the environment. Thus, the cultural interface was designed and implemented in Arabic which entailed training of users, managing the users learning process and teaching users modelling capabilities.
- The organizational interface represented the diffusion of information technology knowledge within the society and the overcoming of the resistance to change. Diffusion dealt with spreading the use of decision support systems at various organizational levels which could be measured by the frequency of use of effective decision support systems.
- The user interface represented the adoption of users and the use of the decision support tools and techniques in the decision making process. Adoption dealt with the personalized use of decision support tools by managers and decision makers and by the support staff which led to customized systems according to users needs.
- The evaluation and assessment of the impacts of decision support systems dealt with evaluation and assessment of utilization, identification of operational problems and measurement of value added benefits to strategic decision making. It involved the assessment of the impact of decision support systems, technical evaluation, analysis of risks and costs incurred, documentation and maintenance.
- The monitoring and tracking dealt with the parameters of critical issues, assumptions, priorities, data and information in addition to the changes in information technology and their impacts on decision support.
- Value assessment dealt with how decision support systems have greatly improved strategic decision making in Egypt and both the values and benefits that could be demonstrated in terms of tangible and intangible efforts.

Impacts

The impacts of the fourth phase were felt during the first quarter of 1992. This was developed due to the fact that in this period each governorate was ready to present a description of the socio-economic development status and what needs to be done in the future to improve the current plans in addition to the proposition of projects and development activities that needs to be done and that are not currently under consideration. The challenges of the fourth phase included the following:

- The management of the institutionalization of the 27 GIDSCs.
- The monitoring of their outputs and the justification of their existence and their expenses to the Cabinet through the positive and concrete outputs presented by the GIDSC in the socio-economic development activities.

The clear impact of the phase was the organization of the first national conference for the GIDSCs namely "local administration in the information age" which was attended also by the prime minister, the concerned ministers, the governors and experts from various related fields. The organization and the attendance of this massive policy and decision makers representing the first and second executive bodies of the country represented a positive and nation-wide approval of the role of the GIDSCs at the governorates level in boosting the socio-economic development programs and in rationalizing the decision making process.

In summary, the experience of such new form of information-based organization in Egypt i.e. the GIDSCs and the implementation of sectoral information and decision support systems led to the rationalization of the decision making process at the governorates level and supported in the socio-economic change and development programs. The new opportunities developed from the use of decision support systems in such an environment have increasingly contributed to the conviction of the top level policy making level in Egypt on the advantages of the use of various information technology tools and techniques in socio-economic change and development purposes.

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