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Transforming the Decision-Making Process in Egypt

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ABSTRACT

Decision support systems (DSS) emerged in the 1970s and have gradually in different dimensions and through various channels based on emerging information technology affected the decision making process at the individual, organizational and societal levels. Competition, convergence, globalization, business and socioeconomic pressures as well as market needs have all contributed to the deployment of cutting-edge mechanisms for rational and effective decision-making processes for government, private and public sector organizations alike. This paper describes the experience of the government of Egypt in spreading the awareness of information technology and its use in managing socioeconomic development since the mid 1980s through building multiple DSS platforms for governmental decision-making with a variety of lessons learnt in the design and delivery of DSS under complex conditions common to developing nations. The experience offers insights into a variety of problems for IS designers, implementers, users, practitioners and researchers. The paper focuses on the use of DSS for development through the experience of a government think tank, Information and Decision Support Center (IDSC), while demonstrating the implementation and institutionalization of decision support platform at the local administration level for delegation, empowerment and development planning.

Keywords

Decision support systems, decision-making, decision analysis, crisis management, information technology transfer to developing nations, development planning, Egypt.

OVERVIEW

The importance of information technology has been greatly emphasized in most developing nations (Goodman, 1991; Lind, 1991) where the government has played a vital role in its diffusion (Moussa and Schware, 1992). These governments, through their policies, laws and regulations, still exert the largest influence throughout various organizations and entities (Nidumolu and Goodman, 1993). Recently, the extensive benefits of information collection, analysis and dissemination, supported by computer-based technologies have been sought to enable decision makers and development planners to accelerate their socioeconomic development programs. Thus, many developing nations have been embarking on medium and large-scale information technology and computerization projects with more focus on public-private partnership models to ensure diffusion and sustainability (Kamel, 2005; Kamel, 2008). In practice, most of these projects have sought to introduce computing and telecommunication technologies for business and socioeconomic development purposes. However, frequently, it concentrated more on large-scale capital expenditures rather than on human capital investment such as training and human resource development (UNESCO, 1989). Therefore, many of them failed to achieve their goals resulting in a generally negative conventional wisdom, which defined information technology as inappropriate to developing nations. However, it is important to note that such a statement should not be generalized on all developing nations because some projects have actually managed to make a difference in their own environments and contributed to socioeconomic development for its own communities such as in the cases of telecenters and community development associations (Kamel, 2004). These projects have managed to close the digital divide in so many communities in developing nations and have contributed in supporting the formulation of the knowledge society. Examples of which will be demonstrated in different sectors of the economy in Egypt.

Developing nations, over the past two decades and gaining from the experiences of the past, have been extensively investing in training and human capacities development, consultancy and the establishment of a strong and efficient technological infrastructure that could move them into a state of self-sufficiency and help build an information infrastructure (infostructure) that could help boost their socioeconomic development efforts. Moreover, many of the developing nations have been embarking on developing long-term and detailed strategy plans for information technology diffusion. The majority of these nations have assigned a high-level policy maker, often at the cabinet level, to be responsible for information technology as well as formulate projects and activities that could capitalize on such technologies in boosting the developmental process. However, to realize concrete benefits from the implementation of information technology and to benefit from the opportunities enabled from emerging technologies, there is a constant and urgent need to apply the appropriate technology

that do fit the nation's values, social conditions and cultural aspects. Additionally, there is a need to identify the information technology needs, and its related policies and regulations that could provide the proper environment for its implementation. Some of these policies need to be created to enable the appropriate environment for growth while other policies in many ways need to be amended to cater for the new market transformations caused by emerging technologies.

Information technology transfer and more importantly introduction, adoption, diffusion and adaptation are important components for successful implementation and institutionalization and represent a building block in realizing effective implications on the community. This paper focuses on one of the applications of information technology, decision support systems (DSS), and demonstrates how it could be deployed in rationalizing the decision making process at the policy making level given the limited or scarce resources in developing nations such as the case of Egypt and in supporting the development process across different sectors in the economy. The paper could also propose suggestions for developing nations with similar eco systems for proper implementation and institutionalization of decision making process that involve different stakeholders, varying backgrounds and cultures however targeting the same objective, socioeconomic development.

DSS are defined as advanced computer-aided information technology that can be used to support complex decision-making, problem solving, policy testing, scenario simulation and strategic planning with more reliance on mathematical models, simulation techniques and quantitative tools (Shim et al, 2002). The importance of DSS models is mainly because they are particularly designed to evaluate alternative decisions, test policy measures, assess the impact of different functioning rules and project future performance of complicated systems. DSS therefore, can provide efficient support to strategic decision-making and development planning (Khorshid, 2003; Kamel, 1994; El Sherif and El Sawy, 1988) especially when using model-driven approaches (Morton et al, 2003; Belton and Ackermann, 1997) with optimal reliance between the technology and the decision maker. Moreover, the complexity of real problem situations in organizations entices decision makers to explore the applicability of various existing methods for solving problems and crisis management situations in organizations (Jackson, 2003; Kamel, 2001).

With respect to socioeconomic issues, decision situations generally include structured, semi-structured, and unstructured elements, a computer system could be developed to solve the structured portion of a DSS problem, but the judgment of the decision-maker was brought to bear on the unstructured part, hence constituting a human-machine problem solving system (Shim et al, 2002; Turban, 1998). It is important to note that since the development of DSS in the early 1970s, many of its tools have benefited from the evolution of information technology infrastructure across the three eras of growth in the industry including data processing, microcomputers and networking (Khorshid, 2003). Recent developments in emerging communications technology and the trend towards information technology and media convergence also promises many opportunities for policy makers to have online and timely access to electronic services through a variety of platforms including mobile and wireless devices as well as more conventional devices. It also promises to offer solutions for multi-cultural stakeholders contributing to the decision making process irrespective of their time or distance barriers (Kamel and El Guindi, 2003).

GOVERNMENT DECISION MAKING PROCESSES

Within the context of developing nations, the government decision-making process has a set of specific characteristics given the challenges faced in terms of planning and socioeconomic development. In that context, table 1 demonstrates according to Khorshid (2003) these characteristics and their related challenges.

<ul style="list-style-type: none">- Problems facing a government decision or policy maker are usually semi-structured or unstructured which cannot be handled by innovative, intelligent, and flexible problem solving capabilities and decision-making techniques and tools only.- Government decisions are strategic in nature and have considerable implications on the future performance of the socioeconomic system of the country.- Socioeconomic data for supporting government decisions are generally varying in quality, sometimes incomplete and rarely consistent and the multiplicity of sources and differences in the methods of collection usually give rise to errors.- Most strategic decisions of a government face an increasing level of uncertainty and risk due to the complexity of problems and the large number of variables analyzed.- Socioeconomic systems are characterized by the existence of complex interactions and linkages among issues, problems, policies and decisions known as multiplier effects, which needs complex and advanced decision support tools and techniques to be captured.- Government decision making involves the evaluation of alternative socioeconomic options, policy measures and decisions with respect to their impact on development objectives, which sometimes results in conflicting effects on different development priorities.
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- When adopting appropriate computer-based tools to support government tactical and strategic decisions, one needs to handle the expected difference in responses among government staff.

Table 1. Government Decision Making Characteristics in Developing Nations

Government decision making is targeting optimum allocation of scarce resources through the delivery of public services in the most efficient and effective way whether deploying the conventional methods or the newly emerging electronic channels such as electronic government (Kamel, 1993 and 1997). Government decision making over the last couple of decades has been greatly affected by the emergence of information and communication technology (ICT) in the way decision-making processes have been transformed to capitalize on the opportunities enabled by such technologies with a focus on socioeconomic development (Kamel, 1994). It is important to note, that ICT should be looked at as platforms and vehicles for development which can be realized through the delivery of different services to the community that aim at rendering citizens' life more efficient and effective by helping to raise their standards of living through more rational and effective decision making process. In the context of developing nations, such process becomes more complicated due to scarce resources including the information infrastructure, which represents a major building block in the government decision-making process (Kamel, 2005). The process is mainly strategic in nature and has considerable repercussions and impacts on the future performance of the socioeconomic system (Khorshid, 2003; El Sherif and El Sawy, 1988). Over the last decade, new models of partnerships emerged integrating multiple stakeholders and supporting the decision making process by availing contributions from the civil society and the private sector (Kamel, 2009).

Socioeconomic data for supporting government decisions usually vary in quality being incomplete and rarely consistent coupled with multiplicity of sources and differences in data collection methods (Khorshid, 2003; Kamel, 1997). Other elements related to strategic decisions at the highest policy and government levels include; high levels of uncertainty, risk, complex interactions with various elements, and multiple effects within a larger developmental framework leading to conflicting effects (El Sherif and El Sawy, 1988). Accordingly, a computer-based DSS should be viewed as a tool to support the decision-making process within a government by enhancing the productivity of decision-makers and increasing effectiveness of public decisions (Khorshid, 2003). Respectively, DSS should be equipped with a comprehensive set of analytical tools that includes information systems relevant to the decision-making environment to provide multi-dimensional ad-hoc dynamic reporting. Moreover, to ensure effective communication means with decision-makers via intelligent man-machine interaction systems given the semi-structured and unstructured nature of problems faced to assess the decisions' related socioeconomic implications (Khorshid, 2003; Lind 1991; Keen and Scott Morton, 1978). Additionally, for DSS to be effectively and efficiently implemented and institutionalized to yield the expected outcomes there is a need for a set of building blocks to be enabled. This includes building awareness and commitment, building leadership and strategic thinking capabilities, building legislative and institutional infrastructures, building human resource capacities, and building and infostructure and a state-of-the art technological infrastructure (Kamel, 2005; Khorshid, 2003; El Sherif, 1990). Moreover, the building blocks include adaptation and localization of different aspects of the tool to cater for the cultural aspects affiliated with the environment served. Following are experiences in the design and delivery of decision support centers and systems in Egypt represented by the example of the Cabinet of Egypt Information and Decision Support Center (IDSC) and a presentation of some of the decision support cases that were implemented since its inception in 1985.

ESTABLISHING THE INFORMATION AND DECISION SUPPORT CENTER

Realizing the enormous impact of information technology and its important role in socioeconomic development, the government of Egypt during the 1980s was striving to implement a nation-wide strategy to support the realization of its targeted objectives. Therefore, it adopted a supply-push strategy to improve Egypt's managerial and technological infrastructure (Kamel, 1997). The objective was to introduce and diffuse information technology into all ministries, provinces, and government organizations, which necessitated the development of an infrastructure for informatics and decision support, a software service industry and a high-tech industrial base in the areas of electronics, computers and communications. Consequently, the government, late in 1985, established IDSC to support top policy makers in key business and socioeconomic issues through the formulation of information and decision support centers and projects (Kamel, 1998). Such strategy was boosted and complemented with the establishment of a ministry for communications and information technology (MCIT) in 1999 (www.mcit.gov.eg) and with a comprehensive plan labeled Egypt Information Society Initiative (EISI) in 2001 (Kamel, 2005). This growth path should be looked at as an adaptive learning curve in the introduction and diffusion of ICT in Egypt while considering the process of development planning and the readiness of the community in terms of resources available and human capacities ready. The formulation process of the national ICT plan and the revisit of the strategy in 2004 and 2007 reflect the importance of closely monitoring the decision making process and catering to the different cultural aspects, especially in a growing ICT sector that is affected by local as well as global aspects (Kamel, 2009).

The cabinet decision-making process is usually seen in terms of its mission, objectives, and outcomes. However, extensive observations revealed that the decision-making process is better viewed by its stakeholders as a process of attention to sets of issues with varying and changing priorities. These issues circulate continuously and are liable to political maneuvering and situation changes until they are managed over time. The issues are usually complex, ill structured, interdependent and multi-sectoral with strategic impacts at the national, regional and international levels (Kamel, 1998; El Sherif and El Sawy, 1988). The decision making environment at the cabinet level is characterized by being data rich and information poor due to poor analysis; isolation of information experts from decision makers; the use of computer systems as ends rather than tools supporting in decision making and the focus on technical issues rather than on decision outcomes (El Sherif and El Sawy, 1988).

The mission of IDSC was to provide information and decision support services to the cabinet for socioeconomic development. This aimed at improving the nation's managerial and technological infrastructure through enhancing the decision making process by developing information and decision support systems for top policy makers. Moreover, it targeted supporting the establishment of decision support systems and centers in different ministries, making more efficient and effective use of the available information resources and initiating, encouraging and supporting informatics projects to accelerate managerial and technological development of various ministries, sectors and provinces (Kamel, 1997 and 1993). For data accessibility and information dissemination, IDSC interacted in three main directions with top policy makers including ministers and governors, government and public sector organizations as well as academic institutions and research centers and through international channels accessing major databases and organizations worldwide through state-of-the-art computing, information and communications facilities (Kamel, 1997 and 2001).

The scope of IDSC activities extends to four levels: the cabinet, different sectors, national and international levels. At the cabinet level, it provides information and decision support, crisis management support, data modeling and analysis, multi-sectoral information handling and databases development. At the sectoral level, it provides technical and managerial assistance in the establishment and development of decision support centers and systems, advisory and consultancy services, and sectoral information systems development. At the national level, it provides assistance in policy formulation and drafting, legislative reform support and in the technological infrastructure development and at the international level, it supports in the transfer of state-of-the-art information technology to Egypt, establishes DSS models for developing nations and formulates cooperation links and communication channels with international information technology organizations (Kamel, 1997). Recently, it is jointly implementing projects with different units in the government for information technology diffusion and for the assessment of information technology penetration and implications at the local level in cooperation with MCIT (www.idsc.gov.eg). It is important to note that the role of IDSC has been transformed and adapted to serve its stakeholders and constituencies in light of its new evolving role that was articulated after the establishment of MCIT. The accumulated learning and experience of IDSC in Egypt was transformed to support the government in decision-making as well as in helping create new generations of ICT-literate communities that are electronically ready and that are capable in dealing within an environment that is governed by emerging and changing ICT tools and applications. Studying the decision-making process helps to understand the different synergies that occur between the stakeholders in resolving their conflict and transforming their process to serve better their development goals.

DSS imply the use of computers to assist managers in their decision processes in semi and ill-structured tasks, support rather than replace managerial judgment, and improve the effectiveness of decision making rather than its efficiency (Keen and Scott Morton, 1978). DSS were mainly developed and applied in profit-oriented organizations, which are managed through market constraints and trends (Kamel, 1994). However, IDSC experience suggests new areas of applications for DSS, which are based on developmental objectives for socioeconomic improvement, governed by countrywide laws and regulations and regarded as systems, which ought to fit within developmental contexts, policy decision making and supporting management problem solving (Kamel, 1997; Kamel, 1998). While there are examples of successful DSS used for strategic decision making by top management in such decision contexts as mergers and acquisitions, plant location and capital expenditures, these DSS tend to focus on limited and well-structured phases of specific decisions. However, when supporting the comprehensive strategic decision making process over a longer span of time with competing and changing strategic and socioeconomic development issues, multiple decisions and changing participants, much less progress has been made (Kamel, 1998).

DSS challenges come mainly from the messy, complex nature of the strategic decision making process and the related issues that it brings to the design, development and implementation of DSS. This could be attributed to the nature of strategic decision making which is usually murky, ill structured and drawn out over a long period through requiring rapid response capabilities in crises (El Sherif and El Sawy, 1988). It is usually a group rather than an individual effort involving cooperative problem solving, crisis management, consensus building and conflict resolution (Gray, 1988). It involves multiple stakeholders with different assumptions (Mason and Mitroff, 1981). The information used is mostly qualitative, verbal and

poorly recorded (El Sherif and El Sawy, 1988) and its continuous flow causes not only an information overload with multiple and conflicting interpretations but also the absence of relevant information (Zmud, 1986). Finally, the formation of strategic decisions is more like an evolving and emerging process where the supporting requirements are difficult to forecast. There are also some challenges that are associated with the nature of the decision maker at such high-level policymaking such as difficulty in communication due to scarcity of time, unwillingness to spend time learning, preference to rely more on personal experience and intuition rather than on information technology tools and techniques, and resistance to changes (Kamel, 1998).

In the case of Egypt, strategic decision making at the cabinet level provides an opportunity for the design and delivery of information and decision support systems that differ from other conventional and traditional settings. The inadequate reliability of the information infrastructure coupled with the need for crisis response led to prototyping the design and delivery processes which was based on an issue-based rather than an organizational decision-based approach to fit the decision-making environment. Many similarities could be mapped between the cabinet and organizational decision-making where the use of issues management is not alien to corporations (King, 1981) and was applied in the planning for various management information systems organizations (Dansker et al, 1987). Table 2 provides a comparison of the conventional decision-based approach and the issue-based approach to DSS as identified by IDSC that has been successfully implemented during the period 1985-1988 in response to the need for supporting strategic decision-making at the cabinet level. The table is useful for information systems researchers and practitioners in determining the advantages and constraints of the issue-based approach to various organizational and decision making environments (El Sherif and El Sawy, 1988).

	Conventional	Issue-based
Focus	Decision maker Single decision Decision making Alternative generation	Issue Groups of interacting issues Attention focusing Agenda setting
Favored domains	Tactical and operational decisions One-shot decisions Functional applications Departmental applications	Strategic decisions Recurring strategic decisions Cross-functional applications Trans-organizational applications
Design and Delivery	Promotes customization to individual decision maker Interaction between decisions not incorporated Prototyping design Design approach becomes the system	Promotes consensus around group issue Integration and consensus drives process Prototyping design and delivery Delivery approach becomes the system
Executive information systems readiness	No tracking component Emphasis convergent structuring Major transformation	Incorporates tracking component Balance divergent exploration and convergent structuring Easy transition to executive information systems
Emerging leveraging technologies	Expert systems Artificial intelligence	Idea processing and associative aids Multimedia connectivity platforms

Table 2. Conventional versus Issue-based Decision Support Systems Approach

The decision making process at the cabinet level addresses a variety of socioeconomic issues such as balance of payment deficit, high illiteracy rate, housing, health, public sector reform, administrative reform, debt management, privatization and

unemployment. The decision making process involves much debate, group discussions, studies development and is subject to public accountability and media attention (El Sherif and El Sawy, 1988). It is important to note that at this level, the successful use of DSS requires that the user has a significant amount of independence and autonomy in the decision making process. Moreover, the perceived usefulness of DSS is reduced where there is lack of autonomy, a command and control culture and little role in the decision making process (Elbeltagi et al, 2005).

TRANSFORMING THE DECISION-MAKING PROCESS: CASE FROM EGYPT

Following is a demonstration of a decision support platform designed, implemented and institutionalized by the government and public sector organizations for socioeconomic purposes in Egypt through IDSC. The case cover priority developmental issues at the local administration level demonstrating the transformation in the decision-making process. Such transformation was orchestrated by IDSC with multiple stakeholders including the government, different provinces and the civil society.

Empowering the Decision Making Process in Local Administration

Egypt is divided into 27 provinces (including the city of Luxor). Each province has a governor who collectively constitutes the council of governors. The decision making process at the provinces level addresses a variety of national socioeconomic development issues such as health, education, food security, high illiteracy rate, housing, poor technological infrastructure and unemployment. In 1981, a presidential decree was issued requiring all of Egypt's provinces and central government agencies to streamline their information collection, analysis and dissemination methodologies and techniques through the development of Information and Documentation Center-IDC (Kamel 1993). However, until 1987 no significance impact was felt. Throughout the period 1981-1987, there were no systematic procedures implemented for the collection of information because viewed information as its personal property and that sharing it would mean loss of power and authority. However, each governor was allowed access to the information available in the local administration offices on a selective basis. These conditions were prevailing because every local administration director owed his loyalty to his federal minister who had the sole authority to review his performance, assess his outcome and make promotions despite the fact that the governor was the one who paid their salaries. Based on the lack of coordination among the local administrations, the bias of its directors to the ministers, the lack of communication and of coordination between the director and the governor, governors frequently based their decisions on their own intuition rather than on the use of information (Kamel 1997).

The role of IDC was insignificant to the development programs as well as to the decision making process at the provinces level. Moreover, in various occasions the data access from different local administrations lacked smoothness, relevance, timeliness and accuracy. The IDC did not provide any support in improving the follow-up and evaluation mechanisms within the provinces nor introduced change to the administrative systems. The failing role of IDC and the need for administrative and technological development, 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.

The decision making process in Egypt's provinces have passed through a number of phases that were changing in nature due to various political, social and economic reasons. In general, it was characterized by being based on ad hoc decisions and intuition. There were previously some attempts to rationalize the decision making process but these attempts failed for a number of reasons that were related to the laws for local administration and the relation between the federal government and the local administrations. With the diffusion of information technology adopted by the government as a part of the nationwide structural adjustment program, there were trends to make use of relevant, timely and accurate information collection and handling techniques to rationalize the decision making process to support socioeconomic development (Kamel 1997).

The government of Egypt has traditionally been hierarchical with crucial socioeconomic development decisions being taken at the federal level causing centralization of power, authority and responsibilities. Thus, each governor has little control over critical decisions although he had discretion over tactical and operational decisions. However, in the late 1980s, the government sought to promote greater decentralization of decision-making; therefore, it considered empowering each governor holding him responsible and accountable for developmental decisions. The government sought to improve the decision-making skills of the governors and the directors of the local administrators with state of the art information technology. Respectively, the government realized in 1987 the importance of establishing a comprehensive information-base network that can provide support for the cabinet and top policy and decision-makers at the provinces level.

The Governorates Information and Decision Support Centers (GIDSC) Project was launched with an objective to provide computer-based information and decision support to the governors of Egypt's 27 provinces. Over the following five years, IDSC established an information and decision support center in each province with its main mission re-conceptualizing the role of local provinces in socioeconomic development and growth. The project had as a strategy a two-tier policy; firstly the

development of an infrastructure for informatics and decision support systems and secondly the development of human capabilities in the areas of information, computers and communications (Kamel, 1993).

The conceptual design of the GIDSC was based on a criterion that includes five main elements. Firstly, it is important to have an output-driven process where the implementation is guided by timely, accurate and relevant delivery of information on socioeconomic indicators in specific areas such as housing, food supply, agriculture, industry, tourism and education. Secondly, there is a need to introduce an impact-driven process where each GIDSC should contribute to improving the standard of living, quality of education, business and socioeconomic development. Thirdly, it is vital to formulate a partnership with the governor to provide local support for the GIDSC. Fourthly, there is a need to implement a phased implementation approach given the limited human, financial and technical resources and the lack of prior experience in implementing similar project. Finally, there is growing interest to use a portability of solutions approach where similarity of the basic needs across the provinces and the limited resources necessitated that the solutions developed for one GIDSC be transferable to the others (Kamel, 1999).

The development of the GIDSC project given the limited financial and technical resources necessitated a phased implementation approach that was developed including four phases: initiation, base building, institutionalization and sustained growth. Table 3 demonstrates the strategies and impacts of each of the four phases. In the initiation phase, the project team focused on studying the decision-making environment in all provinces, assessing the available resources opportunities for the establishment of the GIDSC. One GIDSC location was selected in the province of Suez as the pilot project because of the belief of the governor in using IT for socioeconomic transformation, the rural-urban societal mix of the province of Suez providing various reactions from the society, its proximity to the province of Cairo for follow-up and maintenance purposes and Suez's economical and political status. In the base building phase, six more GIDSC were established in the provinces of Sharkeya, Port Said, South Sinai, North Sinai, Ismailia and Red Sea.

	<i>Strategies</i>	<i>Impacts</i>
<i>Initiation</i>	<ul style="list-style-type: none"> - Use of a supply-push strategy to demonstrate GIDSC benefits priority development issues (education and health) - Portability of the sectoral database to transfer the model across different GIDSC and establish standards - Use of simple user-friendly applications to bridge the technological gap 	<ul style="list-style-type: none"> - Changes in the decision making process (mechanisms and structure for data collection, analysis, information handling and dissemination)
<i>Base-building</i>	<ul style="list-style-type: none"> - Increasing the variety and frequency of training programs for GIDSC staff - Capitalizing on the lessons learnt from the Suez experience - More organizational visibility for the GIDSC 	<ul style="list-style-type: none"> - Standard identification and collection of data - Increasing appreciation to the role of the GIDSC by implementing governors
<i>Institutionalization</i>	<ul style="list-style-type: none"> - Selection of GIDSC staff with minimum levels of managerial and technical skills for recruitment - Extensive training programs were enforced - Cross-fertilization was taking place through the organization of brainstorming sessions between staff of different GIDSC - Documentation of DSS cases - Issuing an incentive scheme for GIDSC staff to encourage them and enhance their motivation 	<ul style="list-style-type: none"> - Increasing support from different governors to the GIDSC model - Creating of a competitive environment among governors on the use of IT in socioeconomic development - Producing a newsletter addressing the DSS cases that were implemented across the nation - Developing of local cultures that accepts the deployment of IT in decision making
<i>Sustained Growth</i>	<ul style="list-style-type: none"> - Massive penetration and diffusion of IT across the 26 provinces - Implementation of DSS to meet local needs reflecting adaptation (cultural interface) - Diffusion of IT knowledge and DSS at various organizational levels to overcome resistance to change (organizational interface) - Adoption of users and the use of decision support tools (user interface) - Value assessment and evaluation 	<ul style="list-style-type: none"> - Organization of GIDSC conference demonstrating to the public and potential users the DSS cases implemented - Emergence of new ideas and projects from the local level

Table 3. Strategies and Impacts of the GIDSCs Implementation Phases

These provinces were selected because they share the same socioeconomic issues. This phase was characterized with having the provinces more aware of the GIDSC project and anxious to follow and replicate the experience. For the project team, they became more aware of the methods and techniques to use while dealing with the staff of the provinces. Adding account executives to conduct periodical visits to the GIDSC and respond to the technical and administrative inquiries altered the structure of the project team and led to effective adaptation to all project-related aspects.

Moreover, the inclusion of training and human resource development programs with boarder topics and areas of applications related to management and information technology was introduced together with a prize presented to the best achievements in the programs in the form of a monetary reward. In the institutionalization phase, the remaining governors were jealous and eager to establish their own GIDSC after the remarkable, although initial and growing, success of the existing GIDSC. Therefore, a plan was developed to expand the project based on a parallel strategy to inaugurate the remaining 19 GIDSC within 1 year. During the fourth phase, the focus was on sustainability and growth which included more attention to training and human resources and better formulation of communication links with various data sources and local administrations in addition to focusing on career development of the GIDSC staff and ensuring the diffusion of the GIDSC services and deliverables across different users in the province.

To conclude, it is important to note that the GIDSC project was important within the context of Egypt's socioeconomic development. Respectively, while the political and social influence perspectives had crucial roles in introducing the early phases of the project (initiation and base building), the role of the functional perspective increased towards the later phases of the project (institutionalization and sustained growth). This is in contrast with previous research conducted where the functional perspective was crucial during the early phases (Cooper and Zmud 1990; Laudon 1985). There are a number of lessons accumulated from the GIDSC experience in Egypt. These lessons could be replicated in other developing nations with similar socioeconomic conditions including, but not limited to, African nations. This includes the importance of understanding the underlying motivations in using IT innovation and placing these motivations in the economic and political context of the adopters. Moreover, emphasizing that the social group has an important role in influencing attitudes towards IT innovation where the governors were highly susceptible to the attitudes of their peers and superiors. Finally, the GIDSC project offered a direct challenge to the conventional wisdom that large-scale information technology projects that are managed by the governments in developing economies are usually badly managed and leads to waste of money and resources. A distinctive characteristic of the GIDSC project is that it has been financed entirely by Egyptian funds, planned and executed completely by Egyptian managerial and technical professionals who have localized and customized the various solutions made available by different information and decision support systems to the local situations and conditions (Kamel, 1997 and 1993).

CHALLENGES FACING THE DECISION MAKING PROCESS

Developing nations represent a challenging domain for information and decision support systems. The characteristics of the nation, the problems faced and the opportunities are among the challenges. Examples of these challenges include the lack of informatics infrastructure, the use and availability of information is still limited, the lack of technical expertise and the application gap between existing information and decision support systems innovations is widening. IDSC experience in Egypt shows that challenges relate to strategic decision-making, DSS, implementation of DSS and its institutionalization process. In strategic decision making, the challenges relate to the ill-structured nature of processes extending over long periods of time, the involvement of many stakeholders, the need for conflict resolution, consensus building and crisis management, the efficient and effective use of scarce resources, and the turbulent and dynamic environment in which the decision making process occurs. In DSS, the challenges relate to managing the development of multiple information and decision support systems, their institutionalization within their application contexts, the development of appropriate interfaces, the availability of tools and generators relevant to different industries, supporting rather than replacing managerial judgments, fast response and prototyping the design and delivery phases. In implementation, the challenges relate to the lack of user involvement, inadequacy of model evaluation, lack of problem definition, resistance to change, and the difficulty to diffuse new model-based systems. Additionally, it included; untimely, unresponsive and inadequate information and non-responsiveness to user needs, lack of top management support, lack of vital continuous communication, poor documentation, and language problems (Gass, 1987). In institutionalization, the challenges include overcoming resistance to change, adapting model-based systems to the context of work and formulating documented procedures, managing the process of change, information technology diffusion and adoption and their impacts on the individual and the organization. Managing the implementation and institutionalization of DSS required facing all the challenges which represented, within the strategic

decision making level aimed at realizing socioeconomic development objectives, one of the most difficult and challenging context for implementation and institutionalization due to the messy, ill-structured, dynamic and turbulent environments.

CONCLUSION

The experience of this new form of information-based organization in Egypt led to the improvement of the decision making process at the cabinet level, supported the socioeconomic development programs, and helped better allocate the available resources. IDSC has been a catalyst for the last two decades in Egypt in terms of ICT transfer, introduction, use, adoption, diffusion and adaptation. Through its modalities of operation, it has managed to enable an environment that facilitated the transformation of Egypt more towards a digitally ready society. Moreover, it helped raise the awareness at the highest policy levels of the importance of ICT as a platform for business and socioeconomic development which not only led to the improvement of the decision making process but also to the better allocation of resources. More importantly, the process highlighted the growing importance of ICT to the growth of the economy, which led to the establishment of MCIT to help position Egypt in the global information society map. The base-building phase of IDSC during the 1980s and 1990s was crystallized with moving to the new phase of spreading the use of ICT among the community at large and not just focusing on policy makers during the 21st century. This role was carried out by MCIT based on the work and achievements of IDSC in the earlier phase. The benefits of the learning experience and the build-up of the phases was felt in the spreading of ICT awareness and utilization among rural and underprivileged areas in Egypt, which was again based on the prior work done by the GIDSC project. Moreover, implementing projects with multiple stakeholders contributed to the transformation of the decision-making process utilizing computer-based and human-supported factors set the tone for the development of the ICT sector and the change in allocation of resources in the overall development process.

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