Abstract

Experience with information technology (IT) implementation in the local administrations of less developed countries (LDCs) has been largely disappointing. Conventional wisdom suggests that such implementation efforts are usually inappropriate to the information-poor environments of many LDCs. This study describes the Governorates Project in Egypt, which seems to have been an encouraging exception to such "wisdom." The project, which was initiated in 1987 by the Egyptian Cabinet's Information and Decision Support Center (IDSC), represented a significant administrative and technological innovation because it sought to implement an IDSC in each of the 27 governorates of Egypt. The purpose of each governorate IDSC was to provide computer-based information and decision support to the governor and other local administrators.

Based on our findings, three stages of the project are identified—implementation, evaluation, and transformation of the innovation. Three theoretical perspectives derived from past research, i.e., functional, political/symbolic, and social information processing, were used to explain the project outcomes, such as the governors' perceptions and behaviors concerning their IDSCs. Results suggest that the symbolic/political and social information processing perspectives had considerable power in explaining the outcomes during implementation, whereas the functional perspective was particularly effective in explaining the outcomes during evaluation and transformation. The theoretical framework and findings suggest considerable potential for understanding IT implementations in both business and administrative settings.

Keywords: IS implementation, IS technology transfer, local government

ISRL Categories: FD, FD05, FD07, EL05, BC0102
The Governorates Project

Introduction

The use of information technology (IT) for socioeconomic development in less developed countries (LDCs) has received much attention in recent years (e.g., Bhatnagar and Bjorn-Andersen, 1980; Goodman, 1991; Lewis and Samoff, 1992; Lind, 1991; Munasinghe, 1989). In many LDCs, the state has a major role to play in the adoption of IT: it is usually the largest single user of computers (Moussa and Schware, 1992) and through its policies and regulations exerts the greatest influence on the diffusion of IT throughout the country (e.g., Flamm, 1987; Lewis and Samoff, 1992; Nidumolu and Goodman, 1993).

The extensive benefits of information collection, analysis, and dissemination that computer-based technologies engender should, in theory, enable planners and decision makers in these countries to accelerate economic development. A number of large and small computerization projects have consequently been funded by the governments of LDCs or by various international agencies (e.g., UNDP, UNIDO, World Bank) in the sub-Saharan countries, India, Egypt, Indonesia, Mexico, Brazil and others (Daly, 1992). In practice, projects that sought to implement innovations such as computer-based technologies in LDCs and ensure sustained usage, particularly for improving administrative effectiveness, have often had disappointing results. They have frequently been inappropriate to the needs of the local context (Berman, 1992), have concentrated more on large-scale capital expenditures rather than on human capital investment such as training, have focused more on large urban centers such as national capitals (UNESCO, 1989) with little benefits to other parts of the country, or have otherwise failed to achieve their goals.

Moussa and Schware (1992) analyzed 76 World Bank-funded projects in Africa that had IT components and concluded that “in the majority of cases, several factors have constrained organizations from effectively using the technology and the information it provides, or have proved to be constraints on the sustainability of IT.” For example, attempts to introduce computers in the Central Tunisia Development Authority failed because the designers did not first focus on the existing infrastructure for information management (Schware and Trembour, 1987). The project would have been more successful if these information-handling procedures had been improved, even before the microcomputers had been introduced.

Overall, the large number of unsuccessful IT projects in LDCs has resulted in a conventional wisdom that is generally pessimistic: developing countries, particularly their bureaucratic establishments, pose virtually insurmountable obstacles for introducing and ensuring sustained use of IT (Avgerou, 1990). However, given the vast amount of IT investments in worldwide development projects estimated at $890 million in 1991 by the World Bank alone (Moussa and Schware, 1992)—it is important that successful projects in LDCs be studied in order to better understand IT implementation and subsequent use. This research describes an IT implementation project—the Governorates Project in Egypt—that seems to be an encouraging exception to the conventional wisdom. The purpose of the Governorates Project was to establish an information and decision support center (IDSC) in each of Egypt’s 27 governorates. Each IDSC sought to enhance the effectiveness of the local administration by providing computerized information and decision support to the governor and his administrative staff. The study of IT implementation in Egypt was chosen because:

1. It is in Africa, long considered “the ‘lost continent’ of information technologies” (Odedra, et al., 1993), where the infrastructure for using information to support decision making has been inadequate. Egypt therefore provides important lessons for IT implementation in difficult settings.

2. As a key player in the Arab and Middle Eastern world, Egypt’s approach to implementing IT affects other Arab or African countries, often through highly trained Egyptians who work abroad (Goodman and Green, 1992). Although its influence in the region has somewhat diminished, its role as
“bellwether and even cause of change in the Arab World” continues to be potent (Springborg, 1989).

3. The economic and political history of Egypt is an interesting context for studying the interplay between the symbolic/political use of information and its more functional uses.

4. The Governorates Project was funded, planned, and controlled almost entirely by the Egyptian government and local administrations, thus offering important lessons for autochthonous development strategies in LDCs.

In a recent comprehensive review of IT components in World Bank lending, Hanna and Boyson (1993) concluded that there was a critical need to develop analytical frameworks for studying investments in information technologies in an international context. Unfortunately, there has been little research in the literature on IT implementations in LDCs directed at developing these types of frameworks. The purpose of this study is to develop and apply such a framework to explain the implementation strategies and outcomes of the Governorates Project.

Theoretical Framework

Particular challenges for LDCs

Implementations of IT-based innovations in LDCs present particular challenges when compared to those in developed countries, primarily because of differences in the degree to which implementation obstacles are present, rather than because of differences in kind. Although LDCs differ substantially among themselves, a common set of themes can nevertheless be identified for computerization efforts in the administrations of many LDCs such as Egypt, China, India, Brazil, and Indonesia, where formerly socialist or government-controlled economies are making a difficult transition to market-controlled economies.

These themes in turn provide the basis for developing a theoretical framework to study IT implementation in LDCs.

First, LDCs typically have a poor computing infrastructure (e.g., in hardware, software, and data communications) as compared to developed countries (Bhatnagar, 1990). For example, the total number of personal computers in Egypt is estimated to be only around 200,000 for a population of approximately 60 million people (one PC for every 300 people, compared to approximately one PC for every four people in the U.S.). The Egyptian communications infrastructure is similarly poor, with a telephone density of one telephone per 20 people (compared to one telephone for almost every person in the U.S.). The inadequate computing and telecommunications infrastructure in turn has resulted in a poor information infrastructure, where many organizations do not have the “information-awareness” that is frequently taken for granted in developed countries (Narasimhan, 1984). The efforts of many central and local administrations in such countries have therefore been focused on investing in computers and telecommunications that are necessary for improving the information infrastructure. These efforts are justified by the functional benefits of computing, such as accurate, detailed, and timely information about the economy and support for effective decision making.

Second, because the private sector has traditionally been neglected in LDCs such as Egypt, India, and China, the government and its public sector agencies have typically been the primary users of information technology (Flamm, 1987; Moussa and Schware, 1992). Since the government therefore dominates the shape of IT development in the country, control over the computing infrastructure has frequently been associated with the political control of information, particularly to reinforce the power of the government. Because non-governmental sources of information on the economy are frequently missing or are unreliable in many LDCs, IT can therefore become a powerful tool for controlling the collection and dissemination of information to the public. Even where IT investments are justified by their functional benefits, particularly in LDCs that are making a transition from socialist to
market-based economies, such investments often serve as a symbol for progress while masking political undertones (Berman, 1992). Any analysis of IT implementation in LDCs should therefore pay particular attention to such political and symbolic uses of information.

Third, the socio-cultural context in which IT is introduced in LDCs often poses special problems (Robey, et al., 1990). Thus, implementors of IT in LDCs need to pay particular attention to the social group that influences the attitudes and behaviors of the target users. For example, the implementors of IT in the local administrations of Egypt had to take into account the strong local customs and ties between employees and their relatives and other socially influential individuals. These social influences ensured that employees were strongly bound to the local community and were typically unwilling to be assigned elsewhere for employment. The governors of the local provinces were also especially susceptible to the influence of their social group, which included the other 26 governors and the central ministers who oversaw the operations of the governorates. The social group could exert considerable influence on each governor with regard to attitudes toward computerization and usage of the governorate centers.

To summarize, IT implementation efforts in LDCs suggest that functional, political, symbolic, and social factors exert considerable influence on the outcomes of the implementation. While these factors are prevalent even in developed countries, they appear particularly important to consider when studying computerization efforts in administrations of LDCs. The next section traces the contributions of past research in both developed and less developed countries in describing how these factors operate. This research is then used to develop a theoretical framework for studying IT implementation efforts in LDCs.

**Elements of the framework**

This section distinguishes between three theoretical perspectives drawn from prior research in IT impacts on businesses in developed countries and on LDCs, i.e., the functional, symbolic/political, and social information processing perspectives. These perspectives were selected because they appeared to have an a priori validity concerning computerization efforts in LDCs, as described above. While the perspectives are not mutually exclusive, they nevertheless serve as useful stereotypes for identifying differing explanations of IT implementation outcomes. The key aspects of each perspective are summarized in Table 1.

**The Functional Perspective**

Franz and Robey (1984) argue that one way of interpreting the events in a systems development effort is using an approach that emphasizes objectives such as the costs, benefits, and technical performance of the system. Administrators in many LDCs have also adopted such a functional approach by emphasizing the objective functions that IT provides for solving problems (Ad Hoc Panel, 1986; Ruth and Mann, 1987; Saito, 1990). For example, proponents of this approach suggest that by improving the timeliness of information and by ensuring better data collection, analysis, and presentation, competition between government agencies is “raised to a new level, away from political or personal antagonism and towards a more constructive level where information is at the center of the debate” (Ad Hoc Panel, 1986). Other proponents argue that IT can help local levels of government (e.g., province, district, and subdistrict) take over tasks typically performed by central ministries (Schware and Trembour, 1987). The functional perspective is widely prevalent among the administrators of African countries, which have adopted information technology as an essential tool for economic development and cost-effective management of resources (Zwangobani, 1990).

**The Political/Symbolic Perspective**

Some IS researchers (e.g., Franz and Robey, 1984, Markus; 1983) emphasize a political per-
Table 1. Summary of Theoretical Perspectives

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Theoretical Perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcomes to Be Explained</td>
<td>Perceptions of users toward IT innovation, behavior of users in terms of adoption and usage of IT innovation.</td>
</tr>
<tr>
<td>Primary Factors Affecting Outcomes</td>
<td>Functional features of innovation such as effect on information and decision making.</td>
</tr>
<tr>
<td>Political</td>
<td>Political aspects of innovation such as effect on power base of the user.</td>
</tr>
<tr>
<td>Social Information Processing</td>
<td>Social factors such as opinions and behaviors of others in social group.</td>
</tr>
<tr>
<td>Effect of IT Innovation</td>
<td>Adoption and use of an IT innovation is desirable because it is perceived to improve the timeliness and accuracy of information, the quality of the problem analysis, and the quality of the decisions made by the user.</td>
</tr>
<tr>
<td></td>
<td>Adoption and use of an IT innovation is desirable because it is perceived to increase the influence of the user through control over information and the symbolic value of IT.</td>
</tr>
<tr>
<td></td>
<td>Adoption and use of an IT innovation is desirable because others in the social group are perceived to have gained from its adoption/use.</td>
</tr>
</tbody>
</table>

The Social Information Processing Perspective

Proponents of this approach suggest that the perceptions and behaviors of individuals are strongly influenced by the perceptions and behaviors of other individuals belonging to the social group (Rice and Aydin, 1991; Rice, et al., 1990; Williams, et al., 1988). Such social influence is especially strong when the situation is ambiguous or uncertain (Thomas and Griffin, 1983). There are two basic assumptions in such an approach: (1) the individual who is being influenced is "proximate to the perceptions, information, or behavior of others to be exposed to social information" (Rice and Aydin, 1991); and (2) the individual attaches value to the proximate others for the social influence.
information to be influential. Such importance could also be derived from a perception that the proximate other wields power over the individual (Brass, 1984). Moreover, proximity need not be spatial; it could also be derived from interactions (i.e., the individual interacts directly or indirectly with the social group (Rogers and Kincaid, 1981)) or from holding similar positions (i.e., the members of the social group have similar roles, status, expectations, and obligations (Burt, 1980)).

Research approach

This research adopts an interpretive approach and studies the implementation and use of the governorate centers through the perspective of the participants (governors, center staff, implementation team, etc.,) using their own interpretations of events and processes. Such an approach has been advocated for studying information systems implementations in LDCs because of the importance of the context, history, and infrastructure associated with computing (Walsham, et al., 1990). As such, a “web model” of computing (Kling and Scacchi, 1982), which emphasizes the social system, rather than a “discrete-entity” model, which ignores the social context, was considered appropriate for the study.

The Egyptian Setting

Economic and political context

An understanding of the macro context, particularly the economic and political, is useful in applying the theoretical framework to the Governorates Project.

Economic Context

Soon after 1952, when Gamal Abdel Nasser and the Free Officers came to power, Egypt was transformed from an entrepreneurial economy into a state-controlled one with its infrastructure, large-scale manufacturing, and finance run by public sector enterprises or organizations controlled by the government. The Charter of 1962 formally introduced socialism to Egypt; among other things, it guaranteed every citizen’s right to an adequate job commensurate with his ability and education (Hansen, 1991). It also formalized a system of government subsidies for a variety of consumer goods and services. Even though Nasser’s successor, Anwar Sadat, introduced some economic liberalization, he nevertheless continued to preserve the public sector that had become dominant under Nasser. After Sadat’s assassination in 1981, Hosni Mubarak came to power and has ruled since then.

Until the mid-1980s, the large government deficits arising out of government subsidies and guarantees of employment had been financed primarily through oil and Suez Canal revenues, worker remittances from abroad, and by borrowings from the U.S. and Western lending institutions. However, since early 1986, a dramatic decline in oil prices and hence, revenues took place, with earnings half that of previous levels; a similar reduction also ensued in remittances from Egyptian oil workers abroad (El-Naggar, 1990). To continue to finance its deficit, Egypt turned increasingly to international lenders, particularly the Bretton-Woods twins—the IMF and the World Bank—for financial support. In return, these institutions have required significant structural adjustments and economic reforms in Egypt.

Political Context

Prior to the Mubarak government, Sadat and Nasser had followed a policy of tight central control and single-party dominance of the state. Since 1982, the Mubarak government has commenced a policy of gradual political liberalization, in part to prevent a resurgence of the military who had gained power under Nasser and the economic groups who had prospered under Sadat. In contrast to Nasser and Sadat, Mubarak followed a cautious, pragmatic, and non-ideological policy that emphasized legality
and rationality and promoted the technocratic groups in society (Hinnebusch, 1990).

In recent years, Mubarak's tenure has also witnessed the growth of political opposition. For example, the al-Ikhwan al-Muslimeen (Muslim Brotherhood), which represents the moderate element of the Islamic movement in Egypt, has extensive support in universities and professional societies such as the Medical Association and the Engineers Syndicate (El-Sayed, 1990). Other prominent groups opposed to the ruling National Democratic Party (NDP) include the tagammu (an alliance of Nasserists, Marxists, and others) and the Socialist Labor Party. In addition, there has been a significant increase in the activities of the radical gama'at (or Islamic underground groups) such as the al-Jihad and the gama'at al-Islamiyya, which seek a violent overthrow of the government. In response to this opposition, the Mubarak government has recently reverted to greater control over the national polity. For example, although Mubarak's NDP was returned to power in late 1995, the elections were controversial because of the government's arrest of prominent leaders of the Muslim Brotherhood.

Impact of the context on the governorates project

Center-Governorate Relations

At the national level, the president of Egypt has ultimate authority over the government of the country. However, the actual administration is undertaken by his appointees, the prime minister and the other central ministers in the Egyptian Cabinet. The central minister for Local Administration oversees the governors of the 27 governorates. At the governorate level, the governor, who is also appointed by the president, is responsible for administering the governorate and for formulating and implementing local development plans. The directorates in each governorate have a matrix-like reporting relationship: although technically considered employees of the governor, they nevertheless report to the central ministry.

Decision-Making Pressures on Governors

While the socialist state under Nasser and Sadat resulted in substantial alleviation of the plight of Egypt's poorest classes (Hansen, 1991), it nevertheless created a system of inefficient subsidies and expensive commitments by the government to its population. The current efforts to modernize the economy and undertake structural reforms—at the urging of international lenders—have led to a reduced role for public sector enterprises and a reduction in government subsidies on essential commodities, and have consequently resulted in greater hardships for the population.

Until recently, the central government made strategic and policy decisions, and the governors were expected to implement them. However, there has been some decentralization of authority to the local governments in recent years in order to make the local governors more responsive to the needs of their electorates. While the extent of decentralization has not been significant at the strategic decision-making level, the governors have nevertheless been given increased authority for operationalizing strategies and addressing local issues. However, this limited decentralization of authority has also been accompanied by increased complexity of the problems confronted by the governors. On one hand, they have had to implement the difficult decisions needed to introduce economical reforms into the economy. On the other hand, they have had to ensure that such decisions do not undermine their political base and the power of the government that appointed them. The pressures on the governors to be more responsive to their local population have been greater because of the increased political opposition in the country.

Promotion of IT by the government of Egypt

Background

In many LDCs, the nation-wide changes in the economy and polity that are taking place in
response to growing inefficiencies of a socialist or state-dominated model of government have spurred efforts at increasing the use of computers (Kluzer, 1990). Through computerization, these countries have hoped to achieve the benefits from technical and economic development normally associated with advanced industrialized countries (Lind, 1991).

Since the mid-80s, the government of Egypt has also begun to view IT as an important means for facilitating the transition from a socialist to a market-based economy. This is in large part because of the perception that computers promote "rational" decision making and enable greater informatization of the economy. Consequently, the IT sector has been developed significantly in the past decade (see Appendix A for details). In particular, information systems have been viewed as the means by which the administrative bureaucracy could be modernized and made more productive. In keeping with this view, the minister of Cabinet Affairs for the government of Egypt initiated efforts in 1984 at exploring the opportunities provided by decision support systems to improve the decision-making capabilities of the Egyptian Cabinet (El Sherif, 1990).

The Cabinet Information and Decision Support Center (Cabinet IDSC) was subsequently established by the Cabinet in 1985 with three principal objectives: (1) to develop information and decision support systems for the Cabinet and top policy makers in Egypt; (2) to support the establishment of decision support centers in the 32 central ministries of the Egyptian Cabinet; and (3) to accelerate the managerial and technological development of the various government agencies (El Sherif, 1990; El Sherif and El Sawy, 1988).

Motivation for Governorates Project

In late 1987, the Cabinet IDSC launched the Governorates Project, which represented a significant administrative and technological innovation for Egypt. The project sought to implement 27 IDSCs, one for each governorate (including the city of Luxor, the site of most pharaonic tombs). (See Table 2 for a profile of the governorates.) These centers were expected to enhance the administrative effectiveness of each governorate by providing information and decision support to the governors and their administrative staff (Kamel, 1995; Kamel and Khosrowpour, 1993; 1994). The Governorates Project represented a distinct departure from the projects that the Cabinet IDSC had considered to date: its central purpose was to diffuse the use of IT to administrators outside of Cairo and Alexandria, which together account for 18 percent of Egypt's population (see Table 2). The use of computers in many of the areas outside these two cities was virtually non-existent. As described earlier, the economic and political changes taking place in the country had exerted considerable pressure on the governors to be more responsive to their public, and the Cabinet IDSC was convinced that the Governorate IDSCs would assist significantly in this effort.

The pool of technical and managerial talent developed and available at the Cabinet IDSC formed the basis for initiating the Governorates Project, thereby ensuring that virtually no external expertise would be needed for its implementation. While the technical expertise was drawn from the engineers and programmers (often Western-educated) at the Cabinet IDSC, the managerial expertise was drawn primarily from former high-ranking officers in the Egyptian army, who had continued to retain their extensive contacts with the bureaucrats and politicians in government.

The Governorates Project Innovation

The governorate information and decision support center

Prior to the establishment of each Governorate IDSC, the governor would typically obtain his information directly from the various administrative units and directorates (i.e., local offices of central ministries) that formed part of the
### Table 2. Profile of Governorates

<table>
<thead>
<tr>
<th>#</th>
<th>Governorate</th>
<th>Area (Sq. Km)</th>
<th>Population (1993)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alexandria</td>
<td>2,679</td>
<td>3,407,300</td>
</tr>
<tr>
<td>2</td>
<td>Assiut</td>
<td>1,553</td>
<td>2,635,600</td>
</tr>
<tr>
<td>3</td>
<td>Aswan</td>
<td>678</td>
<td>964,000</td>
</tr>
<tr>
<td>4</td>
<td>Beheira</td>
<td>10,130</td>
<td>3,893,300</td>
</tr>
<tr>
<td>5</td>
<td>Beni Suef</td>
<td>1,322</td>
<td>1,711,800</td>
</tr>
<tr>
<td>6</td>
<td>Cairo</td>
<td>214</td>
<td>6,929,300</td>
</tr>
<tr>
<td>7</td>
<td>Dakahlia</td>
<td>3,408</td>
<td>4,016,700</td>
</tr>
<tr>
<td>8</td>
<td>Damietta</td>
<td>589</td>
<td>873,300</td>
</tr>
<tr>
<td>9</td>
<td>Fayoum</td>
<td>12,000</td>
<td>1,992,800</td>
</tr>
<tr>
<td>10</td>
<td>Gharbeya</td>
<td>1,942</td>
<td>3,267,400</td>
</tr>
<tr>
<td>11</td>
<td>Giza</td>
<td>4,840</td>
<td>4,938,700</td>
</tr>
<tr>
<td>12</td>
<td>Ismailia</td>
<td>1,141</td>
<td>698,900</td>
</tr>
<tr>
<td>13</td>
<td>Kafr El Sheik</td>
<td>3,492</td>
<td>2,113,400</td>
</tr>
<tr>
<td>14</td>
<td>Kalubeya</td>
<td>1,001</td>
<td>3,271,600</td>
</tr>
<tr>
<td>15</td>
<td>Luxor</td>
<td>55</td>
<td>147,900</td>
</tr>
<tr>
<td>16</td>
<td>Matrough</td>
<td>212,000</td>
<td>174,100</td>
</tr>
<tr>
<td>17</td>
<td>Menia</td>
<td>2,262</td>
<td>3,089,300</td>
</tr>
<tr>
<td>18</td>
<td>Menouffia</td>
<td>1,532</td>
<td>2,619,200</td>
</tr>
<tr>
<td>19</td>
<td>New Valley</td>
<td>376,500</td>
<td>137,900</td>
</tr>
<tr>
<td>20</td>
<td>North Sinai</td>
<td>31,000</td>
<td>248,200</td>
</tr>
<tr>
<td>21</td>
<td>Port Said</td>
<td>1,351</td>
<td>598,800</td>
</tr>
<tr>
<td>22</td>
<td>Quena</td>
<td>1,850</td>
<td>2,708,800</td>
</tr>
<tr>
<td>23</td>
<td>Red Sea</td>
<td>203,685</td>
<td>124,500</td>
</tr>
<tr>
<td>24</td>
<td>Sharkeya</td>
<td>4,180</td>
<td>4,091,800</td>
</tr>
<tr>
<td>25</td>
<td>Souhag</td>
<td>1,574</td>
<td>2,834,100</td>
</tr>
<tr>
<td>26</td>
<td>South Sinai</td>
<td>30,000</td>
<td>49,300</td>
</tr>
<tr>
<td>27</td>
<td>Suez</td>
<td>25,000</td>
<td>459,100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>936,418</strong></td>
<td><strong>57,997,300</strong></td>
</tr>
</tbody>
</table>

The Governorates Project resulted in the creation of four additional units in each governorate: the computer resource unit, the decision support unit, the library unit, and the publications unit. Together, the heads of these five units (including the statistics unit) reported to the center director, who was responsible for coordinating the activities of the units, preparing the annual plans for the center, and interacting with external entities such as the governor (frequently through an aide such as the secretary general), the project staff from the Cabinet IDSC and the heads of the local ministry offices in the governorate. Each Governorate IDSC was therefore expected to transform a manual information collection process into a centralized, automated, and well-equipped information management facility under the control of the governor.
Structure of the governorate IDSC

The statistics unit in each center (consisting typically of four-seven employees), was responsible for collecting data about the governorate for each of the sectoral databases (i.e., those dealing with sectors such as education, health, etc.), or for other databases developed by the center. This data was usually collected from the governorate offices or the local directorates. The decision support unit (three-five employees) was meant to be the “brains” of the center—it was responsible for analyzing and solving problems presented to the center by the governor or other users. It was also expected to undertake problem analysis on its own initiative. The computer resource unit (five-eight employees) was responsible for storing and maintaining information in the sectoral databases and for developing and maintaining any new software programs used by the center.

The library unit (three-five employees) was responsible for storing manuals and procedures of the center and for keeping a record of the work accomplished by the center (e.g., through newsletters and other publications). Hard copies of the data stored in the computer resource unit’s databases were also stored in the library unit. The publications unit (three-five employees) played a key role in describing the center’s activities to its users, other centers, and the Cabinet IDSC. It was responsible for publishing the monthly newsletter in Arabic, which described the activities of each unit in the center. In particular, the newsletter described the center’s solution to the problem areas identified by the Cabinet IDSC as discussion topics for the month. Typically, three such areas were identified in each issue, and each center had discretion in picking a fourth problem.

Technologies at each governorate IDSC

Each Governorate IDSC was equipped with personal computers (PC-ATs typically, 20-40 MB hard disk capacity, at least 10 MHZ processing speed, 640 KB memory), printers, photocopying machines, Arabic/English typewriters, machines to bind reports, and electricity generators. The amount of equipment at each location varied according to the size of the centers, e.g., large centers such as Cairo typically had up to eight computers, while smaller centers such as South Sinai had only two. The software installed on these computers included word processing packages such as Wordstar and Wordperfect, spreadsheet software such as Lotus 1-2-3, graphics software such as Harvard Graphics, and database packages such as dBase 3+, Clipper, and FoxBase. The operating system used for the computers was DOS.

To ensure standardization across the centers, the Cabinet IDSC developed the software applications and database design for the different sectors of the Egyptian economy. These sectors included population, education, public health, industry, housing, tourism, infrastructure, agriculture and irrigation, supply and distribution, financial services (including tax collection), employment, social affairs, youth and sports, and culture. Each governorate center was responsible for collecting and updating the data (often monthly) pertaining to each sector in the governorate. Governorate staff were expected to generate reports and undertake queries using the databases in response to information requests, or to analyze problems requiring decisions.

Training of personnel

In the Governorates Project, training associated with computers and problem analyses had to be centralized in Cairo because of a lack of trainers and equipment. However, travel for such training was a difficult task for the staff at the Governorate IDSCs, who had considerable local responsibilities, which often included a second job to supplement their government employment. Such travel was particularly difficult for women—who were heavily represented in the computer resource units in the Governorate IDSCs—because of family responsibilities and problems in finding suit-
able hotel accommodations in Cairo. The difficulties with regard to training were typical of IT implementation efforts in LDCs, where education and training on information systems and their uses is particularly a problem (Walsham, et al., 1990). As Bjørn-Andersen (1990; p. 282) suggests, training on computerization in LDCs is “often too little, too late, and too technical.”

Research Findings

This section analyzes the stages of implementation of the project in terms of the theoretical framework described above. The research methodology used for the study is summarized in Appendix B. Based on the information collected from the project implementation team, the staff at the Governorate IDSCs, and the governors, three key stages of the Governorates Project are identified: the period 1987-90 during which the centers were being established, the period 1990-92 when the centers were in use and being evaluated, and the period from 1992 to the present when there was a dramatic transformation in the scope of the project. These stages can be delineated by clear-cut milestones: project initiation in 1987, the implementation of all centers by the end of 1990, and a conference of governors and central ministers in early 1992 that resulted in a significant expansion of the project scope.

Stage I: implementation (late 1987-1990)

During the first two years of the implementation (late 1987-late 1989), the perceptions of the governors toward the project was one of skepticism about the value of an information and decision support center, and doubts as to whether it would provide specific benefits to them. According to the original implementation plans, 10 centers were expected to be implemented in the first three years and all 27 centers by the end of six years (Hussein, 1991). In the first two years of the implementation, the project team convinced seven of the 27 governors (Suez, Sharkeya, Port Said, South Sinai, North Sinai, Ismailia, and the Red Sea) to establish a center in their governorates. However, in the third year of the project (1989-90), there was a dramatic transformation in the rate of adoption as centers were set up in all the remaining 20 governorates, three years ahead of schedule.

One of the key drivers of the innovation during this and subsequent stages was the presence of a strong champion in the form of the chairman of the Board of Advisors to the Cabinet IDSC (who was also its de facto head). During the last year of the implementation (1989-90), the chairman made a strategic decision to rapidly push the expansion of the project and complete the implementation in all the governorates by the end of the year. Galvanized by this deadline, the project implementation team redoubled its efforts to convince the remaining governors to adopt the innovation. However, the presence of a strong champion is insufficient to explain why 20 governors, who were previously reluctant to adopt the innovation, suddenly chose to do so in the third year of the project. The relative power of the three causal agencies is considered next in explaining why the above process of adoption took place.

Functional Perspective

Under this perspective, the adoption (or non-adoption) of the IT innovation can be explained in terms of the objective costs and benefits from using it. While the Governorate IDSC represented a long-term investment in improving the governorate's information and decision-making processes, the project team initially found it difficult to identify tangible short-term benefits that would outweigh the cost of investing in the centers. Moreover, the project was perceived as a low-priority trial by the governors and central administrators alike. The attention of the central administrators was directed more at the Cabinet-level Information systems applications, while the governors had not yet begun to grasp the significance of computerization in their governorates. These aspects may explain why a majority of the gov-
The Governorates Project

Governorates were skeptical of the innovation during the first two years: its benefits were uncertain to the governors, and it would cost them resources—around 200,000 Egyptian pounds (LE, where 1 LE = 0.33 US$ in early 1993) to establish the center and 100,000 LE to maintain it annually.

The functional perspective would also suggest that the innovation had developed sufficiently in the third year of the project (1989-90) for its benefits to become readily apparent and its costs brought under control. However, discussions with the project implementation team suggest that the nature of each center was still evolving, and the project team had not yet developed a standard set of procedures for establishing and operating the center. Moreover, a full set of databases had not yet been developed, nor had the design of the databases stabilized. According to the project implementation team, the centers themselves were often ‘shells’ that were not fully functional at the time of their implementation. These in turn led to a lack of clarity about the center’s benefits to the governor, even while the costs of implementing and operating the center were considerable. A purely functional approach therefore does not explain why seven governorates adopted the innovation in the first two years and why the remaining 20 adopted it subsequently in the space of just one year.

Political/Symbolic Perspective

In spite of the lack of clarity of benefits, it is nevertheless noteworthy that seven governors did choose to adopt the innovation in the first two years. The political perspective provides a partial explanation for why this may have been so. The perspective suggests that users have a favorable perception of the innovation if its particular features match their specific political (i.e., power-related) needs. The establishment of the Governorate IDSC at the Sharkeya governorate was a case in point. The project team made a strategic political move of implementing a database that would increase the control exercised by Sharkeya’s governor—because the governor was a former surgeon, the project team created a database on the health sector that would enable him to monitor and control the medical staff under his jurisdiction.

The political/symbolic perspective is especially useful for understanding why the rate of adoption of the centers accelerated in the third year of the implementation. The project implementation team now began to pursue a new tactic by ensuring that the adoption of the center had considerable political and symbolic value to the governor: the inauguration of the center by the governor was publicized widely in the governorate by the project implementation team. These efforts were in keeping with the chairman’s decision to publicize the Governorates Project at the national level in order to sustain the momentum. Thus, the project provided the governor with an excellent public relations opportunity that, in his perception, served to heighten his role as a symbol of ‘rational’ decision making to the public. It therefore provided political mileage to the governor, because it shored up his standing with the public. As we saw earlier, such symbolism was viewed as important in gathering public support for the economic reforms taking place.

Social Information Processing Perspective

For the influence of the social group to be a significant factor in explaining adoption during the first two years of a project’s implementation, it is necessary for a significant number of officials to already have formed favorable opinions about the innovation. This was not the case for the governors concerned in this project. Moreover, although the project was sponsored by Cabinet IDSC, whose chairman reported to the minister for Cabinet Affairs, the relatively low Cabinet priority given to the project in the first two years only served to make it difficult for social influence to be exerted on the governors. During this period, the Egyptian Cabinet and the Cabinet IDSC were more preoccupied with the computerization of the central ministries in Cairo. The general perception of the project during these years was that of an experimental, rather unglamorous effort by a small section of Cabinet IDSC with unknown
benefits and opportunities. Overall, the fact that an uncertain innovation was being implemented top-down, with relatively low commitment from senior management, made it difficult for any significant positive social influence to be present during the first two years of the implementation.

In 1989-90, the decision of the chairman to try to rapidly expand the implementation of the centers and therefore gather national publicity for the project turned out to be a crucial step. Its effects can be analyzed from the social information processing perspective because it generated considerable awareness among both the governors and the Cabinet ministers about the project. What induced 20 hitherto reluctant governors to quickly agree to establish centers in their governorates in the space of just one year? The technical director offered some reasons that were corroborated by others in the implementation team:

[the project liaison with the governors] used to tease the governors. He said we have given so and so governor 200,000 pounds [worth of equipment] and the prime minister came and opened his IDSC. It's a good chance [for you] to invite him or the minister for so and so. [And then] there is a center there and the governor would open it, big smile, . . . very happy that he opened them and he can use the media to report in TV. . . .

In terms of the social information processing perspective, therefore, there were two key influences on each potential adopter during the last year of the implementation: (1) the governor's perception that other governors had adopted the innovation and had derived considerable mileage out of it; and (2) the governor's perception that important entities such as superiors (i.e., federal ministers and the prime minister) perceived computerization to be desirable because it was associated with "rational" decision making. Such information perceived to emanate from the social group (i.e., other governors and superiors) was a major factor in explaining why 20 governors "climbed onto the bandwagon" of Governorate IDSC adoption in 1989-90, even if the functional benefits of the innovation were only partially established. Viewed from this approach, while each governor did have a clear choice in refusing to adopt the center, there was nevertheless sufficient social influence to make this refusal difficult.

Stage II: evaluation (1990-1992)

Once all the 27 governorate centers were established, the process of developing their services and establishing a system of controls became the focus of the project team's efforts. A set of criteria were developed for evaluating the center and its units. The criteria used to evaluate the overall administration of the center (see Table 3), accounted for 25 percent of the total evaluation—the remaining 75 percent were for evaluating the individual units in each center. Until this point, the dominant perceptions of each governor were that supporting the center was both politically and socially desirable. However, the governor and the center staff were now confronted with the task of actually developing and using the center and verifying if it would provide the needed informational and decisional support.

The training of the center staff in using the software and hardware and in undertaking problem analysis continued to be an important issue. By the end of 1991, over 450 Governorate IDSC staff and over 70 staff from other units in the governorate administration had been trained. In addition, the Cabinet IDSC developed a step-by-step procedure for identifying and analyzing problems and evaluating between alternatives. The staff from the decision support unit were then trained in this procedure. However, while governorate staff acknowledged the value of this training during our interviews with them, it was nevertheless clear that the training could have been improved, both in the depth of coverage of technical topics such as information retrieval from the databases, and in the identification of governorate needs. Moreover, travel to Cairo for obtaining training continued to be a major problem.

Because we had the opportunity to meet with governors and center staff at 13 of the 27 gov-
### Table 3. Evaluation Criteria for Center Administration

<table>
<thead>
<tr>
<th>Category</th>
<th>Activity</th>
<th>Max. Points</th>
<th>Actual Points</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and Follow-Up</td>
<td>Availability of an annual plan acceptable for center governorate administration</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of an annual plan acceptable for all governorate administration</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of a monthly plan acceptable for center governorate administration</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of a monthly plan acceptable for all governorate administration</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of an official record book for monthly evaluation of achievements</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization and Training</td>
<td>Existence of a clear &amp; organized structure for center</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existence of authority, responsibilities, and tasks for all workers</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Completion of hiring of all personnel in accordance with guidelines</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of internal guidelines for center</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of training program for employees</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center Management</td>
<td>The specialization of tasks in the center</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coordination of activities among the center units</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cooperation with higher authorities in governorate</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cooperation with data sources</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cooperation with center’s beneficiaries</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The availability of elaborated procedures to ensure the safety of data in the center</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Efficiency of response to information requests</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improvement of the Work Force</td>
<td>Ratio of trained to untrained employees in decision support unit</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ratio of trained to untrained employees in statistics unit</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ratio of trained to untrained employees in computer resource unit</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ratio of trained to untrained employees in library unit</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ratio of trained to untrained employees in publications unit</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Concern</td>
<td>Availability of an annual plan that meets management needs</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Availability of necessary equipment and tools to accomplish work</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>250</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In governorates, we could ascertain directly the perceptions of the governors toward the center. This was undertaken by identifying their satisfaction with the outputs generated by the center. Overall, the governors appeared satisfied with their centers’ abilities to respond to simple information requests, as described below. However, the perceptions with regard to decision support through problem analyses appeared mixed. While some governors appeared satisfied with the decision support, others felt that more serious and substantive analysis needed to be undertaken by their centers. The governors of South Sinai and Aswan, who were formerly very senior military officers with extensive background in computers, were...
particularly dissatisfied with the quality of the problem analyses. The governors of Beni Suef, El Fayoum, North Sinai, and Gharbeya and the mayor of Luxor also felt that problem analyses needed improvement.

Overall, most, though not all, of the governors seemed to be satisfied with the informational support provided by the centers. However, problem analysis was a different issue and seemed to need substantial improvement. Discussed next are the three theoretical perspectives for acquiring a richer understanding of the perceptions of the governors.

Functional Perspective

This perspective suggests that the perceptions of the governor toward the center would be determined primarily by whether the center succeeded in providing him with information and decision support to further objective goals. Interviews with the governors suggest that the objective benefits (and costs) of the center dominated their concerns during the evaluation stage, thus providing considerable support for the functional perspective. A description of some of the problems addressed by the centers and their objective benefits are given in Table 4. Many of these impacts are difficult to quantify, but nonetheless convey a sense of the improvements that took place. These benefits could be divided into three categories, described below.

Responses to Inquiries. Most governors seemed happy about their center's ability to respond to inquiries. For example, the governor of Beni Suef was very pleased with the performance of the center and felt that his own decision making had improved: in the past, it would take him 15 days on average to collect information, but he could now get it almost immediately if the information existed within the center, and within a week if it needed to be collected from others. The governor of Gharbeya felt that the center had provided good information, and the decisions (e.g., on family planning, economic development, reduction of illiteracy), therefore, reflected reality. The governor of Fayoum requested information from the center almost on a daily basis and usually obtained it within five minutes of his request for it. The mayor of Luxor collected information from the center almost daily and expected the center's director to be on call even at night. For example, the center helped him prepare for meetings with the city's constituents, e.g., prior to a meeting with doctors, the mayor expected the center to brief him about the availability of hospitals and medicines in the city.

Analysis of Problems Initiated by Governor. Each governorate center had also undertaken a number of analyses of problems initiated by the governor. For example, the governor of Beheira (who administered 417 major villages and around 4000 small villages) wanted the center to conduct a survey of housing needs for the governorate. The center undertook the survey with the help of the Social Affairs ministry and the town council and presented the governor with a report describing needs and projections of time and costs for building the houses. The Giza budget had included funding for increasing the number of offspring from cows in the governorate. The governor had asked the center to recommend alternative sites where some veterinary experiments could be conducted on this issue. The center recommended two locations that were approved by the governor. He allocated 170,000 LE over three years for this project.

Initiative in Identifying and Analyzing Problems. Governorate staff were also identifying and analyzing problems on their own initiative. For example, the Alexandria center had initiated issues dealing with illiteracy, bread distribution, car accidents, street security, fish resources, licensing and registration, and a variety of others. The Ismailia center had initiated a study of health care services in the governorate's schools. Based on its findings, it recommended to the governor that every student in the school should pay 2 LE toward the school's health unit. The governor agreed with this recommendation, and the plan was to be implemented shortly. The Qaliubiya center had conducted, on its own initiative, a study of the environment and local
Table 4. Impacts Attributed to the GIDSCs

<table>
<thead>
<tr>
<th>Activity</th>
<th>Governorates</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing allocation</td>
<td>Port Said</td>
<td>Computerized the sorting of housing requests and identified 110 fraudulent cases. Savings estimated at 1.1 million LE.</td>
</tr>
<tr>
<td>Housing rental fees</td>
<td>South Sinai</td>
<td>Analyzed rentals and recommended increase. Revenues estimated to have increased by 1 million LE.</td>
</tr>
<tr>
<td>Housing allocation</td>
<td>Suez</td>
<td>Computerized analysis of housing requests identified 50 fraudulent cases. Savings estimated at 1 million LE.</td>
</tr>
<tr>
<td>Housing allocation</td>
<td>Cairo</td>
<td>Registered 46,000 apartments. Discovered large number of fraudulent applications and apartments not paid for in El Salaam city. Savings estimated at 100,000s of LE.</td>
</tr>
<tr>
<td>Distribution of contraceptives</td>
<td>Sharkeya</td>
<td>Problem analysis helped establish family planning centers and allocate supply of contraceptives to them.</td>
</tr>
<tr>
<td>Water allocation</td>
<td>North Sinai</td>
<td>Problem analysis helped allocate water for agricultural development.</td>
</tr>
<tr>
<td>Tourism</td>
<td>Red Sea</td>
<td>Computerized database helped manage tourism (primarily marine-related) estimated at 160,000 LE annually.</td>
</tr>
<tr>
<td>Business activities</td>
<td>National level</td>
<td>A database of 1 million businesses was created. Tax collection estimated to have increased by 30 million LE as a result of collected data.</td>
</tr>
<tr>
<td>Bread distribution</td>
<td>Assiut, Beni Suef, Cairo, Suez</td>
<td>Developed a model for establishing bread distribution outlets and allocating bread to them.</td>
</tr>
<tr>
<td>Land use Analysis</td>
<td>El Fayoum</td>
<td>The analysis identified appropriate agricultural use of land, based on soil type and availability of irrigation.</td>
</tr>
<tr>
<td>Analysis of water-recycling</td>
<td>Assiut</td>
<td>Developed a model of how water could be recycled to irrigate agricultural land.</td>
</tr>
<tr>
<td>Mapping of resources</td>
<td>North Sinai</td>
<td>Developed a map of precious minerals and stones, and a plan to build quarries.</td>
</tr>
<tr>
<td>House payments collections</td>
<td>Cairo, Beni Suef, Assiut, Aswan</td>
<td>Developed a computerized system to follow up on the collection of payment installments for housing collections funded by government loans.</td>
</tr>
<tr>
<td>Project follow-up</td>
<td>Alexandria, Cairo, North Sinai, Port Said</td>
<td>Developed a computerized system to follow up implementation of projects funded by national plan.</td>
</tr>
<tr>
<td>Analysis of health services</td>
<td>El Fayoum</td>
<td>Reanalysis and reallocation of health services and hospital beds for patients.</td>
</tr>
<tr>
<td>Distribution of essential commodities</td>
<td>Beni Suef, Cairo, Menouffia</td>
<td>Developed a computerized system to cope with shortages in butane gas distribution.</td>
</tr>
<tr>
<td>Placement of returning expatriates</td>
<td>All</td>
<td>Developed a plan to place returning expatriates from Gulf states in jobs throughout Egypt.</td>
</tr>
<tr>
<td>5-year plans</td>
<td>All</td>
<td>Helped develop 5-year plan of development for governorate.</td>
</tr>
<tr>
<td>Transportation</td>
<td>Assiut, Port Said</td>
<td>Developed a plan for paving roads in the governorate.</td>
</tr>
<tr>
<td>Health</td>
<td>All</td>
<td>Developed plan for vaccinating all new borns in governorate.</td>
</tr>
</tbody>
</table>
The Governorates Project

development, electricity needs, cooking gas requirements, garbage reduction, and disposal in the governorate. While analyzing data on sources of income for the Aswan governorate, the center staff noticed that a large number of people were not paying their taxes. They brought this problem to the attention of the governor who then brought a number of tax-evaders to trial. As a result, more people began to pay their income taxes and tax revenue increased by 150 percent.

Overall, our analysis of the evaluation stage suggests that the perceptions of the governors were shaped considerably by whether the centers promoted benefits that were objective, or functional in nature, thus providing considerable support to the functional perspective.

Political/Symbolic Perspective

This perspective suggests that a governor would develop a favorable perception of the center if it helped him politically in dealing with his constituency. There is some evidence for this viewpoint when one considers the cost-sharing arrangements between the governor and the Cabinet IDSC. In the Governorates Project, the governor exerted significant hierarchical control over the activities of the governorate center. Although the Cabinet IDSC supplied the equipment and software to the center, the governor provided the space for the center and paid for its annual payroll and operational costs. For example, the governor of Luxor spent 200,000 LE for the initial establishment of the center in 1991, 120,000 LE as operating expenses for 1992 (compared with 60,000 LE from the Cabinet IDSC), 15,000 LE for equipment such as scanners and plotters, and 46,500 LE for purchasing two PCs as part of another study. In return, the governor (or his proxy, the secretary general) decided what activities the center should be engaged in and gave permission to other users to use the center's services.

During elections, the governor of North Sinai had requested information from the center on the number of votes polled by each sheik who had been a candidate. This helped the governor understand the relative power of each sheik and, consequently, forge compromises between them. In Qaliubiya, all information requests made by people other than the governor, his secretary general, or local heads of central ministries needed to be approved by the governor. These included requests from researchers at the Academy of Scientific Research, the head of urban planning, etc.

In Fayoum, the head of the center typically did not recruit staff from outside the governorate administration. He brought in people from other government agencies who had a proven track record. However, all these appointments had to be approved by the governor. In South Sinai, the governor had instructed the center's director not to let some sensitive information be accessed by the local heads of central ministries or other departments in the governorate. The center also had restrictions on the information that was available to the public.

Overall, the political perspective does appear to have some support from the findings. The governor's perception of the centers was influenced by whether the center was strengthening his political base and enabling him to control access to information on the governorate. Moreover, governors were aware of the symbolic value of computers when many of them suggested that the information provided by the center helped justify (or make "transparent") their decisions to their public (cf. Berman, 1992).

Social Information Processing Perspective

Our interviews with governors and center staff suggest that the perceptions of the governors toward the center were only secondarily shaped by the perceptions of their social group (i.e., other governors or superiors) during the evaluation stage. As shown earlier, the primary determinant of their perceptions was their direct experience in using the centers' outputs. One possible explanation for this effect is that social groups become less influential as sources of information if personal experience
with the innovation becomes available. While users may choose to adopt an uncertain innovation based on the opinions of others, the actual assessment of the technology (once it has been acquired) is based on immediate local concerns.

**Stage III: transformation (1992-ongoing)**

In the previous stage, the governors had an opportunity to assess the centers directly and extensively. While their perceptions were favorable concerning the center's ability to respond to information requests, the record on undertaking problem analyses for decision support received mixed reviews. However, it is important to recognize that this dissatisfaction led not toward discontinuation of the centers, but toward a call for transforming the nature of the innovation.

The impetus for the transformation originated at the key milestone that initiated this stage: In February, 1992, the Cabinet IDSC organized a conference of governors in Cairo to address their concerns about the Governorates Project. Again, the chairman of Cabinet IDSC was the primary force behind the initiation and organization of the conference. The event was chaired by the prime minister of Egypt, and each governorate set up a demonstration facility where the governor was expected to personally demonstrate his usage of the governorate center to the prime minister! This in itself was a remarkable testimony to the importance placed by the central government on the project.

At the conference, the governors of the 27 provinces gave their feedback on the project to the prime minister and the chairman of IDSC. Based on this feedback, the conference recommended that the following significant extensions be made to the project: (1) establish training centers at each governorate; (2) establish an IDSC at the central ministry of Local Administration, which was to oversee the project; (3) establish IDSCs at the local directorates within each governorate; (4) establish IDSCs at appropriate towns and villages of each governorate; and (5) implement a national information network to link the Governorate IDSCs and the Ministry for Local Administration.

Most importantly, a budget of 92 million LE was allocated for completing the expansion in the next five years (1992-97). As a symbol of the importance attached to the project, the money for the expansion was appropriated even though the national development plan had already been drawn up prior to the conference. While expanding the number of IDSCs in each governorate and providing electronic links between them (and between the governors themselves), the conference clearly recognized the need for providing local training capabilities, as opposed to training at Cairo.

As of early 1995, the Governorates Project team was in the process of implementing the recommendations of the conference. Twenty-one of the 27 governorates had implemented Local Area Networks in their administration, though only five of them were really being used. Three Wide Area Networks to link towns and villages to the directorate capital had been implemented in the governorates of South Sinai, the Red Sea, and Port Said, and all three were in active use. Moreover, rather than wait for a nation-wide information network to be in place, the Governorates Project staff had decided to establish a temporary information network to link the Governorate IDSCs and the IDSC at the central Ministry for Local Administration. As of this writing, the construction of this network is in progress.

**Functional Perspective**

The functional perspective suggests that the transformation was a result of objective assessments of the problems and opportunities posed by the innovation. We found considerable support for this perspective based on our discussions with the governors and the staff of the Governorates Project. For example, although many governors complained about the quality of the problem analyses, they nev-
Nevertheless felt that the efforts could be improved by broadening the scope of the innovation, along the lines discussed at the conference. They wished to establish minicenters (even if equipped with only one PC) at the level of villages and districts in their governorate, and to electronically link these centers to the governorate center. Some governors and center staff also wanted such centers to be established at the local offices of the central ministries. The benefits included data that were more detailed (down to the level of each village) and easier to collect, and had greater standardization. Overall, the expanded scope was expected to increase the quality of the problem analyses. A secondary benefit of establishing the minicenters was the increased employment they generated.

Another consistent desire that was encountered during our interviews was for electronically networking the various governorate centers. Although the monthly newsletters kept each governorate informed of the activities of others, there was a strong perceived need for greater sharing of information, ideas, and software programs, particularly because many problems were common to the governorates (e.g., inadequacy of housing, health care, schooling, water supply, and bread distribution).

Political/Symbolic Perspective

This perspective suggests that the decision to expand the implementation was based on political considerations, e.g., it could enhance the power of the governors, even if the quality of decision support provided by the center was unsatisfactory. No direct support for this perspective was found, although some indirect support can be ascertained from the nature of the extensions to the project. The centers that were proposed to be established in the villages and districts would link electronically with the center in the governorate administration, as would the centers in the directorates. The governorate center would therefore be the hub of a local governorate network and exert control over it.

Because the governor had virtually total control over the governorate center, his influence could also extend to the centers at the villages and districts, and to some extent, the directorates. Prior to the expansion of implementation, the data from the villages and districts was still being collected by the directorates. The new features called for the Governorate IDSC center staff to be in charge of these activities too. Therefore, by controlling the information to be collected about the governorate and used to analyze its problems, the governor was expected to increase his bargaining power in interactions with his superiors (e.g., central ministers and the prime minister).

Social Information Processing Perspective

This perspective suggests that an individual governor's support for expanding the implementation would be determined mainly by the perceptions of his social group. The evidence shows some support for this perspective. It was clear at the conference that the central ministers viewed the project as a major symbol of the government's commitment to "progressive" means of socioeconomic development, including greater decentralization of decision making. It was also evident that many governors were enthusiastic about the center's potential benefits, even if the quality of problem analyses needed to be improved. Overall, the dominant group perceptions at the conference appeared to strongly favor the goal of dramatically expanding the project in order to address its shortcomings.

Discussion

The experiences of the Governorates Project suggest a number of insights for both theory and practice concerning IT implementation in organizations, whether business or government. The project illustrates an aspect that has repeatedly been emphasized by previous researchers—the importance of an innovation champion. In the case of the Governorates Project, such a role was played by the chair-
man of Cabinet IDSC, particularly at two crucial points in the implementation: the decision to accelerate the implementation of the centers and persuade central ministers to take part in their inauguration (1989-90), and the organization of the Governors Conference in 1992, where the prime minister and other cabinet ministers participated actively.

We also saw that the project continued to grapple with a problem that has beset many IT implementation projects in LDCs (Walsham, et al., 1990): providing adequate training to developers and users. In the Governorates Project, while basic training in using the software and hardware could be considered adequate, some of the dissatisfaction with the quality of the problem analyses may be linked to the difficulty in providing advanced training on database retrieval and design and in identifying the needs of the governors. Moreover, the location of the training continued to be a problem during the implementation and was addressed in the third stage with the suggestion of developing training centers in the governorates themselves.

While the need for an innovation champion and the provision of adequate training have been well-recognized by researchers and practitioners, this study also identifies a number of other interesting issues that had a significant impact on the evolution of the Governorates Project. First, it is important to study the perceptions that the targets of the innovation (here, the governors) have toward it. Equally important is the need to consider how these perceptions change over the course of the implementation. Because many innovations represent a complex, evolving "web" of interconnections between technologies, relationships, and structures (Kling and Scacchi, 1982), initial perceptions toward an indistinct innovation become altered as the outlines of the innovation become clear. Moreover, the tactics employed by the project implementation team have a key influence on these perceptions, as we saw distinctly in the Governorates Project.

Second, the actions of the actors themselves lead to alterations in the nature of the innovation. For example, the decisions taken at the 1992 conference resulted in a considerably more complex and qualitatively different innovation (i.e., a network of centers extending both vertically down into the villages and laterally into other governorates) than the initial innovation (i.e., a single center in each governorate). The Governorate Project suggests, therefore, that there is a continuing interaction between the actors and the innovation itself. A purely technological approach to the innovation, which underemphasizes its dynamic nature over the course of its adoption and diffusion, is thus inadequate.

Third, our findings suggest that it is important to study the processes that lead to changes in perceptions and therefore the adoption and use of the innovation. An inattention to the evolving perceptions of the adopters over the duration of the project will cause researchers to miss much of its richness. Our analysis suggests that a variety of perspectives (the functional, political/symbolic, and social information processing) derived from theory can be used to understand these changes. Moreover, the results suggest that none of these perspectives is sufficient by itself for explaining the changes in perceptions and behaviors during the project. Each perspective has a role to play, and even more importantly, the role varies over the stages of the project. The ability of each perspective to explain the outcomes during the three stages of the project is summarized in Table 5. For example, the political/symbolic and social information processing perspectives had considerable explanatory power in understanding the implementation of the centers, whereas the role of the functional perspective increased toward the later stages of the project (evaluation and transformation). The finding that functional explanations were not so important in the first stage is interesting and contrary to some established research in the adoption of innovations. For example, Cooper and Zmud (1990) and Laudon (1985) conclude that the functional features of the innovation are crucial during the early phases of the adoption of an innovation.
Fourth, the study highlights the importance of understanding underlying motivations in adopting and using an innovation, and placing these motivations in the economic and political context of the adopters. Repeatedly during our interviews, many governors told us that the use of information systems helped justify (in their own words, make “transparent”) their decisions to their constituents. Under the political and economic reforms taking place in Egypt, the governors felt that they had to be more accountable to their citizens and were obliged to explain their decisions. The use of information systems helped project this symbolic display of “rational” decision making. The study also shows how the use of the centers served the political purposes of the governors, both in reinforcing their standing with the public and in exerting control over access to information.

Fifth, the research identifies the importance of the social group in influencing perceptions toward an innovation. Especially during the implementation and transformation stages of the project implementation, governors were susceptible to the perceptions of their peers and superiors. The project team was successful in expanding the innovation because it capitalized on the social information derived from superiors such as the central ministers and the prime minister, and from other governors who had benefited from adopting the innovation. The symbolic/political and social information processing perspectives help explain why our findings apparently contradict those of Cooper and Zmud (1990) and Laudon (1985): in the early stages, potential adopters seem to obtain their cues about an indistinct innovation from others in their social group, or from their perceptions of the political and symbolic value of adopting the innovation.

Overall, the above findings reinforce the value of adopting an interpretivist perspective where the focus is on the meanings associated by the actors with the innovation, and on the influence of the social, political, and economic context. A purely functional approach to IT implementation based on a positivist perspective is inadequate in capturing the richness of this relationship.

### Conclusion

The Governorates Project offers a direct challenge to the “conventional wisdom” that large-scale government-run IT projects in developing countries are usually ill-conceived and badly executed, squander their sponsors’ money, and are difficult to sustain. By contrast, the Governorates Project has had a relatively successful history so far: beginning with a small and rather unnoticed effort in 1987, it spread in the next eight years to a nation-wide implementation that involved all the governorate capitals, key central ministries such as Local Administration, and many towns and even villages spread throughout Egypt. Moreover, it managed to sustain and even enhance the level of involvement and commitment of central ministers (including the prime minister) and all the governors in Egypt. Such commitment has also been tangible, rather than merely symbolic: governors have been willing to bear the cost of operations for the center, and the central government has been willing to spend over 70 million LE to expand the innovation.
The project continues to have important problems, particularly concerning training, the development of problem analyses capabilities, and lack of free access to information by the public. Nevertheless, there have been notable successes: the governors actively use the centers and appear satisfied with their information-support capabilities, and there have been a number of decision support and problem analysis cases that directly benefited the governorates. Moreover, the current status of the project—continued expansion into more remote regions of Egypt such as towns and villages, wide area and local networking of centers—suggests that it has acquired substantial momentum.

In an influential article on the use of microcomputers in Kenya's Ministry of Agriculture, Pinckney, et al. (1987) lay down the following criteria for considering an IT implementation as complete (emphasis in the original): "1) Kenyans themselves demand the output from the machines, 2) all operations are done by Kenyans, 3) all programming is done by Kenyans, possibly local consultants; 4) good microcomputer operators are retained by the civil service, and 5) maintenance and supplies are provided for in the budget." The ability of the LDC to pursue such an indigenous computerization strategy (i.e., one where it utilizes local skills for all aspects of the implementation, except perhaps for hardware production) is therefore a crucial aspect of the IT implementation.

Applying the above criteria, we find that the Governorates Project seems on its way to institutionalization, in spite of problems with training, quality of problem analyses, and centralized control over access to information. The governors themselves demand the output from the center (whether for functional or political purposes), all operations at the center are undertaken by Egyptians, all programming is done by Egyptians, and the costs for maintenance and supplies are provided for in the governorate budget. Moreover, the Governorates Project illustrates key aspects not covered by Pinckney, et al.: it was funded entirely by the Egyptian government using Egyptian expertise in project planning and implementation, and the centers were spread over all of Egypt. As such, the Governorates Project represents a useful model of relatively successful IT implementations in less developed countries.

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Appendix A

Research Methodology

The research methodology consisted of a longitudinal case study with multiple sites. Case studies are particularly useful for answering "why" types of questions where little or no control can be exercised over the phenomenon by the researcher (Yin, 1984), and for understanding the process through which an IT innovation is adopted by an organization. The population for the study consisted of all the 27 governorates of Egypt (including the city of Luxor). We collected extensive data from 13 (approx. 50 percent) of these governorates during the course of the study. The research extended for two years (1992-1993) with members of our team making four separate visits to Egypt to study the project.

The sample of governorates was selected based on the following criteria: (1) it had to include both successful and relatively less successful implementations, where success was given by the extent of use of the center by the governor; and (2) it had to show variation in demographics such as urban/rural concentrations, desert/delta terrain, geographical spread and agriculture/industry base. For example, Alexandria is a large urban governorate with a strong industrial base at the mouth of the fertile Nile delta. In contrast, South Sinai is a largely rural governorate spread over a large stretch of rocky desert. Based on these criteria, the following governorates were selected for the study: Alexandria, Aswan, Beheira, Beni Suef, Fayoum, Gharbeya, Giza, Ismailia, Luxor, North Sinai, Qaliubiya, Qena, and South Sinai.

Our primary sources of information were interviews with the governors of the above 13 governorates. It should be emphasized that a typical governor is more than just the CEO of a mammoth enterprise (the governorate bureaucracy with thousands of employees)—he is also the unquestioned chief of a province within a country, each with 2-3 million inhabitants on an average. Given the complexity of the problems that he has to deal with and the variety of constituents with whom he has to meet regularly, it is typically extraordinarily difficult to obtain an interview with him. However, as an indication of the importance attached by the government to this project, our research team managed to meet with each governor for over an hour and assess his perceptions of the center.

Other key sources of information based on interviews included: (1) center directors and heads of Decision Support and Computer Resource units in each sampled governorate, each of whom were interviewed for at least one hour; (2) members of the implementation team at the Cabinet IDSC (including Gen. Radwan Said, Gen. Hamada, and Brig. Ibrahim); (3) the chairman (Dr. Hisham El Sherif) and executive director (Dr. Ahmed Nazif) of Cabinet IDSC; (4) the technical director of the project in the early stages, Prof. Sami Akabawi; (5) the central Minister for Local Administration, H.E. Mahmoud Sharif; and (6) a variety of others at Cabinet IDSC who had been associated with the project.

Altogether, over 75 people were interviewed for a total of more than 150 hours. Depending on the interviewee, the issues dealt with an historical reconstruction of the process of implementation, the management controls for the project, the operations of each governorate center, the governors’ perceptions toward the center and its outputs, and the impacts that the center had on the operations of the governorate. During our interviews with each center staff member, we tried to ensure that his/her supervisor or subordinates were not present, thus controlling for response bias.

Because the large majority of the center staff and governors did not speak English, we had an interpreter (typically a Western-educated staff member at the Cabinet IDSC) and two notetakers (one in Arabic, one in English) to cross-verify what the interviewee had said. In addition, we collected extensive information from documents such as project implementation plans, organization charts, gover-
The Governorates Project

norate center operations guides, newsletters, performance evaluations of governorate centers undertaken by the Cabinet IDSC staff, and problem analyses and recommendation reports prepared by governorate center staff.

While identifying underlying motivations and perceptions is always a difficult task, we sought to ensure that our interpretations were valid by: (1) cross-checking the motivations and perceptions of the governor against the center staff's own descriptions of how the governor viewed their activities; (2) cross-checking the governors' motivations and perceptions against the impressions formed by the project implementation team itself; (3) cross-checking the project implementation team's description of implementation issues against those given by their managers such as the chairman of the Cabinet IDSC and the technical director; and finally (4) verifying our interpretations of underlying motivations and perceptions with Middle Eastern experts such as Prof. Jerrold Green, International Policy Department at the Rand Corporation.

Appendix B

Computing and Communications in Egypt

In Egypt, statistics on information technology use are generally either non-existent or hard to get. Egypt boasts the largest population in North Africa but suffers from a high rate of illiteracy—50 percent—despite the large number of university graduates in urban areas. This makes the widespread adoption of computers across the different sectors of the economy very slow. So far only 10 percent of Egypt's computerization potential is estimated to have been achieved. The computer industry in Egypt comprises active PC-assembly operations that assemble kits imported from Southeast Asia, and an emerging software industry that has achieved some success particularly in Arabized software, generating exports to other Middle-Eastern countries as well as England, France, and Italy.

The Egyptian government has sought to create a demand for information services since the early 1980s to enhance the country's assimilation of computer technology. In 1983 the president issued a decree requiring all government and public-sector entities to establish computer centers within them. In 1985 the same decision was extended to also include public schools. The first locally produced PC compatibles were procured by the Ministry of Defense and manufactured by the state-owned Banha Electronics Company, one of the largest electronics companies in the Middle East. To further boost local demand for computers, customs duties on computers have been set at a relatively low 5 percent, which when added to a 10 percent sales tax, still maintains a fairly inexpensive price for imported as well as locally assembled PCs in Egypt. In 1992, government procurement accounted for 50 percent of mainframe computer sales, 40 percent of minicomputer sales, and 25 percent of personal computer sales.

The Cabinet IDSC also includes the Regional Information Technology and Software Engineering Center (RITSEC), which seeks to promote advanced software development practices in Egypt. The Cabinet IDSC is also responsible for implementing Egypt's first science and technology park, known as the Pyramids Technology Valley. Many foreign electronics companies have expressed an interest in participating in this complex. Other entities that have a stake in the local IT research and policy-making process include the Arab Republic of Egypt National Telecommunications Organization (ARENTO), the Supreme Council of Universities Foreign Relations Coordination Unit (FRCU), which manages the Egyptian Universities Network (EUN), the Central Agency for Public Mobilization and Statistics (CAPMAS), and the Academy for Scientific Research and Development.
In 1992, Egypt's computer hardware market was estimated to have been $195 million: mainframe computers accounted for $48 million, minicomputers for $100 million, and personal computers for $47 million. The total software market was estimated at $7.95 million, of which $7.43 million were due to imports and $0.53 million due to local production. Exports were estimated at $0.22 million. In 1994, Egypt's personal computer market increased to $61.8 million, and the total installed base was estimated at 194,300. The total software market grew to $33.5 million in revenues (a fourfold increase over 1992), of which $22.2 million was due to imports and $11.3 million due to local production. Exports were estimated at $3.8 million.

There are currently about three million telephone subscribers in Egypt, compared to the country's population of nearly 60 million. Significant advances in Egypt's telecommunications infrastructure have taken place in the past 15 years. Exchange capacity increased from 510,000 to 3,123,500 lines between 1981 and 1994. Despite the fact that the government regulates fax usage and imposes a tax on it, the number of installed fax machines rose from 374 to 25,000 between 1986 and 1994. International traffic also increased from 28 to 350 million minutes a year between 1981 and 1994. Full Internet services, including e-mail, gopher, and at least eight WWW servers, are available through the Foreign Relations Coordination Unit (FRCU) at Cairo University, the American University in Cairo, and the Cabinet IDSC. Egypt specialists, students abroad, and the expatriate community supply more online information from sites outside the country than is provided within Egypt, a common occurrence among countries with poor information distribution channels. Internet connectivity is via a 64 kbps leased line to Montpelier, France, but login is often difficult because of the small number of communications ports available in Egypt.