

Bounded Rationality and Sectoral Differences in Diffusion of National IT Policies

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Abstract: How do national IT policies disseminate in a country? Why would there be a differential awareness of policies among various economic-sectors? These are the two major research questions addressed in the study reported here. Simon's theory of bounded rationality is utilized to predict which sector will find which policy closest to their inherent interests. Individuals, it is argued, will generally bound their search and knowledge-building by these pre-defined policy sets. The authors use quantitative and qualitative techniques to assess sectoral differences in the diffusion of national IT policies in Egypt by gauging the awareness of IT policies by key decision makers within each major economic sector. Interviews with 33 policy-makers and private sector managers were the respondent base of data. Findings show a skewed distribution of awareness of national IT policy diffusion and that this distribution is related to sector-affiliation, as predicted.

Key words: C Information Technology, H Information Systems, AM Economic Theory, BC03 Public Policy, BA02 Economic Sector, Bounded Rationality

1 INTRODUCTION AND JUSTIFICATION

Each individual has access to a unique knowledge domain; this knowledge domain is determined by the information sources available –and those not available– in the context the individual is embedded in. These constrained knowledge domains impose limitations to the individual's

information processes, being one of the causes of bounded rationality (Lipman 1995). Bounded rationality refers to “choice that takes into account the cognitive limitations of the decision-maker –limitation of both knowledge and computational capacity” (Simon 1987).

Bounded rationality is known to affect the awareness of the various possibilities available to decision makers (Dekel, Lipman et al. 1998). Knowledge about the policies in place is necessary if the policies so established are to be effective in leveraging the nation’s economic, social, and cultural development.

By looking at sectoral differences in awareness of IT (information technology) and ICT (information and communications) policies, this paper adds clarity into the process of dissemination of these IT policies.

2 RESEARCH PROBLEM AND OBJECTIVES

The theory of bounded rationality suggests that decision makers within a specific sector are predisposed to have deeper knowledge of the IT policies that most heavily influence the sector to which they belong or the business or profession they perform. Said another way, the environment in which decision-makers dwell is defined by the economic sector that they belong to –amongst other factors. This environment is predicted to influence which aspects of national IT policies these decision makers will be interested in and thus seek to be knowledgeable about. Likewise, they are less likely to be aware of the policies that have little or nothing to do with the sector to which they belong.

By examining sectoral influences on the diffusion of national IT policies in the Middle Eastern country Egypt, we posit that the economic sector to which a decision maker belongs influences the awareness of decision makers about national IT policies. In keeping with bounded rationality, we predict that government officials will be more aware of policies than non-governmental officials. Moreover, both will be more aware than private sector officials.

3 RESEARCH SETTING, DESIGN AND METHODS

Using a field study technique with multiple key informant interviews, the current study examines these sectoral differences through diffusion of

national IT policies in Egypt. Awareness of IT policies by key decision makers within each economic sector is used as the measure of IT diffusion. We define *awareness* as the ability of a person to remember actual policies when asked about their understanding of specific IT policies. The data used in this study was gathered in an on-going project on the impacts of culture on Information Technology Transfer (ITT).

3.1 Arab Policy and IT (APIT) - Arab Culture and IT (ACIT)

The study is part of a long term, multi-method program of research. Among the objectives of the study is a desire "to examine the effectiveness of national IT policy on ITT" (Loch, Nelson et al. 2001). Prior work explored the effect of culture-specific beliefs and values and Technological Culturation on ITT/ICT Outcomes (Hill, Loch et al. 1998, Loch, Straub et al. 2000, Straub, Loch et al. 2001, Straub, Loch et al. 2002). The data gathering process in these early stages included: focus groups and a pilot study; a field study in Jordan; extensive data collection via surveys in Jordan, Lebanon, Egypt, Saudi Arabia, and the Sudan, exploratory interviews in Egypt.

Research now in progress extends the scope to include national IT policies and transfer implementation factors and is supported through a grant from the National Science Foundation (NSF) in the United States. In this paper, we report preliminary results from the first of four stages in the current project.

3.2 Data gathering and analysis

To address the research questions, high-level officials of governmental, non-governmental and private institutions in Egypt were interviewed. The interviews consisted of open-ended questions where the officials were asked about their knowledge of IT-related policies. A total of 33 interviews were conducted. The ensuing conversations were recorded and transcribed, followed by coding and content analysis. Content analysis aimed first at identifying the most salient government policies related to IT and later at determining the level of awareness of the policies.

All 33 interviews were analysed to single out all existing governmental initiatives regarding IT. Interviews that were in electronic form, 11 in total, were then coded for awareness about each policy. Subject-policy pairs were coded as either A or U, where 'A' means aware (if the subject mentions the

policy) and 'U' means unaware (if the subject doesn't mention the policy). Finally, subjects were classified into three categories according to the sector affiliation: governmental, non-governmental and private. Results of the cross-tabulations and other descriptive statistics are thus reported in group form.

4 RESULTS

4.1 Identification of IT Policies

Twelve salient policies (Table 1) emerged from the thirty-three interviews in Phase I. The twelve policies can be grouped into four broad categories:

- (1) Infrastructure development and technology transfer - policies 2, 5, 7, 8 and 9
- (2) Human resource development and capacity building -policies 3, 4, 10 and 12
- (3) Legislative framework policies which include – policy 1 and 11
- (4) Policies concerning culture preservation and heritage - policy 6.

Table 1: IT policies identified

Policy	Description
1 MCIT	In October of 1999, the Egyptian government created a separate Ministry of Communications and Information Technology. The purpose of this ministry is to encourage the growth of the telecommunications and IT industries in Egypt. The ministry is acting as an agent for change rather than as an enforcer of change.
2 Custom Duties	The Egyptian government reduced the tax on importation of computer hardware from 15% to 5% in 2000. This reduced the cost of a 2000LE PC to organizations, for example, by 200LE

Table 1: IT policies identified (continued)

Policy	Description
3 Computer Literacy	The Egyptian government is working with the private sector to greatly increase public awareness of computers, IT, and the Internet. Training programs underway at the present time have the goal of graduating 100,000 persons per year with heightened computer literacy. A more computer literate workforce is a goal of the program.
4 Professional IT Training	The Egyptian government is working with the private sector to significantly raise the number of skilled IT professionals, analysts, and programmers in Egypt. Companies involved are ICL and IBM. Presently, 5000 university graduates per year are being targeted for training in this "Professional Development Program." One goal is to make Egypt the software leader in the region by the year 2010.
5 E-commerce	The Egyptian government is encouraging e-commerce initiatives within the government itself, in part to stimulate the movement of the entire private sector to e-commerce. The United States Agency for International Development (USAID) has been supporting this initiative with large scale funding.
6 National Center for the Documentation of Egypt's Cultural and Natural Heritage	The Egyptian government is establishing a National Center for the Documentation of Egypt's Cultural and Natural Heritage. With such accurate databases about many facets of Egyptian heritage, this project will encourage tourism and preserve knowledge about the national archeological treasures.
7 Privatization	The Egyptian government is privatizing the telecommunications industry in Egypt. Begun five years ago, this government policy initiative will lead to government minority ownership of the industry within another five years. The formation of MobiNile, ClickGSM, and EgyNet are all part of this privatization initiative. Made up of private and public sector members, the Telecomm Regulatory Authority (TRA) is a body being formed as part of the transition.

Table 1: IT policies identified (continued)

Policy	Description
8 Outsourcing	The Egyptian government is encouraging the development of an advanced Egyptian industry for communication and information technology by outsourcing government systems, networks, and applications to the private sector to a much larger extent.
9 Smart Villages	The Egyptian government is granting tax-free status to IT and high-tech firms that locate their operations in incubator cities or villages, known as "Smart Villages." One of these villages will be located near the pyramids. High speed Internet connections and other high-tech capabilities will be built by the private sector into these villages.
10 Certified Computer Network Engineers	The Egyptian government is working with the private sector to educate and make employable a large number of certified computer network engineers each year. Companies involved are Cisco, Lucent, and Microsoft.
11 Copyright	The Egyptian government is putting in place legislation to support e-commerce and a software industry within Egypt. Copyright laws as well as digital signature and digital certificate laws are part of this initiative.
12 Technology Clubs	The Egyptian government is working with the private sector to increase the knowledge and awareness of young people about computer systems and the Internet. Along with the Egyptian-sponsored "Future Generations Foundation," they have created Technology Clubs (formerly known as "21st Century Kids' Clubs") for local communities in order to offer computers and Internet access to young people. Training sessions on computer literacy and on certain computer applications like spreadsheets and word processing are also offered. Mrs. Suzanna Mubarak is a public spokesperson for these clubs.

4.2 Sectoral Comparisons of Policy Diffusion

We assessed awareness by the differential between aware and unaware officials (Table 2). Overall results are in keeping with our predictions.

Consistent with theory, government officials (+38) are more aware of policies than non-governmental officials (-4), who in turn are more aware than private sector officials (-10). Government officials show higher scores than the other two sectors in all four categories of policies.

What it is revealing are the scores for each particular group of policies. The awareness level of non-governmental officials over private sector officials is not common to all groups of policies. A comparison between the groups of policies show that private sector officials are more aware of those policies that relate to infrastructure development and technology transfer (0 vs. -2), whereas non-governmental officials are more aware of human resource development (0 vs. -4) and cultural and natural heritage (0 vs. -4). A closer look at the individual policies (Table 3) reveals that policies in the Infrastructure Development and Technology Transfer group are more likely to impact the private sector in the short run. On the other end, Human Resource Development and Capacity Building and Cultural and National Heritage are groups of policies that are generally closer to the interests of non-governmental organizations. These results are also consistent with our propositions.

Table 2: Differential awareness across sector-policy groups

Policy Group	Government	Non-Government Organizations	Private
Infrastructure development and technology transfer	+11	-2	0
Human resource development and capacity building	+20	0	-4
Legislative framework	+10	-2	-2
Culture preservation and heritage	-3	0	-4
<i>Grand Total</i>	<i>+38</i>	<i>-4</i>	<i>-10</i>

Raw results are also presented in Table 3. The table shows the number of subjects within each group that were aware and unaware of the policies. The results are presented in graphical form in Figure 1. Each bar represents a sector-policy. Aware and unaware subjects are indicated in different colors. Policies (both in Table 3 and Figure 1) are sorted according the categories indicated above.

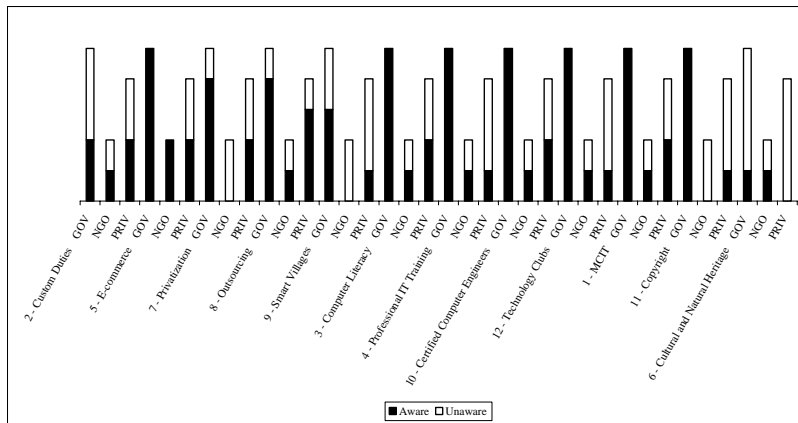
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Table 3: Raw results on policy awareness across sectors

Policy Group	Policy	Sector							
		Gov.		NGO		Priv.		Total	
		A	U	A	U	A	U	A	U
Infrastructure development and technology transfer	2 - Custom Duties	2	3	1	1	2	2	5	6
	5 - E-commerce	5	0	2	0	2	2	9	2
	7 - Privatization	4	1	0	2	2	2	6	5
	8 - Outsourcing	4	1	1	1	3	1	8	3
	9 - Smart Villages	3	2	0	2	1	3	4	7
	Total	18	7	4	6	10	10	32	23
Human resource development and capacity building	3 - Computer Literacy	5	0	1	1	2	2	8	3
	4 - Professional IT Training	5	0	1	1	1	3	7	4
	10 - Certified Computer Network Engineers	5	0	1	1	2	2	8	3
	12 - Technology Clubs	5	0	1	1	1	3	7	4
	Total	20	0	4	4	6	10	30	14
Legislative framework	1 - MCIT	5	0	1	1	2	2	8	3
	11 - Copyright	5	0	0	2	1	3	6	5
	Total	10	0	1	3	3	5	14	8
Culture preservation and heritage	6 - Cultural and Natural Heritage	1	4	1	1	0	4	2	9
Grand Total		49	11	10	14	19	29	78	54

A: Aware, U: Unaware

Figure 1: Awareness of IT policies by sector



5 CONCLUSIONS AND IMPLICATIONS OF THE STUDY

The analysis offered in this paper uses a mixed quantitative-qualitative approach to assessing the diffusion of IT policies within a given context. The coding of which sectors were aware of which type of policy was relatively straight-forward and uncontentious, but the assignment of “sector interest” was highly interpretive and the result of years of intense research in Arab countries such as Egypt.

6 FUTURE RESEARCH

6.1 Future Steps in the Project

The next step in the current project is twofold. On one hand, we will at some point be employing rigorous statistical techniques to assess our predictions. In order to do this, the undergoing data collection includes quantitative measures of awareness (Checchi, Sevcik et al. 2002).

On the other hand, we will expand the scope at both sector and managerial levels. The undergoing data collection include a greater level of detail about sector membership as well as subjects at different levels in the decision making process (Checchi, Sevcik et al. 2002).

6.2 Future Research

Other directions for future research are to identify the mechanisms by which policies disseminate, particularly whether IT policies have different diffusion mechanisms than other national policies. These research directions are implied in the current project, but not explicitly defined. Other researchers may want to explore this in greater detail.

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