

*The Utilization of ICT in Small and Medium Size Enterprises in Egypt*  
*A Research In Progress Paper*

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**Abstract**

This is a multiphase joint research, development and implementation project in support of Egyptian efforts in adopting Information and Communication Technologies (ICT) in Small and Medium size Enterprises (SME) in order to prepare for the new challenges of the millennium. GATT, WTO, ISO9000 and electronic commerce present SME in developing nations with challenges that affect their survivability. The project aims to measure the current ICT adoption, and to identify factors that affect the process in SME in Egypt. This will be followed by a second phase to develop and test two tools; a tool for Egyptian enterprises to implement information technology in the area of external communication (e.g., Internet) to benefit from a world that is growing smaller, and a tool for small and medium size enterprises to develop and implement information technology to meet the managerial needs in monitoring and controlling organizations.

An objective of this presentation is to solicit input from the various participants regarding the structure and scope of the ICT questionnaire. This international review should assist in the development of a widely used questionnaire that will allow for future comparison between different countries.

**Keywords:** *ICT, IS in SME, IS in Organizational Enhancement, IT Adoption, IT in Developing Countries.*

**Overview**

Several forces are creating new realities in developing countries. The General Agreement on Trade and Tariffs (GATT) and the World Trade Organization (WTO) are changing the competitive environment for local industries by allowing foreign firms to compete more economically. ISO 9000 and related standards are often used as pre-selection criteria of suppliers, hence creating new barriers to entry. Information and Communication Technologies (ICT) increase productivity, quality and reach of organizations. For example, information technology is an essential element in successful

ISO 9000 certification. Electronic commerce and E-Business are creating new tools for business to compete locally as well as globally.

This multiphase joint research, development and implementation project supports the Egyptian effort in adopting ICT technology in small and medium size enterprises in order to prepare for the new challenges of the millennium. It aims to (1) identify the status of ICT in Egypt and (2) develop and test two tools- a tool for Egyptian enterprises to implement information technology in the area of external communication (e.g., Internet) to benefit from a world that is growing smaller, and a tool for small and medium size enterprises to develop and implement information technology to meet the managerial needs in monitoring and controlling organizations.

The paper is organized into the following sections; background identifying the problems; proposed research followed by project description and benefits.

## **Background**

### **Changes in the world**

#### **GATT and WTO**

Developing countries have used tariffs, customs and import duties as tools to encourage and protect local industries. GATT and its successor WTO are reforming trade policies and limiting their use as protectionist tools. Some argue that liberal trade measures recommended by GATT & WTO will have a profound negative impact on local industries and manufacturers leading to their demise, while others argue the opposite (Yusuf 2003). The U.S. Treasury Secretary Lawrence H. Summers in a speech to the United Nations Economic and Social Council in New York on July 5, 2000 stated “In the postwar period, multilateral trade liberalization through the GATT and other mechanisms has brought enormous global benefits. But while the rhetoric would suggest otherwise, the most valuable part of the process for any country has not been the concessions they receive from others, but the concessions that they grant themselves: the opening of their own economies to the competition, goods and ideas that integration affords. While other factors have certainly played a role, domestic protectionism and discouragement of exports bear a large share of the blame for the decline in sub-Saharan Africa's global trade share since 1970 - a decline that has represented an annual loss of income of more than 20 percent of regional GDP” (Ellyn 2000).

#### **ISO 9000 Family**

GATT and WTO represent one aspect of the issue; another is the use of Information & Communication Technology. ICT is increasing in importance because of the change in trade conditions, and because of the increase of the power and expectations of the customers. It is common to find new demands being forced on suppliers and organizations. Efforts to increase productivity and improve customer service have resulted in several standards such as ISO 9000 family. Companies often require that their

suppliers be “ISO 9000” certified. Small and medium size enterprises in developing nations often find it difficult to implement the Standard in organization without the needed IT foundation and infrastructure. As such ISO 9000 often represent barrier to entry and expansion of the market, thus limiting the growth potential of the organization.

The adoption of ISO 9000 or similar standards necessitates the proper use of information technology as a management tool, as well as the redesign of business processes to comply with the new demands. Such a step will give complying small and medium size enterprises major competitive advantages over those who don't have the certificate. The organizations will have two distinct sets of advantages- one as exporters and another as local manufacturer. As exporters, it will reduce the size of competition and increase the size of the potential market. As local producers, the standard should improve both the quality and productivity of the organizations.

### **Electronic Commerce and E-Business**

The Internet is causing the world to grow closer, and adding legitimacy and accuracy of the term global village. Many of our students are active members of the Internet communities that extend across continents, and few of them are paying their way through school by having Internet based businesses that often cross national borders. The same is true in the business world. The potential market of Internet based organizations is the world. For example, colleagues in Egypt and other countries use Amazon.com as their bookstore.

However, successful e-business requires organizational changes that differ greatly from existing management and business practices. The new trade policies and the Internet are combined to create new and different business environment. Small and medium size enterprises have to compete, in their own local market, with organizations located in other countries. At the same time, has to compete in the global market. These objectives can't be achieved without the proper use of ICT to increase quality, productivity and effectiveness.

### **Information Communication Technology can Help**

ICT is a recognized tool that presents organizations with the needed flexibility and ability to meet the new challenges. ICT technology is an essential element in the management of organizations in developing countries. Expenditure on IT continues to increase by double digits rates. Recent support for the benefits of IT utilization was expressed by Dr. Alan Greenspan, the chairman of the U.S. Federal Reserve Board. In a recent statement he credited the use of IT as an important factor in improving the productivity of American industry, and in the ability of the American economy to maintain high rate of growth in productivity and low unemployment with an acceptable inflation rate. In addition to being responsible for the increase in productivity in the US, ICT is responsible for the major portion of the difference between the GDP growth in US over the euro zone big three (Germany, France and Italy) (The Economist Intelligence Unit 2004)

However, increased expenditure in ICT is not sufficient. There are several factors that must be addressed. These include governmental factors such as using trade to promote development (Yusuf 2003), and regulatory environment (Zhu 2004) to organizational factors including technology readiness, size of organization, financial resources and increased use of the technology to increase the size of the market and improve the competitiveness of organizations.

In order for SME in developing countries to meet the new demands, governmental support is essential. For example, Taiwan has recognized the benefits of ICT and the Internet, and the government supports the development of an enterprise catalog on a CD and online so that organizations from different countries may have access to information on Taiwanese firms. India is another example for the government has supported technology and liberal trade policies.

### **Proposed Research**

This research proposal has a long term objective of investigating how to introduce and support the utilization of information technology in small and medium size enterprises in Egypt. The research investigates two issues:

- The adoption and implementation of ICT to support external communication. For example, (1) the utilization of ICT as a means of communication with other organizations locally and globally, (2) the use of Internet to locate additional contracts, and to expand the enterprise's market.
- The adoption and implementation of ICT to support internal organizational processes. This approach should support the implementation of ISO 9000 (i.e., the use of ICT as a managerial tool) as well as increase the productivity of the enterprise (the use of ICT as a manufacturing tool).

During our investigation of the prospect of building an e-commerce site in Egypt it became clear that there is no shortage of required technical talent. However, there is a shortage in infrastructure both to support technology e.g., communication bandwidth, and to present the required supporting activities such as ground shipping or credit card utilization. For this reason we feel that early efforts should concentrate on using the Internet and IT as a communication medium, while allowing supporting infrastructure to develop.

In order to achieve these objectives, it is important to determine the stage of ICT utilization in Egypt. Information technology starts as a means of storing data (Transaction Processing Systems), that evolve into systems that assist in monitoring and controlling organizations (MIS), thus improving managerial decision making, increasing organizational flexibility while rising efficiency and effectiveness. Similarly communication and e-business evolve in stages such as web site development; e-commerce, then e-business. Finally, the Internet is often used as a business

communication tool in different formats; to search for information; to publish information on the organization; and to conduct business transactions.

### **Status of Current Utilization of IT in Egypt**

There are few published studies on the use of IT in small and medium size enterprises in Egypt. Most suggest very limited use of ICT in SME and a very small level of penetration (Bradshaw 2001). Anecdotal evidence leads to reach the same conclusion. The evidence, collected by two of the researchers during several visits to Egypt including a three months consulting assignment in Egypt, suggested that computers were used as storage devices as opposed to management tools to increase the efficiency and effectiveness of organizations. During several discussions with one of the largest management and software development consulting firms, it became clear that most of the systems were developed to generate accounting statements for financial reporting, and that few companies had asked for a true "MIS" system. At the same time, most of the small and medium size enterprises that the researchers visited did not utilize a computer. Those that did, used it as a storage device. Even in some large organizations such as banks the use of IT is was limited. For example, bank tellers are were utilizing manual book keeping procedures while conducting normal banking transactions (e.g., check cashing or accepting deposits) instead of a computerized management information system. When cashing a check during early 2000, the bank teller, who had a pc computer on his desk, checked the balance using a manual register, deducted the check amount manually and marked the page using a post-it note.

In 1998 the Middle East exports to Western Europe and North America were close to 56% of its total exports (WTO 2000). As such potential changes requiring ISO 9000 and similar standards will have drastic effects on those organizations that don't qualify. Egyptian businessmen have recognized this issue. For example, during several meetings conducted in Egypt several participants expressed concerns that countries including the EU may substitute protectionist policies with a set of regulations that make companies in developing countries less able to compete such as requiring ISO 9000 from foreign companies prior to allowing them to conduct business. During one of these meetings a representative of a major fast food organization stated that his organization is considering demanding ISO 9000 certification from all of their suppliers.

### **Prior Research**

#### **IT Adoption**

Studies found a difference in IT adoption based on the size of organizations. In other words, IT adoption and utilization differ between small, medium and large organizations. Even when the size of organization is the same, IT adoption often depends on the type of systems, e.g., traditional IT supporting internal operations versus the inter-organizational dimension of the Internet (Mackay 2000). One of the researchers in the proposed study has identified factors for adoption of IT for internal operations in small organization and is currently involved in investigating the factors affecting organizational adoption and

impact of the Internet in small firms (Igbaria 1997, 2000). This research, however, concentrates on organizations in developed nations (i.e., New Zealand and Canada). Additional studies have suggested some similarities in the adoption model, but differences in cultural issues, laws and infrastructure (Dasgupta 1999).

The extension of research results across countries or hemispheres have been questioned. Al-Khaldi and Olusegun (1999) observed that results of a study on the relation between end-users attributes and PC utilization differed between a Canadian study and a similar one in Saudi Arabia. Therefore, this study opts to investigate the status in Egypt, while considering studies carried out in countries in the same developing phase with extreme care since additional differences in culture, laws, and infrastructure may have profound effects.

### **ICT in the Middle East and Egypt**

There are few studies that dealt with ICT adoption and utilization in the Middle East. Anderson (2000) stated that different countries in the Middle East adopted different approaches to technology development, and that national governments support IT in formats differing widely. Some leave it to the private sector, while others impose strict control to the extent of creating a national Internet connected to the Internet through a firewall that sifts and filters the information.

Though there is a realization in some Middle Eastern countries of the importance of Internet and electronic commerce (Taylor 1999), their adoption is slow. Less than 1% of Egypt (.71%) are Internet users (Bradshaw 2001). Fandy [2000] stated that in 1999 there were 6 million phone lines, and 600,000 cellular phone lines. However, there were only 200,000 Internet accounts, which he suggests should be multiplied by a factor of 2 to 3 to allow for multiple users per account. Statistics on the number of business with Internet connection and or sites are scarce. However what is troublesome is that most of these users and PC owners are private individuals and not companies. This suggests that IT penetration is limited and can be improved. Jalloul [1999] studied computing in Lebanon. He stated that "Almost all the computer action is in Beirut and Mount Lebanon and that the number of Internet users are around 30,000. In other words, less than 25% of the country territory and less than 10% of the population utilizes the Internet. Similar inequalities in Egypt are expected.

### **Project Description**

#### **Phase I:**

The first phase of the research will concentrate on developing a research survey instrument, conducting a pilot study and collecting the research data.

A number of interviews with personnel from different areas (CEO's, software/management consulting organizations) will be conducted in two separate periods. The first period will concentrate on identifying potential items to be included in the survey.

The second period will follow the data collection and analysis and is expected to elaborate and validate research findings. It is expected that phase I will take 9-12 months.

Another objective of the research is to define Small and Medium Size Enterprises and their IT utilization. Though there are several definitions of the terms small and medium, these definitions are often borrowed from other countries with no regards to the Egyptian environment. The initial work will develop a definition based on the volume of sales and number of employees. Additionally, anecdotal evidence suggests small and sometime medium size enterprises don't have a formal MIS department; IT and its implementation is the responsibility of the owner or a high level executive. This research will measure IT utilization in SME through the use of survey.

### **Proposed Questionnaire**

A questionnaire has been developed to collect the appropriate data. It is built on available research surveys similar to Mackay (2000), the World Bank, and the United Nations. These surveys were combined and additional dimensions were added in order to meet the unique characteristics of Egypt and of this research while at the same time allow for the comparison across countries.

The survey<sup>1</sup> concentrates on answering the following questions:

- What is the Egyptian definition of small and medium size enterprises?
- What is the existing ICT implementation in small and medium size enterprises?
- How is ICT being implemented in small and medium size enterprises?
- What is the perception of Egyptian top management of SME of the importance of ICT?
- What factors would encourage the adoption of IT in Small and Medium size enterprises? List of factors influencing IT adoption in SME, in internal operation and external communication.
- How to approach adoption of IT in SME? What are characteristics of the approach that will facilitate IT adoption?
- What is the availability of the required infrastructure including computers, telecommunication, educations, and governmental regulations?

Existing survey questionnaires concentrate on measuring the constituents of the information society and the availability of infrastructure (e.g. World Bank survey). The survey in this research adds a third dimension to measure the utilization of ICT (see figure 1).

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<sup>1</sup> Since the survey is conducted as part of a much larger study conducted by the Agency for Public Mobilization and Statistics, additional elements are included. This section concentrates on the issues discussed in the paper.

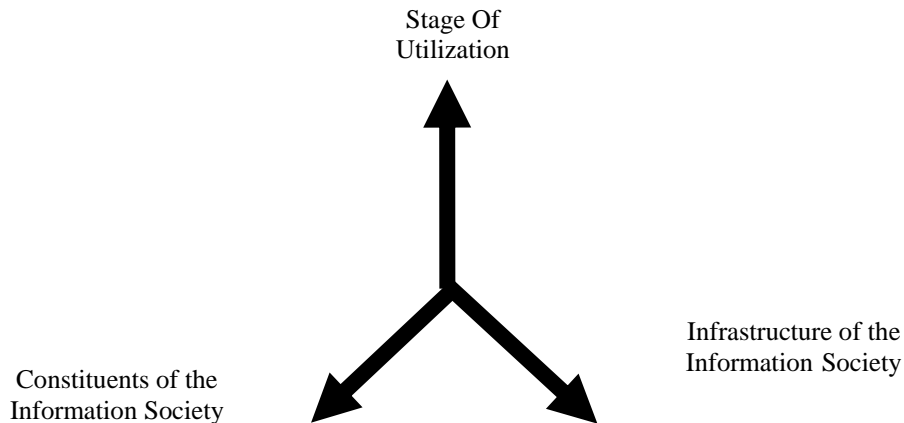


Figure 1. Dimensions of the Information Society

The third dimension must be added in order to successfully measure the ICT status in a country. Hence the survey includes:

- The Constituents of Information Society
  - Enterprises (Governmental and Business entities)
  - Educational Entities
  - Individuals and Families

For each of these entities a set of questions that deal with size, location, and other factors (industry and type of organization)

- The Infrastructure of Information Society
  - Communication tools such as phone lines
  - Computers
  - Software Application
- The Stage of ICT utilization (for each constituents, the following list is limited to ICT utilizations in organizations).
  - Use of Computers in Management
  - Use of Computers in Manufacturing
  - Use of Internet
    - As a communication tool (e-mail)
    - As a tool to conduct business transactions (collaboration with Internal organization members or with outside organization)
    - As a tool to search for information
    - Others

The questions regarding the stage of ICT utilization were developed using a number of academic models including Nolan's IT adoption model and King's Strategic Information Systems planning model. Appendix A includes a more detailed set of questions that will be included in the survey.

## **Sample and other research issues**

The sample size, selection and data gathering techniques will be determined with the cooperation of the Egyptian Central Agency for Public Mobilization and Statistics. A high return rate is expected due to the support expressed by Egyptian business and academic entities. A pilot study will be conducted using organizations in one of the industrial complexes that have an active management and business association. Once the initial phase of the project is completed, the research will measure the validity and reliability of the questionnaire and the ability to extend the results to other industries in Egypt. Univariate and Multivariate statistical analysis techniques will be used to develop and analyze the survey results.

## **Phase II**

The research will address appropriate approaches for ICT implementation in SME. It is expected that the approaches will include:

- The establishment of a program to support small and medium size business in introducing and implementing ICT in the organization to support managerial activities.
- The development of training for upper management to facilitate acceptance and increase importance of ICT utilization.
- The development of assistance Certification programs for ISO 9000 or similar standards.

It is important to determine which form(s) of support is best suited for the environment. This includes the forms of support that should be sponsored by appropriate governmental agencies and the forms that should be sponsored by private and/or not-for-profit organizations? The following issues will be investigated:

- What are the strategies and resources needed to promote the internal and external utilization of ICT and Internet in SME?
- What resources are needed and how should they be applied in order to develop an ISO 9000 compliance program?
- What can appropriate government agencies do in order to assist small and medium size organizations? For example, could agencies establish a web site for Egyptian small and medium size enterprises to advertise their products (e.g., catalog) and agencies establish of a web site to assist Egyptian enterprises in finding new markets (e.g., locating bids and auctions).

## **Benefits**

As stated previously, some researchers argue that GATT, WTO and similar measures threaten the survivability of small and medium size enterprises. The same concerns were expressed during the WTO meeting in Seattle, Washington. These concerns are not limited only to developing nations. The TV manufacturing industry in the U.S.

disappeared due to foreign competition. At the same time the steel and auto industries in the U.S. are examples of industries that were unable to compete with foreign firms for a period of time, then used information technology to return to profitability and competitiveness. In other words, ICT can assist in turning these concerns into opportunities.

This research project attempts to assist small and medium size enterprises in Egypt in implementing ICT. The first phase of the project concentrates on defining the environment and identifying specific factors that affect the utilization of IT in small and medium size enterprises. During the second phase we will develop tools that may be used by small and medium size enterprises to utilize IT in an effective and efficient manner. The benefit of IT can't be understated. The effects of GATT, WTO, ISO 9000 can't and should not be minimized.

The successful implementation of IT in an organization often requires several small steps and a deep understanding of numerous organizational factors. Efforts attempting to institute ambitious changes often fail as seen by the high failure rate (estimated at 75% and more (Turban 2000)) of Business Process Reengineering (BPR) as well as Enterprise Resource and Planning (ERP) implementations. This proposal achieves these objectives by first studying the Egyptian environment, and then develops tools that achieve specific and well-defined objectives.

The benefits of the research project extend to both Egyptian private sector and Egyptian industry as a whole. The tools developed by the project will be offered to the small and medium enterprises. These organizations often represent the backbone of the economic welfare of the nation and are considered the economic engine leading to improved conditions in Egypt. From a technical perspective, the knowledge gained from this research may be extended to large size enterprises in Egypt, and considered when investigating similar issues in other nations.

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## **Appendix A: Questionnaire**

There are several dimensions that must be included in order to successfully measure the ICT status in a country. These include:

- **The Constituents of Information Society**
  - Enterprises (Governmental and Business entities)
  - Educational Entities
  - Families

For each of these entities a set of questions that deal with size, location, and other factors (industry and type of organization)

- **The Infrastructure of Information Society**
  - Communication tools such as phone lines
  - Computers
  - Software Application
- **The Stage of ICT utilization and Expenditure**
  - Use of Computers in Management
  - Use of Computers in Manufacturing
  - Use of Computers in Education
  - Teaching Computers
  - Use of Internet
    - As a communication tool
    - As a tool to conduct business transactions (collaboration with internal organization members or with outside organization)
    - As a tool to search for information
    - Others

## **Organizations**

### **General**

- Industry
- Location
- Ownership (form of organization)
- Governmental Agency
- Semi-Governmental Organization
- Private Sector (Publicly traded)
- Private Sector (non Publicly traded)
- Others
- Status of ISO 9000 Certification
- **Size of Organization**
  - Volume of Revenues (in Egyptian Pounds)
  - Number of Employees
- **Investment in ICT (in Egyptian Pounds)**
  - Investment in Communication
  - Investment in Computers
  - Investment in Software (business applications)
  - Investment in Software (manufacturing applications)
- **Communications**
  - Number of Phone lines (land line) in the enterprise
  - Average monthly cost per land line
  - Number of Cellular Phones in the enterprise
  - Average monthly cost per cellular phone
  - Number and Types of Broadband (DSL or Cable) lines
  - Capacity of each Broadband line

- Upload
- Download
- **Computers**
  - Number of computers
  - Type of Computers
  - Operating System
  - Networks (LAN, Intranet, and Extranet)
- **Software Applications in the Organizations**
  - **Office tools**
    - Word processors
    - Spread Sheet
    - Database (personal)
  - **Organization Level (managerial tasks)**
    - Database
    - Data warehouse
    - Accounting applications
    - Inventory Systems
    - POS (Point of Sale Systems)
    - Others (e.g., payroll)
  - **Organizational Level (Manufacturing / Engineering Tasks)**
    - Quality Control Programs
    - Manufacturing (Numerical control)
    - CAD / CAM
- **Utilization of Computers**
  - As a Management Tool
  - To store financial data and create accounting reports
  - To monitor and control the organization including quality and performance program
  - As a decision support tool
  - As an Engineering Tool
  - In the manufacturing process
  - As a quality control tool
  - Internet
    - Does the enterprise have Internet Connections
    - Type of Internet Connections (Modem, Broadband)
    - How is the Internet used by the organization?
      - Search for information
      - Conducting business transactions (with outside entities)
    - Does the enterprise have a web site?
    - Number of e-mail addresses per organization
    - Is the web site used to conduct business transactions
      - Active (shopping cart)
      - Passive (catalog)