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COMPUTERS FOR INDUSTRIAL MANAGEMENT IN EGYPT

BY

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DATE : 28/2/90

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1. INTRODUCTION

1. INTRODUCTION

1.1 Purpose & Objectives

This study is carried out according to the contract between the consultant and UNDIO. The objective of the study, as stated in the terms of reference, is to give a general view about using computers for industrial management in Egypt. The study is divided into two main sections :

- Present use of computers for industrial management
 - The Egyptian industry.
 - Computer applications for industrial management.
 - Computer companies and brands.
 - Main types of software.
 - Computer training in general.

- Prospects for expansion and main obstacles
 - Trends in computer use for industrial management.
 - Computer market in Egypt.
 - Environmental conditions.
 - Telecommunications in Egypt.

1.2 Scope & Limitations

As stated in the terms of reference, a full survey of manufacturing establishments is beyond the scope of this study. The consultant is going to use the available published statistics. However, this study does not include any confidential information such as armed forces, ministry of interior, or ministry of foreign affairs.

1.3 Data Sources

Two main sources of data are used in this study :

- The Statistic of Computers In Egypt " Part One ", published by Central Agency for Public Mobilization and Statistics (CAPMASS).

This statistic is published in 1987 and covers all computer activities in general organizations and public sector companies only till 31/12/86.

- A field survey by Wafai and Associates (W&A). The survey is based on a sample of 3,500 interviews representing private sector companies and individuals in Egypt. It was conducted during the spring and summer of 1988.

Information extracted from the statistic and survey was confirmed by some interviews with computer professionals.

However, the analysis of the findings in this paper depends mainly on the consultant personal judgment in addition to statistics and data collected.

2. PRESENT USE OF COMPUTERS FOR INDUSTRIAL MANAGEMENT

2. PRESENT USE OF COMPUTERS FOR INDUSTRIAL MANAGEMENT

2.1 The Egyptian Industry

Industrial organizations in Egypt can be classified into two groups as follows :

- Industrial type,

Food,

Chemicals,

Metals,

Engineering,

Petroleum,

Construction,

Wood,

Leather, and

Garment industries, etc..

- Industrial sector?

Public sector,

Investment or joint venture, and

Private sector organizations.

As we are going to describe later, this classification will be helpful in our analysis of the use of computer applications, and distribution of computers in the Egyptian industry.

2.2 Computer Applications For Industrial Management

The major applications used for the industrial organizations, ranked according to no of users, are as follows :

- Payroll and personnel systems.
- Stock control systems.
- Sales order processing & accounts receivables systems.
- Purchasing & accounts payables systems.
- General ledger and costing systems.
- Production planning and controlling systems.
- Maintenance management systems.
- Computer aided design.

We are going, in this section, to describe in some details the characteristics of each application related to the Egyptian industry.

This will include the following points :

- The estimated percentage of companies using each application to the total companies using computers.
- Type of process applied, i.e. batch processing versus online processing (typically front - office).
- Language used, i.e. Arabic, English, or Arabic/English bilingual.
- Type of application, i.e. imported, local readymade, or tailored which include short analysis as well.

- Classification of organizations using service bureau or own computers.
- Other special characteristics related to implementing each application in the Egyptian industrial environment.

- Payroll and personnel systems

- Around 56% of computer user organizations of all sectors are using payroll and personnel systems (W&A survey).
- Batch processing is the common type of the payroll programs.
- Arabic is almost the only language used.
- Payroll is a typical tailored made application since there are different rules for taxes and social security. Some of these rules differ from one sector to another. On the other hand, these rules have been changed several times during last few years and could be changed later.

Each organization has its own incentive system which is almost based on production and differ from one industrial type to another.

- Industrial organizations using the payroll and personnel systems can be classified as follows :-
 - Organizations using service bureau (some public sector organizations).
 - Organizations using their own computers (joint venture, private sector, and other public sector organizations).

- Stock Control Systems

- Around 48% of computer user organizations of all sectors are using stock control systems, (W&A survey).
- While most of the public sector companies are using the stock control on batch processing, some private sector companies are applying the system online especially for finished goods at the outlet location.
- Arabic is the main language for stock control systems. However, some companies are using the English language, while others prefer to use Arabic/English bilingual programs. English language is sometimes essential for expressions and terminologies which can't be translated. Some companies prefer to use the same reference number or item code of the original manufacturer.
- The stock control is much more standard than the payroll, so that readymade local and foreign programs are used as well as tailored programs .

- Industrial organizations using the stock control systems can be classified as follows :

- Organizations using service bureau (few public sector organizations). This group of organizations is using the system for inventory control at the end of the period to control the cost of inventory and stock on hand instead of following up day to day operations. Results are always late, so the systems are used for comparison with manual results and for historical analysis.
- Organizations using their own computers (joint venture and private sector companies and other public sector companies).

- Sales order processing & accounts receivables

- One of the most important applications for all industrial sectors and levels to control the company debit values and cash.
- Around 40% of computer user organizations, from all sectors, are using sales order processing and receivables systems.
- Joint venture and private sector companies are using this application more than public sector companies.
- Arabic is the main language for sales, order processing, invoicing and accounts receivables. English language and bilingual is essential in the case of joint venture and foreign companies.
- Local readymade and imported software as well as tailored programs are used for different industrial sectors.
- Industrial organizations using this system can be classified as follows :
 - Organizations using service bureau, (few public sector organizations). This group of organizations is using the accounts receivable subfunction for accounting and auditing purpose only.

- The second group of companies is using the system on their own computers as batch processing function with more interaction than the first group but still typically back office.
- The third group is using the system online to control day to day, sales order, produce invoices, as follow up customer accounts interactively.
- Some companies are using integrated systems linking stock control, sales order processing, invoicing, accounts receivables and general ledger systems.

- Purchasing & Accounts Payables

- Purchasing and accounts payables systems are not as important as stock control and sales systems for industrial organizations.
- Around 31% of computer user organizations, from all sectors, are using purchasing and accounts payables systems (W&A survey).
- Foreign purchasing and letter of credits are another subsystems which are used by some industrial organizations.
- While Arabic is the main language for these systems, English language and bilingual are essential in the case of foreign purchasing systems specially for joint venture companies.
- Local readymade and imported software as well as tailored programs are used for different industrial sectors.
- The majority of purchasing and accounts payables users depend on their own computers to implement these systems, but very few of them still using service bureau.
- Purchasing and accounts payables systems are typical batch processing type of systems.
- Some companies are using integrated systems and accounts payables as one of four main functions (general ledger - accounts receivables - accounts payables - stock control) which link stock with financial transactions.

- General Ledger & Costing Systems

- One of the most standard systems since the public sector organizations are using what is known as "The Unified Accounting System (UAS)".
This system is considered very good base for coding the chart of accounts into typical tree structure. Cost centers are indentified as well in the chart of account. While public sector organizations are obliged to use the UAS, joint venture and private sector organizations are not.
- Over 30% of computer user organizations, from all sectors, are using the general ledger and costing systems.
- Arabic, English, and bilingual languages are used for local and foreign companies, but Arabic still the predominating language in these systems.
- Local readymade and imported software packages are used more than tailored accounting programs.
- Some companies are using online interactive accounting packages effeciently and successfully while others still using the batch processing whether on their own computers or at service bureau.
- Some companies are using the general ledger systems within the integrated managment information system.

- Production Planning & Controlling Systems

- Production planning and controlling is the top of the line of the management information systems for industrial organizations. The system includes the important production functions such as stock control, bill of material, scheduling, material requirement planning and costing. These functions are, ideally, integrated all together to serve the production planning and controlling functions.
- Two comprehensive software packages are predominating the Egyptian industry.
 - 1 - Online Manufacturing Control (OMAC); from ICL.
 - 2 - Manufacturing Accounting Production Information Control systems (MAPICS); from IBM.

Both packages have most of the important features such as, modularity, online and batch systems, locally customized and they are Arabic / English bilingual as well.

- OMAC, which is owned and supported by ICL, was leading till two years ago when IBM assigned agencies in Egypt to take care of customization, Arabization, and implementation of MAPICS.
- Most OMAC users are public sector companies while MAPICS is penetrating the private sector companies.

- In addition to these two standard software packages, other independent tailored applications have been developed and used to carry out separate functions within factories and companies. Most of those programs are Personal Computer based applications which run online at the function location.

- Maintenance Management Systems

- Maintenance management is one of the most important systems for advanced management systems where management are matured and has the feeling of the problem areas.
- The maintenance management system include functions such as, inventory control of spare parts, purchase requests, equipment tracking, preventive maintenance, work order tracking and costing.
- There is only one local made comprehensive package CMMS from Compact Computer Systems INC. This package is online and batch processing with Arabic and English versions and still in the implementation phase is some manufacturing companies.
- Other than this package, some other independent tailored applications are used for preventive maintenance, inventory control of spare parts, and equipment data base file handling.

- Computer Aided Design (CAD)

- Computer aided design is a typical engineering and manufacturing application which has not yet efficiently used in the Egyptian industry.
- PC based software, Autocad is the predominant software package in Egypt. Autocad is almost used in architecture design other than manufacturing. On the other hand, most CAD users are using Autocad for graphic without taking advantage of the analysis part of the system.

- Summary

Based on W&A survey, consultant personal judgement, and opinion of other experts, around 56% of users are using payroll applications, 48% are using stock control systems, 40% are using sales order processing and accounts receivables systems, 31% are using purchasing and accounts payables systems, and 30% are using general ledger systems. Few are using integrated production planning and controlling, maintenance management systems, and computer aided design software.

- Arabic is the most predominant language for computer users and applications in Egypt. A lot of computers and software packages have been Arabized to meet the market requirements. English software is still used by foreign companies. Arabic / English bilingual software is solving a lot of problems and widely used by different levels of organizations especially joint venture companies; where both languages are essential.
- Most public sector industrial organizations are applying batch processing systems, while some of them still using service bureau to run applications such as payroll and stock control systems.

Other public sector organizations are using their own computers to run separate or integrated types of applications such as integrated financial systems and production planning and controlling systems. Some of these applications are used either interactive online or batch types.

- Industrial organizations are moving toward applying integrated online interactive production systems. OMAC and MAPICS are the only competitive standard software packages. The two packages are customized and Arabized to suit the local environment.
- It is premature to say that CAD systems are considered workable solution for industrial management in Egypt. However, different universities, institutions, and software houses are going to use the CAD systems especially on personal computer level.

2.3 Computer Companies and Brands In Egypt

According to W&A survey and latest update of computer user magazine directory (Feb. 1990), there are around 300 agents, dealers, and distributors working in Egypt.

CAPMASS 1986 computer statistic shows that there are 50 computer brands installed in government, general organizations, and public sector companies in Egypt. The computer business in Egypt have been increased during the last few years which attracted new computer agencies and brands. As for 1990, there is no exact figure about the number of computer brands in Egypt. The estimated brands used in Egypt are around 100 brands; out of them 15 exist in the area of mainframe and mini and 85 in the area of personal computers.

In the area of mainframe and mini computers, three brands predominate the market :

IBM , IBM world trade corporation.

ICL , ICL computer system.

NCR , NCR Egypt Ltd.

According to 1986 CAPMASS statistics (table-1.), there are 44 mainframe and 115 minicomputers in the public sector organizations till Dec. 1986.

We are going to use this statistic to have an indication about the market share of the main computer brands. The market share of the main computer brands in this sector are as follows :

Mainframes	ICL 48% (21 systems).
	IBM 23% (15 systems).
	NCR 18% (8 systems).
Minicomputers	NCR 26% (30 systems).
	IBM 23% (26 systems).
	ICL 21% (24 systems).

The most usable model for each brand are :

ICL , Mainframes	1900 and 2900 series
	Minicomputers ME series
IBM , Mainframe	370 and 4300 series
	Minicomputers 36 and AS400 series
NCR , Mainframes	Century
	Tower

As mentioned before, this information is related only to public sector organizations and effective at the end of 1986. On the other hand, data about private sector and joint venture organizations are not available in confidential publications.

However, according to CAPMASS experts information, number of computers in public sector organizations in 1988 are 684 systems versus 270 system in 1986.

The increase is 414 system, i.e. around 150% in two years. This increase is mainly in personal computers other than mainframe and minicomputers.

In the area of microcomputers, IBM is the market leader, followed by IBM compatibles, and then comes Apple computers.

IBM compatible brands are many and cheap so they have a great market share and effect on the computer market. Examples of main computer compatible brands in Egypt are as follows :

- Tandy (USA)
- Zineth (USA)
- Compaq (USA)
- Micronet (Tywan)
- ACER (Tywan)
- Circle (Tywan)
- Amistrad (UK)
- Cordata (Koria)

(Table - 1)

(Distribution of computers by brands in government, organizations, and public sector, CAPMASS 1986)

Sector	Type	NCR	ICL	IBM	OTHERS	Total
GOVERNMENT ORGANIZATIONS	MAIN	-	2	1	2	5
	MINI	2	4	-	20	26
	MICRO	4	16	32	85	137
Total		6	22	33	107	168
GENERAL ORGANIZATIONS	MAIN	2	6	7	14	29
	MINI	18	4	-	87	109
	MICRO	2	8	67	177	254
Total		22	18	74	278	392
PUBLIC SECTOR	MAIN	8	21	15	-	44
	MINI	30	24	26	35	115
	MICRO	4	23	56	28	111
Total		42	68	97	63	270
ALL	MAIN	10	29	23	16	78
	MINI	50	32	26	142	250
	MICRO	10	47	155	290	502
Total		70	108	204	448	830

2.4 System Software Types

- Mainframe and Minicomputers Systems

- System software is directly related to computer brand.

Examples of main operating systems used are :

IBM operating systems MVS, DOS-VS, VM, etc.

ICL operating systems George series, and VME.

NCR is using UNIX operating system on Tower minicomputer.

- Microcomputers

- DOS is still used more than OS, XENIX, and other third party's operating systems such as MOS, (Multi operating system). Local area network such as D-link, IBM PC-NET, and Novell are used by different computer users. Novell is widely used and has a lot of distributors and better support than the others because it does not conflict with different Arabic applications.

High level languages such as BASIC, COBOL, PASCAL, and C as well as DBASE III + are used by software houses and developers to develop Arabic and English applications.

Software houses mainly use high level languages, while DBASE is used for developing in-house organizations applications.

LOTUS 123 is widely used by different levels of computer users for a wide range of applications.

Different Arabic utilities are also used; such as Aptec, IBM, Elmosaad, Fagr, Pyramids, and others. Aptec is the most popular and effecient Arabic utilities; followed by IBM Arabization.

Concerning word processing packages, English packages such as Wordstar and Displaywrite are commonly used as well as Arabic packages such as Arabstar, Arabword and Arabdisplaywrite.

- Apple computers , on the other hand, have their unique software such as desktop publisher, Apple design and graphic tools. Generally speaking Apple users are using most Apple interactive software library effectively.

2.5 Application Software Types

- Mainframe and Minicomputers Application Software

Although most applications are tailored upon customer requirements, some standard software packages are used in the industry such as :

- 1 - OMAC: A comprehensive online interactive production planning and controlling package which is customized and Arabized. Around 20 systems of this package are installed on ICL mainframe and minicomputers in industrial organizations.
- 2 - PROSPER: A comprehensive planning, controlling, and budgeting tool for different types of industrial organizations. This package is used on ICL mainframe and minicomputers.
- 3 - MAPICS: A manufacturing accounting production Information control system. It is comprehensive online interactive production planning and controlling package. Which customized and Arabized. Around 7 systems of this package are installed on IBM system 36 and AS400 in industrial organizations.

- Microcomputers Application Software

A wide range of tailored Arabic / English programs based on DOS operating systems have been developed. These programs are developed upon customer requirements and specifications to do specific functions such as stock control, invoicing, accounts receivables, accounts payables, general ledger, and some production as well as maintenance functions. Some tailored integrated systems have been developed as well to suit customer requirements.

In spite of the fact that these programs take long developing cycle, cost and effort, they proved to be the most suitable solution for most of the customers.

Concerning readymade packages, only few readymade packages have been developed and used in the market. Examples of the integrated commonly used as Arabic/English software packages are:

- Delta, Arabic / English accounting system.
- Alpha, Arabic / English accounting system.
- Compact, Arabic / English accounting system.
- Compact, Arabic / English maintenance management system.

2.6 Training of Computer Staff

Different types of training packages are available for computer staff in Egypt.

Information systems and computer is part of the undergraduate courses for different faculties such as engineering, commerce, and science. In addition, there are computer science sections at most faculties of engineering and science at Egyptian universities and the American university in Cairo (AUC).

On the other hand, higher degrees such as Diploma, MSc and PhD, in computer science or information systems are available at the same faculties as well as the statistical institute of Cairo university. Different training courses are offered by :

- Universities public service centers.
- Computer companies training centers such as ICL, IBM, NCR, and BALSAM.
- Large industrial organizations.
- Other commercial training centers such as CAPMASS and AMAC.

Main courses offered by these centers are :

- Introduction to computers.
- Computer for management.
- High level languages (BASIC, COBOL, PASCAL, and C).
- DBASE III + and DEASE IV.
- DOS operating systems.
- Lotus 123.
- Autocad.
- Artifitial intelegence.

In addition, computer companies offer specialized training courses for their customers on operating systems, data base management and other utilities.

3. PROSPECTS FOR EXPANSION & MAIN OBSTACLES

3. PROSPECTS FOR EXPANSION & MAIN OBSTACLES

3.1 General

In the previous section, we have described the computer applications used in industrial organizations, computer brands, software types, and training of computer software in Egypt.

In this section, we are going to describe the prospects for expansion and main obstacles. This will include, the trend in computer use for industrial management, process types (batch and online) and computer types (mainframes, minis, and personal). We shall describe also the computer market in Egypt, environmental conditions, and telecommunications in Egypt.

3.2 Trends In Computer Use For Industrial Management

Generally speaking, the computer use for industry is expanding and there is a great demand and opportunities for computer companies in this sector.

According to CAPMASS statistics there were around 270 computers in the public sector organizations in 1986. The number has increased to 684 in 1988 which means a 150% increase within 2 years, i.e. 75% increase per year, while the number of public sector organizations did not increase during this period. Also, this number does not include private sector organizations which have been increasing a lot during the last few years.

According to W&A survey, the number of computers in Egypt in 1990 is estimated by 70,000 units. This number covers all sectors, individuals and includes home, personal, mini, and mainframe computers. Although this number needs to be confirmed, it gives an indication that the computer market in Egypt is expanding very fast.

Another factor which should be considered is that the government policy is to encourage investment in industrial projects especially in new cities such as El sadat, 10th Ramadan, 6 October, and 15 May.

In addition to the existing industrial organizations which are expanding their activities and using computers, other modern industries will be introduced and the computer is going to play a greater role in this area.

Trend in type of process (Batch & Online)

The trend in Egypt is to move from batch processing to online processing systems. Although some organizations still use service bureaus, many of them have already bought their own computers and moving to the online systems. This trend is very clear in applications such as integrated sales order processing, accounts receivables, and stock control systems. The need to follow up stock balance, customer accounts, and cash gives rise to move to the interactive online systems. The trend in hardware, software, and personal computers are other factors that a greatly affect the use of the online systems.

Trend In Computer Types (Mainframe, Minicomputers and Personal
Computers)

During the last few years and exactly after personal computer have been introduced, sales of minicomputers decreased to a great extent. Demand on mainframe computers has not been affected as much as minicomputers since personal computers can not, by all means, replace mainframes functional- or processing-wise. Large organizations, typical mainframe users, are using huge amount of data on corporated data bases and large number of terminals which need highly efficient processing and input/output devices. Around 1984 - 1985, there was general trend that minicomputers were going to be replaced by personal computers.

The cheap personal computer with readymade software has attracted small and medium size organizations to use the computer for single applications such as payroll stock control or sales etc.

As business expanded, personal computer users became aware of the benefits of computers; and different organizations discovered that they have to link different functions together via integrated management systems. Some organizations are moving to multiuser systems, others to local area networks, and the rest to minicomputer systems.

As we described in the former section, Novell is the most commonly used local area network. Some Novell networks have been installed with Arabic / English bilingual application programs. Local area networks proved to be workable solutions for problems such as integration between functions, multiuser, multitasking, and using common data bases.

We can state that the role of local area network in industrial applications is going to expand during the next few years.

Some other multiuser software such as MOS (Multi Operating System) is used in the market. This system is using host PC and dum terminals and based on memory partitions for multiusers and multitasking as well. Any high speed processor PC with large memory and up to 8 terminals can be used. The system is Arabized by pyramids computers which can emulate different arabization utilities. Different systems are in the implementation phase right now. In a summary, mainframe users are almost the same, while personal computer users are expanding at a very high rate. There is a still demand on minicomputer but at a very low rate. The existing personal computer users are moving towards multi-user systems and local area networks, but few of them are changing to minicomputer systems.

Trends In Computer Education System

As a natural result of computer business expansion during the last few years, computer education expanded to meet the demand for computer professional staff and calibers. As mentioned in the first section, information systems and computer courses are parts of undergraduate education at faculties of engineering, commerce, science, and others. The government has introduced computer courses in some schools and is going to implement large computer aided education program during next years.

Degree in computer science, BSc, diploma, MSc, and PhD can be obtained from most faculties of engineering at Egyptian universities as well as the American university.

In addition to university degrees, other training courses, as mentioned in last section, are offered by :

- University public service centers.
- Computer companies such as ICL, IBM, NCR, and BALSAM.
- Large industrial organizations.
- Other commercial training centers such as CAPMASS and AMAC.

3.3 Computer Market In Egypt

The computer market in Egypt is competitive and expanding as number of potential customers, computers brands, agents, dealers, and software houses are increasing. There are indicators of the market expansion such as :

- Over 300 computer agents, dealers, and distributors contending for market share.
- There are arround 100 computer brands in Egypt; 15 of them are mainframes and minicomputers, while the others are personal computers.
- To meet the market demand and face competition, computer companies are using dealers and distributors. IBM has 5 dealers and 4 agents, while Apple has one dealer and five distributors, and NCR, ICL, and other companies follow the same distrbution policy.
- Arround 100 software houses are also competing for market share. Few of them (arround 10 software houses) are working in the area of mainframe and minicomputers, while the others are using personal computers. On the other hand, a greater competition exist in business applications such as payroll, accounting, stock control, et. other than in professional applications such as production and maintenance management.

As a result of market competition, prices of computers decreased, especially IBM compatible computers. A user can buy typical IBM compatible (640 KB) RAM and 20 MB HD) with 1200 - 1500 US\$.

Customer service and support differ from one brand to another and from a dealer to the other. Generally speaking, customers can find good support, maintenance, advice, and repair. Spare parts and supplies are always available. There are no import restrictions on informatic products. To the contrary, the government does encourage importing these products and the taxes on them are considered very low in relation to other products.

There is always continuous supply of informatic products and the market can hardly feel shortage of spare parts of computer supplies.

3.4 Environmental Conditions

Environmental conditions such as temperature, humidity, and dust may cause problems for mainframes and minicomputers. For personal computers the effect of the temperatures and humidity in Egypt is not remarkable. Dust sometimes cause problems, especially for equipment with mechanical movements such as removable hard disk, printers, digitizers, and graph plotters. Only regular maintenance is needed to overcome such problems.

The electricity network is considered reliable in most locations in Cairo and Al xandria. The normal power cut does not exceed once or twice a month. It is not normal to have dangerous spikes or surges which cause damage to equipment. However, powercut sometimes cause damage to some data files, so it is recommended to use uninterruptable power supplies (UPS), which are available with reasonable prices.

3.5 Telecommunications In Egypt

Egypt public telephone system has been improved, expanded, and became extensive and reliable. In 1981 there were only 470,000 telephone lines in Egypt. Today there are more than 1.3 million lines, almost one third of all telephone lines in Africa.

International circuits have been increased from 1030 in 1981 to 4580 in 1986.

Different types of networks have been installed in Egypt, piece mail, single purpose, local area, and wide area networks. Single purpose and local area networks are the most common networks in Egypt. They are used to share resources, transfer data, and remote data base and data files access.

These networks are installed in large organizations such as :

- Central Agency For Public Mabilization and Statistics (CAPMASS) and Social Insurance Organization (SIO).
- Ministries such as Ministry of Interior and Ministry of justice.
- Banks such as National Bank of Egypt and Bank Misr.
- Pertroleum companies.
- National Information Networks.
- Research Projects and Centers.

Arab Republic of Egypt National telecommunications organizations (ARENTO) has just initiated, in December 1989, a new far-reaching national data communications network in Egypt called EGYPTNET.

EGYPTNET will provide computer users in Egypt with X.25 packet switching network. By the middle of 1990, six major packet switching exchanges, four in Cairo (Ramses, Opera, Heliopolis, and Roda), one in Alexandria, and one in Suez will be coordinated by two network control centers in Cairo (one at Ramses and one at Opera). There are also other nodes at different locations such as Nasr city, Maadi, and Bab El Louk, to form a packet switching network of 128 to 512 public telephone lines. Around 3,500 computer terminals expandable to 7000 terminals can use the network simultaneously. Computer users can access the network by public switching telephone network, telex, or point to point connection through multiplexers or direct, dedicated lines. ARENTO is in the process to issue another tender for a sophisticated new CCITT X.400 Message Handling System (MHS) that will provide instantaneous delivery of information and simultaneous message-sending 24 hours a day.

Access to the MHS will be available through ARENTO'S X.25 EGYPTENT network and will connect Egypt to other X.400 systems worldwide. With MHS, Egyptian computer users will have facility of electronic mail as well.

4. SUMMARY

4. SUMMARY

The objective of the study is to give a general view about using of computer for industrial management in Egypt. A full survey is beyond the scope of this study so the consultant has used the following available statistics :

- The statistic of computer in Egypt, part one for public organization (CAPMASS) 1986.
- A field survey by Wafai and Associates (W&A) 1988.

The study is divided into two main sections, as follows :

Present Use of Computers For Industrial Management

Industrial organizations can be classified according to the industrial type into nine types and according to industrial sector into public, investment, and private sector organizations.

Around 56% of companies are using payroll, 48% using stock control, 40% using sales, 31% are purchasing, and 30% general ledger systems. Few companies are using the integrated production planning and controlling, maintenance management, and computer aided design systems.

Arabic is the most predominant language and a lot of programs and packages are Arabized. Arabic/English bilingual software is essential for joint venture and foreign companies. Some public sector companies are still using service bureaus, while the majority of companies are using their own computers to run separate and integrated, batch and online application programs. Computer aided design (CAD) is still in the preliminary stage and applied more in architecture design than in manufacturing applications.

According to CAPMASS statistic 1986, three companies predominating the mainframe and minicomputer market. For mainframe, ICL has 48%, IBM 23% and NCR 18%. For minicomputers NCR has 26%, IBM 23% and ICL 21%. The number of computers in public sector organizations increased from 270 in 1986 to 684 in 1988(around 150% in two years), while the number of organizations are almost the same.

In the area of microcomputers IBM is the market leader and followed by a group of IBM compatibles and Apple computer. The most used IBM compatibles are Tandy, Zineth, Compaq, Micronet, Acer, Amistrad, and Cordata.

System software for mainframes is directly related to brand while DOS is the most common operating system for personal computers.

OS, XENIX, and MOS operating systems are not commonly used as DOS. Novell is used more than other local area networks like D-link and IBM PC-NET. Lotus, Wordstar, Displaywrite, and DBASEIII+ are used by all types of customers whether in English or in conjunction with different Arabic utilities. Different Arabic utilities are used such as Aptec, IBM, Elmosaad, Fager and Pyramids. Arabic word processing packages are also used such as Arabstar and Arabword. Arabic application software packages and other separate programs such as Delta, Alpha, and Compact software are used in the area of buisness applications.

Two main production planning and controlling packages, OMAC from ICL and MAPICS from IBM, are sharing the market. They are integrated, Arabized, and customized.

Information systems and computer is part of undergraduate courses for faculties of engineering, commerce, and science.

BSc, Disploma, MSc, and PhD degrees can be obtained in information systems and computer science. Other computer professional training courses are offered at universities public service centers, computer companies training centers, large industrial organizations, and other commercial training centers.

Prospects for expansion and main obstacles

Computer business in Egypt is expanding. According to CAPMASS statistic for public organizations the increase was around 150% between 1986-1988. According to W&A survey the estimated number of computers all types including home computers and covering all sectors are 70,000 computer in 1990. Computer users are moving from batch processing to online interactive processing.

Mainframe customers and users are still depending on mainframes and can hardly change and the majority of new customers are moving to personal computers, while the existing personal computer customers are moving toward multiuser systems and local area networks. (However, there is still some minicomputer customers). Computer education in Egypt is progressively expanding; degrees are increasing, institutes are expanding, and number of students are increasing. The computer market in Egypt is at boom, over 300 computer agents, dealers, and distributors representing around 100 brands are competing for market share.

Around 100 software houses do exist in the market. At least 10 software houses are working on mainframes and minicomputers, while the others are working on personal computers. Computer prices are low, customer service, advice, maintenance, and support are available and there is no import restrictions on informatic products.

Environmental conditions may cause problem for mainframes and minicomputers only. Electricity network can be considered reliable. There are no dangerous spikes and the incidence of powercut is normal. [Uninterruptable power supplies are recommended as well as regular preventive maintenance to overcome any of these troubles].

Egypt public telephone system has been improved. There are more than 1.3 million lines and 4580 circuits. Different types of networks have been installed, piece mail, single purpose, local area, and wide area networks. ARETO has installed a new far-reaching national data communications network in Egypt (EGYPTNET). EGYPTENT is X.25 packet switching network starting with six major packet switching exchanges, two node control centers, and at least three nodes. Around 3,500 computer terminals expandable to 7000 terminals can access the network simultaneously by public switching telephone network, telex, or point to point connection through multiplexers or direct, dedicated lines.