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PROFILE OF THE INFORMATION SOCIETY IN THE SYRIAN ARAB REPUBLIC

2003

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INTRODUCTION

The term “information society” refers to a society where information, knowledge and related technologies are used to positively boost the society’s productivity, its education methods, social relations among its individuals, its policies, and other aspects of life [8].

The information society can be defined as the society where access to information, and activities related to the search, use and production, as well as exchange of information, plays an important role in the lives of all individuals and establishments.

It is highly praised, in an information society, to have an enabling information infrastructure, which in turn should be available to all groups of people through affordable prices and regardless of their age, language or educational level.

Therefore, the information society is the one that makes use of information, knowledge and all related technologies, for the development of individuals, society and economy. The development of a society depends on the effective use and exchange of information.

The Information and Communication Technology (ICT) represents the basic tool of the information society, similar to the role of industrial technologies that were the driving force for the industrial revolution at the beginning of the 20th century. It is a common belief, today, that ICT represent the following:

- (a) A bridge between developed and developing countries;
- (b) The basic tool for social and economic development; and
- (c) The main pillar for building a comprehensive society and knowledge-based economy.

The basic principles of the information and knowledge-based society include the following:

- (a) Providing access and complete services to all individuals, to be able to use information. Access can be either available to individuals directly, or through public access centres and at work places;
- (b) Equal opportunities for individuals in the society to access information, regardless of age, gender, education, and standard of living;
- (c) Diversity of content to meet the needs and preferences of the society groups, with their different cultural backgrounds;
- (d) Secure and certified access to information, taking into consideration the protection of the privacy of individuals;
- (e) The necessity of enforcing intellectual property rights in a world where life, economy and money revolve around information.

It is worth mentioning that the Internet and its applications play an important role in the information society, and are sometimes considered as its main factor.

Nowadays, many data banks are available on the webs. These banks can cover almost all aspects of life; whether scientific, cultural, economic, financial, political, health or educational.

Furthermore, many applications have spread widely, and acquired special importance in vital fields; such as, e-learning, e-health, e-business, e-commerce, and e-government.

This study examines the status of the Syrian society concerning ICT, and the extent to which this society depends on ICT in the fields of education, health and economy.

I. POLICIES AND STRATEGIES

A. NATIONAL INFORMATION SOCIETY POLICIES AND STRATEGIES

There is a clear tendency in the different national sectors to enter the information society. This is recognized through a number of IT projects in the different sectors, targeting the use of information to promote development and productivity.

However, this tendency has not yet been expressed in the form of strategies and policies that specify strategic objectives and implementation plans required to achieve these objectives.

Many studies have been conducted about the status of the IT sector in Syria, among which is a survey done by the Ministry of State for Technology Transfer and Development. Although this survey was not comprehensive and lacked precision, it gave indicators on the status of IT in Syria.

The Ministry of Communication (MoC), in cooperation of the United Nation Development Programme (UNDP), is currently formulating the Syrian National Strategy for the use of ICT in economic and social development. The first stage of the project was completed and it concentrated on probing the status and needs of a number of ministries, for the aim of the basic features of the national ICT strategy.

The national team for this project has conducted studies that covered the following:

- (a) Culture, education and training;
- (b) Business and economy;
- (c) Services; and
- (d) ICT infrastructure.

The results of these studies were compiled and the following strategic goals in ICT were formulated:

- (a) Moving into an ICT society by the end of the first quarter of this century;
- (b) Using ICT to leverage work, services, education and training for the aim of achieving a sustainable socio-economic development;
- (c) Widening access to ICT, to reach all citizens regardless of age or place of residence, and help the nation become knowledge-based. The use of ICT would help spread culture, connect with people living abroad with Syrian origin, and enable effective and lifelong learning, education and training. This would help in reducing illiteracy and creating a more informed and qualified citizen, and is considered to be a basic tool for a sustainable development;
- (d) Using ICT to actively enter a knowledge-based economy;
- (e) Using ICT to develop administrative services; and
- (f) Availability of ICT access to all citizens and establishments in Syria.

B. SECTORAL PLANS FOR BUILDING THE INFORMATION SOCIETY

There is a distinct disparity in the level of planning, among government establishments, to enter the information society. Planning the financial side, related to purchasing equipments, software, network connections, and realizing import and installing contracts, dominates all other planning activities. The plans of some government institutions to build the information society include the following:

- (a) The Ministry of Education (MoE), in cooperation of the UNESCO, formulated a national strategy aiming at using ICT in schools at all levels. The strategy aims at gradually introducing IT courses to reach the target level of the strategy plan by the beginning of 2005. Currently, two hours of IT courses per week are given to the 8th, 10th and 11th grades. The MoE started building a network that connects between the administrations of education in the regions and the ministry, and between

the schools and the administrations. The MoE plan includes three phases, each aiming at connecting 1000 schools with their administrations in the region, and connecting the ministry's network to the Internet;

- (b) The plans of the Ministry of Higher Education (MHE) include implementing a modern e-library that links the institutions of higher education in Syria with a group of e-magazines, data banks and international catalogues. This would enable professors and students to have access to up-to-date information, which is an essential prerequisite for the information society and a basic requirement for the realization of a knowledge-based economy;
- (c) The Ministry of Industry (MoI) conducted a study about the use of IT to evaluate the performance of industrial companies and institutions in the public sector. In light of the results of this study, the plan of the MoI was to establish a distributed information system and make it operational in 2004. Currently, the MoI is finalizing the necessary arrangements to start using a system for the registration of private industrial firms. This system was developed in cooperation with the chamber of commerce and industry;
- (d) The Ministry of Transport (MoT) has a plan to apply the one-stop-shop principle in all its administration offices where vehicle registration and fees-collection is the core business. A significant part of the necessary software development, required for realizing this objective, has been completed. The ministry, however, is studying the possibility of using smart ID cards for cars;
- (e) Reducing the long waiting list of requests on fixed telephone lines is the main concern, for both of the Syrian Ministry of Communications and the Telecom Establishment, for the year 2004. The objective is to reduce the waiting list to zero and provide immediate installation of fixed telephone lines upon request;
- (f) The IT plans of the Ministry of Interior (MoI) include the development of several information systems required for the development and modernization of citizen-related services, and services given to decision makers. The important projects include: Automation of civil registration and records, and issuing machine-readable ID cards; automation of passports and migration operations, issuing modern standardized passports, and recording the movement of passengers; and the computerized legal register system and traffic management.

II. LEGAL AND REGULATORY FRAMEWORKS

A. INTELLECTUAL PROPERTY RIGHTS AND PRIVACY PROTECTION

In February 2001 the Syrian government issued the presidential decree number 12 concerning the Intellectual Property Rights (IPR). This law includes protecting all kinds of intellectual products; such as, printed publications, musical and art works, and software.

To implement the IPR law, the Ministry of Culture was assigned to provide standardized applications of this law. The enforcement of the IPR law is still vague and lacks comprehensiveness, and is mainly applied to art and literature work. As far as the information market is concerned, the IPR law is rarely applicable due to many reasons, such as:

- (a) Lack of public awareness of the importance of protecting intellectual and creative works;
- (b) Lack of law enforcement concerning the piracy of intellectual works;
- (c) No rewards or encouragement for people working in the intellectual field;
- (d) Weak purchasing power due to low standards of living for interested consumers, and the lack of human and financial resources to enforce the law.

B. TELECOMMUNICATION REGULATORY FRAMEWORK

The Syrian Telecommunication Establishment (STE) is the only telecommunication operator, with “full authority to monopolize wired and wireless telecommunications all through Syria: on land, in territorial water and in space”. According to the operational regulations applied to all public and private establishments in the country, The STE -despite being the monopolist- can implement investment contracts with other parties that implement and operate telecommunication systems. This way, other parties can be introduced to the Syrian telecommunication market. Consequently, STE signed the following contracts:

- (a) Investment contract concerning the installation and operation of public phones;
- (b) Investment contract that allows the marketing of the prepaid cards (hello Syria);
- (c) Two identical BOT contracts were signed in 2001 with two companies; Investcom Global Ltd, and Drex Technologies S.A, on the basis of which a license was granted to investors in the private sector to provide mobile phone services under the supervision of the STE. The STE gets a percentage of the profit made, and this share would increase every few years. According to these two contracts, 1.7 million lines, equally divided between the two companies, should be installed in a period of 15 years – the total duration of the contract.

Therefore, we can say that despite of the official monopolization of telecommunication market by STE, it has actually become open to competition by starting new forms of work; such as, licensing, BOT contracts, and service contracts.

These new forms of work has proved to be capable of providing the Syrian citizen with the freedom of choice; however, at the same time imposed a sort of “accomplished fact”, with which STE monopolized the basic infrastructure and only allowed other parties to provide more moderns technology related services.

Hence, a controlled kind of competition is introduced to the market, which should be taken into consideration when communication policies are formulated.

C. INTERNET REGULATIONS

Being the monopolist telecommunication company in Syria, the STE worked on drafting Internet regulations. The STE granted a license to the Syrian Computer Society (SCS) to provide Internet services to its members and to some sectors, including; university professors, physicians, engineers. During the implementation of a National Public Data Network, the STE expressed its readiness to give licenses to public and private Internet Service Providers (ISPs).

The ICT concerned authorities are studying the Internet regulations. The STE has set up a number of rules that will be applied for granting licenses to ISPs, and is applying these rules in evaluating applications submitted by the potential private ISPs. In accordance with this, the Ministry of Communication (MoC) formed a committee to study the regulations for providing services.

D. PRIVACY AND SECURITY LAWS AND REGULATIONS

In the absence of laws and regulations, dedicated to the protection of privacy and security of data and information systems, traditional information and privacy laws are applied. Representatives of the Ministries of Justice, Economy, Communications and Culture were assigned to set the rules for the authentication of the electronic signature.

III. ICT INFRASTRUCTURE

A. TELEPHONE PENETRATION

1. Fixed Lines

Table 1 below shows the number of fixed telephone lines in Syria between 2000 and 2002, and the penetration rate during these three years.

TABLE 1. PENETRATION RATE OF FIXED TELEPHONE LINES

Year	Population (million)	Number of fixed telephone lines	Penetration rate
2000	16.19	1,666,982	10.21
2001	16.61	1,810,756	10.83
2002	17.04	2,095,508	12.23

A contract to expand the fixed telephone network is being implemented, and by the end of this project in 2003, the penetration rate is expected to increase to a more than 18 lines per 100 inhabitants.

2. Mobile Network

Table 2 shows the number of mobile phones in Syria between 2000 and 2002, and the penetration rate in these three years.

TABLE 2. PENETRATION RATE OF MOBILE PHONES

Year	Population (million)	Number of mobile telephone lines	Penetration rate
2000	16.19	30,000	0.19
2001	16.61	192,000	1.16
2002	17.04	400,000	2.35

3. Internet Subscribers

Table 3 shows the number of Internet subscribers between 2000 and 2002.

TABLE 3. INTERNET SUBSCRIBERS

Year	Internet subscribers
2000	8,000
2001	10,000
2002	73,000

By the end of 2003, the number of Internet subscribers is expected to increase to 100,000 subscribers.

B. INTERNET BACKBONE

There is no real backbone for the Internet network. The STE and SCS, the two ISPs currently operating in Syria, are using the fixed telephone network for the provision of services. Each of these ISPs has installed routers in telephone exchange centres to receive incoming connection requests, and these, in turn, are compiled and data is transferred through circuits that link the distributed routers in telephone exchanges with the central router that is connected to the international network.

Both establishments provide Internet access service through dial-up connections. Recently, they have been working on leased lines, ISDN and ADSL. The total bandwidth of international links used by STE and SCS to provide Internet services are 128 MB and 40 MB respectively.

Currently, a project for building a national data network is in progress. This high-speed network is designed to serve 250,000 subscribers at the beginning, and can be expanded to serve 800,000 subscribers.

C. ISPS AND ASPS

There are only two Internet service providers operating in Syria, namely; the Syrian Telecommunication Establishment (STE) and the Syrian Computer Society (SCS). Services provided by these two ISPs include browsing and e-mail. Other services such as file transfer protocol (FTP) and chatting are still unavailable, and hosting is still in its very beginnings. The STE prepared the terms of reference to grant licenses to private ISPs, and these licenses would be given when the public data network becomes operational.

D. ACCESS

1. Access to Services

The waiting list of requests for fixed telephone services is still long, which is partly due to the high percentage of phantom requests submitted by subscribers at the time when the STE could not expand its services to all citizens. This problem is expected to be solved with the expansion project that is currently under implementation. On the other hand, the mobile phone service could be easily accessible through the widely spread selling centres.

The STE provides internet services to all the citizens and establishments in Syria, while the SCS provides the same service to all its members, as well as to university professors, researchers and professional workers; such as, Medical Doctors, Engineers, Lawyers..etc).

It was only recently that Internet cafes became legal in Syria. In spite of this fact, the number of these cafes was continuously increasing in the past years. The exact number of Internet cafes is not available; however, Damascus alone is believed to have around 100 Internet cafes.

It is also hard to estimate the daily number of people using these Internet cafes that are mainly found near universities, however, the number could reach 4000 users. Not all Internet cafes users necessarily connect to the Internet, however, some might use the computers to play games and others use it for different applications. Most of these users are students and non-Syrians, with the number of females representing 35% of the total number of users.

2. Service Costs

Table 4 shows the cost of telecommunications services that are currently available in Syria.

TABLE 4. SERVICE RATES IN SYRIA

Type of service	Cost
Local calls	0.2 L.S./mn
National calls	Average of 2 L.S./mn (Differs from one city to another)
Fixed telephone line installation fees	4000 L.S.
Fixed telephone line annual subscription fees	300 L.S.
Mobile phone subscription fees	9000 L.S.
Mobile phone monthly subscription fees	600 L.S.
A call from mobile to fixed line	6 L.S./mn
A call from mobile to mobile	4 L.S./mn

The cost of local calls in Syria is considered to be one of the cheapest in the world, while the cost of national calls is within the average of international rates. As for the rates of international outgoing calls, they are considered to be high, compared to the regional and international rates, which would therefore compensate for the low rates of local calls.

Concerning mobile phones, the rates do not exceed those at the regional and international levels, in case the standard of living is not taken into consideration. However, the installation and monthly fees are still high. Table 5 summarizes the current services costs applied by ISPs in Syria.

TABLE 5. CURRENT RATES OF INTERNET SERVICES IN SYRIA

Service	Cost
Internet subscription at STE	0.7 L.S./mn including local call cost
Internet subscription at SCS:	
10 hours per month for SCS members	300 L.S. plus 12 L.S. per hour (local calls)
10 hours per month for non SCS members	350 L.S. + 12 L.S. per hour (local calls)
20 hours per month for SCS members	500 L.S. + 12 L.S. per hour (local calls)
20 hours per month for non SCS members	650 L.S. + 12 L.S. per hour (local call)
Cost of an extra hour	36 L.S.

E. ON-GOING PROJECTS

The following are some of the most important ICT projects present now in Syria:

- (a) The second telecommunication modernization and expansion project that includes the installation of 1,650,000 new fixed telephone lines (through contracts with Samsung, Ericsson and Siemens), and involves the development of both optical and microwave networks and subscribers' networks. The number of fixed telephone lines will reach 3 million fixed lines by the end of this project, and a digital data network will be available throughout Syria;
- (b) Building the national data network with a capacity of 250,000 subscribers, expandable to 800,000 subscribers, to be the basic high-speed backbone for Internet in Syria. Within the context of this project, other public and private establishments will be allowed to provide Internet services by virtue of a license issued by the STE;
- (c) Expanding the two mobile phone networks, operated by two competitive operators according to the previously mentioned BOT contracts.

F. PC DISSEMINATION

The number of computers in Syria is estimated to be around 300 thousand PC's, half of which is owned by public sector establishments and the other half is owned by either individuals or private sector companies. Given the low-income levels, the cost of a computer is still high and purchasing one is not at the top priorities of families in Syria. Therefore, most people resolve to buy locally assembled computers to reduce their cost to the minimum possible.

Some of the scientific and academic institutions, such as universities, public hospitals, syndicates, and the Higher Institute of Applied Sciences and Technology (HIASST), offer facilities to their employees that enable them to buy personal computers, through loans or by purchasing a number of PC's in cash and then selling them to the employees by installments. Around 10,000 PCs were made available through this arrangement.

The Ministry of Communications started an ambitious project called the "public computers" that aims at providing computers in installments to all telephone subscribers who wish to have the Internet service through STE. Computers have been sold this way and the ministry is still trying to expand this project through agreements with the Syrian banks to sponsor this project.

A joint venture company, including some companies registered as SCS members, has been established to provide high-quality personal computers to SCS members at fairly good prices and with payment facilities.

IV. ICT CAPACITY BUILDING

A. AWARENESS AND INFORMATION CULTURE DISSEMINATION PROGRAMMES

1. *The National Programme for Information Dissemination*

The Ministry of Education (MoE), in collaboration with the SCS, is implementing the national literacy training programme (NLT) for training on computers, which started in 1997. Currently, there are 218 training centres distributed at schools in Syria. Each training centre has six computers connected to a local area network (LAN), and the number of trainees has reached 300,000 trainees. The programme provides 4 levels of training: Regular training for beginners, intermediate (A) and intermediate (B), and self-training levels. Table 6 below shows the percentage of trainees in each level, and Table 7 shows the distribution of trainees in Syria.

TABLE 6. LEVELS OF TRAINEES IN THE NLT PROGRAMME

Level of training	Trainee percentage
Beginners	80%
Intermediate (A)	11%
Intermediate (B)	3%
Self – training	6%

TABLE 7. DISTRIBUTION OF TRAINEES IN SYRIA

Governorate	Percentage	Governorate	Percentage
Damascus	13	Aleppo	11
Damascus Suburbs	7	Idled	6
Qunaitra	3	Latakiah	8
Daraa	4	Tartous	8
Sweida	4	Dier Elzor	4
Homs	10	Hasakeh	9
Hama	9	Rakah	3

The programme includes three phases and covers the basic IT literary modules, namely; Windows, Microsoft office, programming, introduction to networks, and the use of Internet. Each module is given in 36 hours distributed over two weeks and costs around US\$ 3.

2. *International Computer Driving License*

As part of its work to reduce illiteracy in informatics, UNESCO proposed a programme to provide the necessary basic computer knowledge for a normal user. People enrolled in this programme can sit for an exam that enables them to get the International Computer Driving License (ICDL), which is recognized in 56 countries. The curriculum of this programme is equivalent to that included in the three-phase programme of the national programme for informatics dissemination.

The Syrian MoE and the UNESCO-Cairo office signed a memorandum of understanding related to the ICDL. The two parties agreed on a preparatory project that can be replicated later. The preparatory project will include the establishment of 15 training and testing centres distributed in the Syrian governorates. Around forty ICDL trained teachers will be teaching in the programme, after receiving training on the ICDL. The teachers would be chosen from the best of those who have passed the Ministry's 9-months informatics-training course and those who taught in the national programme for informatics dissemination. The teachers' responsibilities would include the following:

- (a) Training trainers for the ICDL programme;
- (b) Training citizens working with the national programme for informatics dissemination; and
- (c) Provide the testing process in accordance with the ICDL standards.

The MoE is currently preparing 15 centres in the Syrian governorates to be accredited by UNESCO as training and testing centres. The SCS will supervise the implementation of the ICDL programme in Syria, as well as the training and testing centres. The cost of examination/testing is estimated to be at S.L. 3000, which can be reduced to L.S. 2000 when the number of enrolled candidates is high. Government employees can take the ICDL training programme through their ministries or institutions.

3. Training Courses at the Syrian Computer Society

The SCS started organizing ICT training courses since 1997. At present, the SCS has two training labs, each containing 15 computers with one server and an Internet connection. The SCS is currently organizing, in its main branch in Damascus, 72 training courses per year, in addition to 25-40 training courses for the public sector. Similar training courses are also organized in other branches in Syria.

The course duration ranges from 18 to 48 hours, at a cost ranging from US\$ 30 to US\$ 120 per course, and around 1000 people per year receive the course training.

Through organizing lectures, workshops and training courses, the SCS have achieved a remarkable success in improving ICT literacy in all sectors of the society. However, the most important role of the SCS was its leading role in the national programme for informatics dissemination, organized in collaboration with the MoE.

4. Private Institutes and Training Centres

The private sector is currently playing an effective role in providing ICT training courses. The number of trainees reaches 800 per year in large training centres, and does not exceed 300 trainees per year in small ones. These centres usually offer training courses, without degrees, in various fields such as oracle, office, networking, programming languages, computer maintenance, Internet skills and web design. The cost of a training course usually ranges from US\$ 30 to 120. On the other hand, trainees in professional courses, such as Cisco, Oracle and Microsoft Certified System Engineer (MCSE) go to Lebanon or Jordan to sit for the exams required to obtain diplomas, because Syria does not have certified testing centres.

5. Fund for Integrated Rural Development of Syria - Mobile Training

In 2001, the Fund for Integrated Rural Development of Syria (FIRDOS) launched an ICT training programme for rural citizens. The programme covered nine cities and was successful in completing 34 training courses, each including 20 trainees, by the end of July 2002. Therefore, the total number of trainees during the programme reached 680 trainees.

The courses are usually divided into two levels, each with a period of 30 hours, and cover Windows and MS Office programmes. The cost is only US\$ 1 for the fund members and US\$ 2 for non-members.

In addition to the above-mentioned courses, FIRDOS has launched, in July 2002, the first Mobile Information Centre (MIC), equipped with 17 computers and a server, and two additional mobile training centres in the beginning of 2003. Each MIC visits three villages weekly and trains the people there. Each course contains three parts: Introduction to computers, Microsoft office, and Internet use. The MIC currently visits the rural areas of Damascus, Homs and Aleppo.

B. COMPUTERS AT SCHOOLS

Using ICT in education started in 1997. In 2002, from a total of 17691 schools and institutes under the Ministry of Education, 4683 schools received financial support for the purpose of equipping all school levels with computers. Table 8 shows the total number of computer rooms in the preparatory and secondary schools in each of the governorates in Syria, and the number of computers and printers until mid 2002.

TABLE 8. TOTAL NUMBER OF COMPUTER ROOMS IN PREPARATORY AND SECONDARY SCHOOLS (MID 2002)

Governorate	No. of schools	No. of computer rooms	No. of computers	No. of printers
Damascus	130	135	934	353
Damascus suburbs	242	254	957	316
Qunaitra	54	52	200	77
Daraa	171	128	396	151
Aleppo	491	260	813	238
Hamah	376	250	725	306
Homs	308	252	800	286
Latakia	199	196	612	250
Tartous	243	198	613	257
Sweda	112	92	340	98
Idleb	249	175	579	186
Raqa	96	83	282	97
Hasakeh	197	105	366	146
Deir Ezour	110	106	419	126
Total	2,978	2,286	8,036	2,887

Table 8 shows that 75% of preparatory and secondary schools are equipped with computers; however, most of these schools are not connected to the Internet. When computer rooms are not available in schools, students use computer labs of other schools.

In the second half of 2002, the MoE provided schools with around 4800 computers, which makes a total of 12,800 computers provided by the end of 2002.

It is worth mentioning that the MoE is making a big effort to improve its work performance by investing in ICT. Since 1991, the results of the preparatory and secondary school exams are produced by an automated information system at the computer centre in the central administration. The ministry also invests in dedicated IT systems for accounting, educational statistics and studies, documentation and library management.

C. VOCATIONAL TRAINING

The following are the main parties that offer planned training courses in ICT:

1. *The Vocational Training Programmes at SCS*

The SCS provides vocational training courses in various fields of ICT such as:

- (a) Operating systems;
- (b) Programming languages;
- (c) Networks;
- (d) Databases;
- (e) Web design;
- (f) Computer aided design (CAD).

Trainees are from both public and private sectors, and the SCS organizes tailored courses according to the needs and requirements of some public establishments.

2. *National Information Technology Centre*

The National Information Technology Centre (NITC) was founded by the decree no. 1 of 6 January 2001. The centre aims at developing highly qualified expertise in information technology, software development, web design, and Internet and e-commerce applications.

The centre also offers specialized training in fields such as MCSE, and already has agreements with some companies such as Netg, to obtain e-contents for training. During 2001 and 2002, the centre held 64 training courses, in which 651 trainees participated.

The work at the centre is still in its beginnings, and is expected to considerably thrive if it was able to get the license from companies such as Cisco, Oracle or Microsoft, to be an authorized test centres.

3. *Private Institutes and Companies*

In the big cities in Syria, such as Damascus and Aleppo, there are about ten well known training institutes, with good experience and reputation in vocational training on the most common products, such as operating systems, database management systems (DBMS), and network management. Before recruiting their own staff and starting their specialized training, the institutes had to invite accredited trainers from abroad until the local human resources were available for training.

The cost of training at these institutes is less than their equals in the neighboring countries, but is still considered to be high compared to the average per capita income. A trainee usually pays about S.L. 75,000 (US\$ 1500) to take the basic subjects training to be able to sit for the MCSE exam. The fees do not include those of the exam, and the trainee has to sit for it in one of the authorized centres outside Syria.

4. *IT Companies*

In some information system importing contracts, the exporting IT companies are requested to provide specialized training to some of the employees in the contracting institutions, to enable them to use and manage the system. This kind of training is either done by the company itself or through sub-contracts with training institutes. Sometimes, trainees are sent outside Syria to be trained. Usually, this opportunity is given to IT directors and vice directors in public institutions, and in most cases trainees do not receive a diploma.

D. UNIVERSITY EDUCATION

1. *Computers at Universities*

The ICT situation in the Syrian Universities is more developed than that in Syrian schools. There is an average of 70 computers for each faculty (for both administrative and students work). The academic network infrastructure that connects between the Syrian universities encouraged the development of IT at all universities.

Damascus University enjoys an automated administrative system. In addition, a computer centre was established in the faculty of civil engineering in the late 70's, which has been used, since mid 80's, in processing registration requests for acceptance of students. It also issues lists of the names of students accepted in all colleges and institutes in Syria. The university has been encouraging faculty members to publish the curriculum on the web, and the university libraries have an average of 3 computers in each faculty library.

All faculties at Damascus University have access to the Internet, whereby students can use the Internet for 2 to 4 hours a week in most of the faculties especially engineering. This possibility is available throughout the day for the students of the faculty of computer engineering, who have free access to Internet in three fully equipped computer rooms that have 30 computers.

If we look at the number of computers in specialized faculties, like the computer-engineering faculty in Damascus University, we find around 475 computers, 400 of which are connected to a local area network. The faculty also has two 64 kbps Internet lines and six dial-up lines. On the other hand, the faculty of information technology in Aleppo University has 12 dial-up lines and 200 computers, 80 of which are connected through a network.

2. Syrian Higher Education and Research Network

The Ministry of Higher Education (MHH), in cooperation with the UNDP and within its programme for supporting ICT infrastructure that started in January of 1997, has launched the Syrian Higher Education and Research Network (SHERN) project that aims at connecting between the Syrian universities and with the HIAST, via a high-speed network connected to the Internet.

The project started in January 1999 and is jointly financed by the Syrian government, the UNDP, and UNESCO. The total project costs around US\$ 850,000.

In March 2001, the first phase of this project was accomplished, and it includes connecting between universities through a high-speed data network connected to the SCS through a 7 mbps bandwidth microwave link. This network allows for distant learning, as well as the exchange of curricula and scientific research among higher education institutions.

3. Computer Engineering Institutes

The first initiative taken by the MHH in the rehabilitation of IT education was in the establishment of an IT institute at Damascus University in 1987, to graduate assistant engineers in the field of IT. The need for the graduates of these institutes is increasing in the job market, which explains the popularity of the institute among high school graduates. Three other institutes were established in the Syrian universities at the beginning of the 90's, and three other institutes were opened in Raqa, Idleb, and Daraa. These institutes provide the labor market with 500 graduates every year.

4. Computer Engineering Faculties

In 2000, a presidential decree was issued by which four computer-engineering faculties had been established in the four Syrian Universities of Damascus, Aleppo, Latakia and Homs. The basic curriculum of these faculties include 3 specializations:

- (a) Information systems and software engineering;
- (b) Computer systems and networks; and
- (c) Artificial intelligence.

In July 2003, around 200 students of the computer-engineering faculties are expected to graduate from the 4 Syrian universities, and the number is expected to reach 650 graduates in 2004. These estimates are based on the number of fourth-year students who are currently registered in the computer-engineering faculties. By 2007, the number of graduates is expected to reach 800 graduates.

In spite of the increasing need for computer engineering graduates in the labor market, the capacity of the four universities is still limited due to their inadequate infrastructure. It is worth mentioning here that the four faculties are not taking into consideration the importance of qualifying engineers who specialize in both computer engineering and management, a widely required major and significantly needed in the Syrian labor market. Table 9 shows the number of students in computer engineering faculties and the expected number of graduates in the four faculties.

Statistics show that the faculty-members-to-students ratio is 1/28 in the computer engineering faculty at Damascus University, which is a relatively acceptable ratio compared with other faculties in the area, however, it is a low ratio compared to similar faculties in developed countries. The ratio in Aleppo computer engineering faculty is 1/36.

TABLE 9. NUMBER OF STUDENTS AND GRADUATES AT THE COMPUTER ENGINEERING FACULTIES

University	Actual no. of students	Date of graduation	No. of graduates expected in 2003	No. of graduates expected in 2004
Damascus	900	July 2003	60	250
Aleppo	700	July 2003	50	180
Lattakia	600	July 2003	50	120
Homs	400	July 2003	50	100

5. Higher Institute of Applied Sciences and Technology

The Higher Institute of Applied Sciences and Technology (HIAST) is considered to be the only academic institute in Syria that offers a comprehensive curriculum in computer engineering, and the first institute to start this specialization. The first group of computer engineers graduated in 1984, and the telecommunication as a new specialization was introduced in 1997. The IT courses taught at HIAST are at a weekly average of 2 hours of lectures and 4 hours of practical training during the first two years, after which the third year students start the engineering specialization. At HIAST, 7 modern computer rooms are available for students, in addition to the one at the student dormitory.

All the computers are connected to a local network (LAN), and each computer room includes around 10 computers, one server and a printer. On average, this provides one computer for every two students. On the other hand, students of the 5th year are provided with free access to the Internet throughout the year. Graduates from the HIAST are highly qualified engineers, and the institute's curriculum is equivalent to that in European Universities. However, the crucial problem at HIAST is in the low number of students, where by the yearly number of graduates range from 6 to 10 graduates, and the majority of them work at the HIAST itself after graduation.

Recently, the presidential decree related to the HIAST has been amended to allow self financed students to study at HIAST, which will allow for an increase in the number of students, and therefore supply the open labor market with distinguished graduates.

On the other hand, the academic staff of HIAST support the faculty of computer engineering at Damascus University. Professors of HIAST have participated in preparing the curricula and university lecture notes that are currently taught at the computer engineering faculties in the Syrian universities.

6. Teaching IT in Non-Specialized Faculties

Students in faculties other than computer engineering take the IT course during the whole term, at an average weekly rate of 2 hours for lectures and 4 hours for practical work, during which students learn about the following: Basic theories of ICT, use of Computer and file management, word processing, spreadsheets, databases and presentation skills.

E. RESEARCH, DEVELOPMENT AND INNOVATION IN ICT

Research and Development (R&D) activities in Syria are mainly applied research, and projects related to institutional administrative automation receive significant efforts in spite of the fact that most require the use of basic technologies.

The core of R&D and innovation in IT includes research related to the Arabic language. Many academic and scientific bodies are interested in these projects, especially that Syria is considered to be a pioneer in Arabization.

Recently, subjects related to Internet applications received more attention at both universities and scientific institutions, which can be clearly observed from the increasing number of thesis and publications on the subject.

R&D activities are almost limited to universities and scientific institutions. This is due to the lack of scientific and financial resources to conduct research at other public bodies, and the relatively high cost of research that is sometimes not affordable by many institutions. Furthermore, only a limited number of IT companies working in software development have R&D activities.

However, the role and work of university vocational units in ICT research and development projects cannot be ignored. Faculty members of the Syrian universities found these vocational units and work in them. The units offer technical advice, systems analysis and software development, and are considered to be the link between the university and the society.

V. BUILDING THE ICT SECTOR

A. ICT COMPANIES

There are no exact statistics available about the number of ICT companies in Syria. Around 130 IT companies are registered members in the SCS, and they represent the largest IT companies working in Syria. The core business of national IT companies is commercial, through promoting imported products. The percentage of IT companies that have dedicated software departments do not exceed 25%, and the number of companies specialized in software development does not exceed 10 companies. As for size of enterprises, the Syrian IT companies are classified under small and medium sized companies.

B. INVESTMENT IN ICT SECTOR

The rate of public investment in the science and technology sector in general, and in the ICT sector in particular, is considered to be one of the lowest in the world. The private sector is still reluctant to invest in the Syrian market. This is due to a weakness in the Syrian market, and to the difficulties and risks that usually accompany the startup of large companies and projects.

C. GOVERNMENT FACILITIES

The investment law no.10 is considered to be the most important law that organizes investment and specifies the government facilities offered to new companies. However, the application of this law on the establishment of technology companies in general, and IT companies in particular, is still weak, since the conditions imposed by the law, for the companies to get government's support and tax-exemption, are not very much compatible with the conditions and requirements for establishing new IT companies.

D. EXPORT OF EQUIPMENTS AND SOFTWARE

The IT industry in Syria did not develop to be able to export equipment, and the actual work done in this field is mainly assembling computers from imported hardware components, to meet the local market needs.

The main exports in the field of IT are the software development and IT services that are provided by individuals and local companies to international companies and institutions.

VI. APPLICATIONS IN GOVERNMENT ESTABLISHMENTS

A. COMPUTERIZATION OF PUBLIC ADMINISTRATIONS

Despite the fact that ICT in Syria is still not highly sophisticated, there are some important IT projects related to organizing administration work and improving citizens' service facilities. Some of these projects are the following:

1. Automation of Civil Registration Project - Ministry of Interior

The automation of civil registration project is considered to be one of the biggest and most important IT projects in Syria. It aims at storing civil registers of all Syrian citizens, listed in the civil records since the 1922 statistics, and distributed over 286 civil registration offices throughout Syria. It also aims at giving a national identification number for each individual, and a family number to each family consisting of a husband, wife and children.

The civil register is the only official source of civil data about the Syrian citizen, to which personal identifiers (photo, fingerprints and distinguishing features) will be added, during the automation process and acquisition of further data, in order to realize the link between the person and his civil record.

At the end of the project, Syria will have one civil registration office, which will enable people to get their civil records from the registration office, regardless of their place of residence and without having to travel to their place of registration.

The main objective of this project is to build a national integrated information system to be the basis for population databank, including civil data about all Syrian citizens, and to provide government institutions with immediate access to comprehensive information and statistics related to all citizens in different ways.

The national identification number of citizens will be the key for access to his records in all information systems, at all government establishments. It will be used in all official citizen-related documents and transactions, and would be one of the important factors that facilitate the processes of administrative reform in public institutions.

Together with the civil registration project, comes the project for issuing new and high-specifications identification cards (ID) for Syrian citizens, with a two dimensional barcode, and including all records of the card holder and his/her photo. The new ID card is machine-readable and will facilitate the movement of people across the borders, and inside Syria at the entrances of public establishments. It will also help citizens in legal and financial matters, and in all e-government transactions that require electronic authentication.

(a) Project implementation plan

The total duration of project implementation is 6 year, starting from 2001 to 2006, and including the following stages:

- (i) Repairing thousands of the basic civil registers (there are more the 20,000 civil records) all over Syria, copying the damaged ones, performing the family linkage operations for each family and its civil registration number, and training the required technical staff on the operations of copying and tracing family history (this stage is almost complete);
- (ii) Preparation of automation centres in the 14 governorates in Syria and training the project staff. Around 1100 employees were hired to work in these centres and the civil registration offices. This stage has finished;
- (iii) Preparation and installation of data entry software for the civil register records and the personal identification data (photo and fingerprints) in the 14 governorates centres, connecting the automated civil registration system with the personal identification system, and starting the production of personal ID cards all over Syria. This stage has been completed;
- (iv) Development of the final version of the application software required for the automation of civil registration and installing it in two of the automated centres; the development and gradual set up of the civil registration office software; and the preparation of the national server software in Damascus (This stage will be completed by the end of 2003);
- (v) Installation of the final version of the application software in the remaining governorate centers in Syria and training employees to use them during the 2nd half of 2003;
- (vi) Building new civil registration offices in the Syrian govern orates, and rehabilitating the buildings of the civil registration secretariats throughout Syria and building new ones in a number of cities and suburbs. This stage started in 2000;
- (vii) Establishing a comprehensive data network that connects between the civil registration offices in each governorate and the governorate's automation centre, and a data network that connects between the govern orates' servers and the main national server. Work on building this network started in the beginning of 2003 and will be completed in two years;
- (viii) The last stage of the project includes the integration of all its components and the main national server, making the necessary testing for family linkages at the national level, and trying to extract the family tree for each family. This stage will be completed during 2005 and 2006.

(b) Current state and future plans

Currently, data entry and ID cards production are being done in the automation centres in the 14 govern orates in Syria. More than 5 million records have been entered and more than 500,000 ID cards issued. The new plan of the project, since the beginning of 2003, is to speed up data entry to reach 140,000 records per week (so about 7 millions per year) to complete data entry by the end of 2006.

The mass production of ID cards will be launched as soon as the technical requirements to work in two shifts are available, which will increase production capacity to more than 3.5 million cards a year. This will make it possible to change around 12 million of the already distributed cards, and to issue two more million cards for citizens who will be 14 years old during the period from 2003 to the end of 2006.

Fourteen automation centres have already been established in the Syrian govern orates. A national central server will be established in Damascus to store the records of registered Syrian citizens. The 14 centres will be connected with the national server in Damascus through a national data network that covers all Syria.

The application software for the automation of civil registers was locally developed at the electrical engineering department in Damascus University and the project is managed by the Deputy Minister for Civil Affairs. The total cost of the two projects; the civil registration and ID cards, is estimated to be around Billion S.L. 2. Experts in ICT from the SCS are part in the project management committee, which follows up on the progress of work, and they provide the necessary advice to ensure the continuity of work implementation, and to check whether the right design of software and choice of equipments is made.

2. Decision Support System at the Ministry of Health

The Ministry of Health (MoH) is working on the establishment of the Decision Support System (DSS) that uses modern IT products to link between the different departments, and to connect the main administration in the ministry with its subordinates that are spread in different locations in Damascus. The DSS covers the following four main areas:

- (a) Planning that covers the investment plans of the MoH, and is carried out through the directorate of planning and other related directorates, especially those for medical services and hospital administration;
- (b) Administration development that tackles all aspects of administration progress at the MoH; covering the application of quality standards, and modernization and administrative development, at the focal point of the administration development department and in cooperation with other related departments;
- (c) Developing healthcare, mainly covering the basic healthcare issues, healthcare in rural areas, environmental and chronic diseases, mental health and hospital medication issues.

The DSS is linked to all the administrative departments through controlled communication. The employees in charge meet periodically to control the accuracy and quality of flow of information and the degree to which it serves its purpose, and send a feedback to data sources when needed. All the procedures and recommendations, made by the workgroup, and related to information standardization and precision are documented. The DSS also provides information services to decision makers, and the makes the required infrastructure available for e-libraries, e-medicine and distant learning.

Parallel to the establishment of the DSS department in the central administration, Decision Support and IT departments are being established in the govern orates, and the required staffing and training are provided in order expand the data entry and processing operations and establish an IT working group for all of Syria. This activity enjoys technical and financial support of the European Union (EU) and the World Health Organization (WHO).

Through the Decision Support System, the MoH aims to continue with the process towards an e-government stage where the following is achieved:

- (a) Migrate the IT applications into a web-based environment so that data entry can be done remotely from its source in the govern orates;
- (b) Development of the ministry's Web site to include a full directory of the medical services provided by the ministry, with emphasis on a detailed description of the administrative and technical procedures of the ministry's work, which will save the time and effort of citizens.

The MoH seeks to implement other projects related to e-health applications, the most important of which are the following:

- (a) The use of smart cards as electronic medical records. This is already applied in the ophthalmology surgical hospital, as a first step, and will soon be applied in Al-Basel hospital for cardiological diseases and surgery;
- (b) Designing a special part within the ministry's Web page through which doctors can exchange medical information and consultations. This could be of significant benefit to both citizens and doctors, as it includes lectures on continuous medical learning that are continuously given to doctors in the ministry's hospitals.

The ministry is trying to be an Internet service provider for the Ministry's establishments and offices, and all workers in the medical sector.

The ministry had received financial and technical support, for the implementation of these projects, from the WHO, the EU, the Italian government and the British government.

3. IT at The Ministry Of Finance

The Ministry of Finance (MoF) is considered to be one of the first ministries to use IT in its work. It stated more than 25 years ago, and continues with this approach through the following activities:

- (a) Re-engineering and organizing the document flow in accordance with the automation requirements;
- (b) Guarantee the availability of a trained working group through intensive and continuous courses;
- (c) Gradual automation of financial management systems, starting with the financial department in Damascus and expanding to the remaining departments;
- (d) Linking between the different database, to provide the digital and statistical records about the finance administrations to support decision making;
- (e) Creating communication between the ministry and other related ministries and establishments;
- (f) Rely on the ministry's staff in providing all the requirements for the automation operations, including the data security, maintenance, programming and training.

The current stage of automation in the MoF, which started in the late 90's, includes the development of accounting work in the finance departments in the govern orates, through the installation of a special network in each department and connecting these networks with the ministry. This stage also includes the design and development of the following software:

- (a) Software systems for real-estate and income taxes, and issuing computerized verification tables in all finance administrations in Syria;
- (b) An integrated software system to perform budget schedules, and public and treasury estimations;
- (c) Re-analysis and development of some software applications at the ministry to comply with the changes in business rules and the technical developments;

Through these projects, the ministry aims to computerize all taxation check-ups and collection, supervise the daily work of the tax inspectors, and provide the following services:

- (a) Inquiries about the tax accounts (such as profit tax or income tax) through the network;
- (b) Providing the possibility of tax collection through bank accounts;
- (c) Payment through electronic payment tools;
- (d) Using the e-mail to exchange information with taxpayers.

The ministry provided many training courses to the different levels of its employees, especially to programmers and technicians. The training courses include 3 levels; the managers and decision-makers level, the technicians level (programmers, system analysts, and network engineers), and end users level (such as income inspectors).

4. IT at the Syrian Commercial Bank

The project aims at automating the main administration of the Syrian Central Bank and the work operations of three of its 49 branches, two in Damascus and one in Aleppo.

A contract has been signed, in the last quarter of 2002, with a German company that has a branch in Lebanon, to hand in the complete project. The contract implementation started with the installation of the computer network and setting the servers in the central administration building, and then training began on operating systems and network management.

The central administration network uses fiber optics, and communicates with its branches using leased lines. Connecting the central administration with the branches is not accomplished yet.

The contract includes the provision of computers and installation of a network, in addition to the provision of specialized software for bank operations. It also includes providing intensive specialized training courses to bank employees, and modifying programmes to suit the special requirements of the bank, and data migration operations. The data transfer operations are almost complete. The current value of this contract is around 1 million dollar, and the duration of its implementation is 18 months.

It is worth mentioning here that the bank lacks the qualified human resources that will manage the computer centre. Furthermore, compared to international banks, the Syria commercial bank has many special needs, which makes the way for adopting and coping with international software packages a time consuming and effort taking process.

5. IT at Damascus Governorate

The computerizing operations at Damascus governorate started with performing an analytical study on the work of central administrations and the administrations in Kafar Souseh complex. Based on the results of this study, the design study for the administrative automation that relies on databases and an optical archiving system was completed.

The automation project includes the installation of equipments and a network in the governorate, and a network connection with the Kafar Souseh complex using leased lines. Currently, around 150 computers are available in the governorate and connected with the central network. There are also around 100 computers in the service complex. The governorate has already completed the automation works in part of its administrations and the other parts are in the process of being computerized.

In addition to the implementation of the database and archiving systems, the governorate is using a number of applications that rely on the Geographic Information Systems (GIS), such as the digital address, the infrastructure data (electricity and water networks) and the real-estate management applications.

The governorate, within its project, is linking between the three sub-systems (databases, archives and GIS) for the aim of building a core for the DSS in the governorate.

The governorate relies on its well-trained employees to implement its IT projects. At present, the governorate is performing a pilot project using workflow systems in the field of commercial licensing, and intends to move towards e-government through providing some of its services via the Internet, such as information on construction licenses and building violations.

6. Other IT Projects

Most ministries are following the same trend in computerizing their accountings and administrative operations. The stages of this automation process vary among the ministries; some of them have already laid a comprehensive computerization plan, such as the Ministry of Transport, the Ministry of Tourism and the Ministry of Communications, while others are still at early stages.

B. DIGITISATION OF INFORMATION

In addition to the previously mentioned data entry processes that accompany the implementation of large IT projects; such as the automation of civil registration and automation financial records at the MoF, there are some very important operations related to information digitisation, which include the following:

1. Digital Maps Production

- (a) The survey department produced digital maps at a scale of 1/50000 for all the Syrian lands, and is currently working on producing maps at more accurate scales (1/25000) for some areas, and digital plans for some Syrian cities. These maps are considered to be the basis for the use of GIS applications in Syria, and the criteria for their distribution is currently under preparation;
- (b) The Ministry of Tourism is implementing a pioneer project that uses the GIS for producing a digital map for the old city of Damascus. This map includes more than 30 layers, each containing one type of historical places, buildings and establishments, such as; mosques, churches, religions schools, and baths. Each of these historical places on the digital map is connected to a descriptive record and a group of photographic pictures. This project has reached its final stages.

2. Digital Archiving

A number of bodies such as the Ministry of Foreign Affairs (MoFA), the Ministry Communications (MoC), the Syrian Arab News Agency (SANA), and the National Information Centre have already started their own archiving projects that aim at converting all their paper documents to digital ones. This will enable the access of people interested in these documents and help in protecting the documents themselves from any damage or destruction. The digital archiving system at MoFA is considered to be a great success in electronic archiving as it managed to digitise more than 100,000 documents, and compile an index of these documents to facilitate search and access.

C. E-GOVERNMENT PLANS

There are no real e-government applications in Syria; however, there are few Web sites for some ministries, such as:

TABLE 10. GOVERNMENT WEB SITES

URL	Content
www.syrianeducation.org	Ministry of Education
www.mopmr-sy.org	Ministry of petroleum and mineral wealth
www.syriatourism.org	Ministry of tourism
www.syrecon.org	Ministry of Economy and External Trade
www.min-trans.net	Ministry of Transport
www.teshreen.com	Tishreen Newspaper

D. E-PROCUREMENT APPLICATIONS

The employment and procurement laws in Syria are impeding the development of procurement applications. For instance, in public sector tenders, the technical specifications and the rates publicized on the Internet by certain companies do not meet those approved by the public sectors' establishments. These establishments require certain paper documentations (some are obtained from the internet) that are signed by the bidder company and include the specifications of the offered equipments, to be studied technically and financially.

As for employment, the traditional way of competition is still used in the employment process. Furthermore, there is no computer-based information system in any of the employment offices, to provide information on the available expertise and qualifications among applicants, and enable the establishments to choose the most suitable applicant for the job.

VII. APPLICATIONS IN EDUCATION

A. E-LEARNING

Although the Web site for the Ministry of Education provides educational material that can be downloaded and used in an asynchronous way, this experiment is still limited and needs further attention and development.

A number of the Syrian universities, in addition to the HIAST, are developing projects in the field of e-learning within the framework of the Euro-Mediterranean Information Society (Eumedis) cooperation projects. The MEDFORIST project is one of the most important of these projects, and it aims at training a number of Mediterranean specialized trainers in the field of ICT on designing and implementing projects that could benefit industrial and commercial business management. In addition to the training process, participants in the project will develop an IT work environment, which relies on the Internet and helps in the exchange of information and the sharing of work, provides access to a knowledge-based Mediterranean-shared information database, and makes educational lessons available on the Internet. Countries participating in the development of this project include France (project management), Finland, England, Greece, Morocco, Algeria, Lebanon, Cyprus, Egypt, Jordan, Malta, the Palestinian Authority, Tunis, Turkey and Syria, represented by HIAST.

B. E-SCHOOLS PROJECTS

E-school projects are still under consideration at the Ministry of Education, which, at this stage, is striving to complete its IT network and develop the curricula to be within an interactive matrix and suitable for e-learning.

C. VIRTUAL UNIVERSITIES

A national distant learning initiative was launched in Syria, in May 2002, with the presidential decree that established the Syrian Virtual University (SVU). This helped in grouping efforts for promoting e-learning in Syria. The basic feature of this modern university is that it provides the legal framework for work and the necessary financial resources for developing the national capacity to improve distant learning and provide online curricula.

The SVU is considered to be the first and only recognized Virtual University in the Middle East, which makes it a pioneer and leader in the region in terms of learning through the Internet. It is also an important initiative that provides students with a suitable alternative for learning abroad.

The university's head offices are in Damascus, and its Web site is well designed and organized, and easily accessed. The work of the SVU is based on representing a number of foreign universities, facilitating registration procedures, providing online curricula and making and signing agreements with the foreign universities.

A wide range of students can enrol at the SVU, including high school graduates, university graduates who wish to pursue their studies for a masters or doctorate degree, and employees who want to improve their knowledge in a certain field or even to continue their studies.

The SVU provides its students with curricula from various universities in Canada, America, Britain and France. It also plays the role of an academic mediator through providing students with a highly rendered virtual environment that facilitates interaction between students and teachers, on the one hand; and among the students themselves, on the other hand.

Having 83 distant communication centres, connected to the Internet by ISDN lines, helps the students to get on-line easily. The SVU will provide services to students through a virtual grouping that includes the best of Arab experts and academic teachers in the world. At the same time, students would be supervised, throughout their study period, by academic supervisors who are university professors and qualified to work in a virtual environment.

The SVU has signed partnership agreements with 16 internationally recognized universities, and will soon become a partner with another 40 recognized educational establishments. As for certificates granted by the university, they will be signed and approved by the Ministry of Higher Education in Syria.

This year, around 400 students have registered with the SVU in three different majors: English Language, Internet technologies and time management. An agreement was signed between the SVU and the youth union to establish 14 access centres to serve the needs of the Virtual University students. Most of these centres have already been equipped with computers and communications equipment, and ready for use.

VIII. APPLICATIONS IN COMMERCE AND BUSINESS

A. EXTENT AND MATURITY OF E-COMMERCE AND E-BUSINESS APPLICATIONS

There are no real or active e-commerce activities in Syria, due to the lack of the necessary laws and regulations, and the unavailability of communication infrastructure and facilities for e-transactions (payment). On the other hand, most of the public institutions have recently been partially computerized, which covered a number of standard administrative activities, such as; general accounting, salaries, warehouses, and human resources (personnel records). The lack of local financial resources frequently impedes IT based development efforts. Subsequently, most current IT projects are financed through outside sources.

The lack of local electronic payment systems prohibits electronic transactions through the Internet among companies in Syria.

In Syria, there are no companies using Web sites that are hosted by local servers and that offer e-commerce services. However, there are few companies that offer information about their products through Web sites that are hosted by outside servers. These Web sites can be accessed through the portals mentioned in table 11.

B. AVAILABILITY AND QUALITY OF E-BANKING APPLICATIONS

The e-banking applications and the availability of the means for electronic transactions are considered to be among the most important factors that impede the spread of e-business in Syria.

Banks that are subsidiary to the Ministry of Economic and External Trade, such as; Syrian Central Bank, Syrian Commercial Bank, Cooperative Agricultural Bank, Real-Estate Bank, Public Credit Bank, Industrial Bank, and the Saving Bank, are gradually automating their banking operations.

The Real-Estate bank started the implementation of a pilot project to provide credit cards, and started by installing three ATMs, two in Damascus and one in Aleppo. The bank has also issued prepaid cards in Syrian currency for its customers. Furthermore, an agreement was signed between the Real-Estate Bank and the Syrian Commercial Bank, which is the only authorized bank to deal with the foreign currency, to upgrade

the ATMs to accept international credit cards such as the Visa and Master Cards. Work is also underway to increase the number of ATMs and the number of banks participating in the project.

Government banks are expected to accelerate the pace of work to move towards e-banking applications and improve their services, in order to keep up with the three private banks that were lately allowed to operate in Syria.

IX. APPLICATIONS IN HEALTHCARE

A. DATABASE FOR NATIONAL HEALTHCARE

Some healthcare institutions, such as the University Hospitals, have begun using IT in some of their activities through partial automation projects. However, these projects are still in their early stages and not yet well developed to be considered as a national database for medical services.

Currently, there are no real Web sites for medical institutions, though some portals offer brief and summarized information on some hospitals such as the address and telephone numbers.

There are also some Web pages that provide medical news and updates, such as; www.syrialine.net/health, lists the hospitals of the big cities such as Damascus and Aleppo, such as; www.damascusuniversity.edu/br_hos.html and www.syrilivenet/health/hospitals.

On the other hand, most pharmaceutical companies have stronger presence on the Web through their own Web sites, such as:

TABLE 11. PHARMACEUTICAL COMPANIES WEB SITES

Company	URL
Ibn Zoher	www.avenzor.com
MBC	www.mbc.com
Alpha (Aleppo medical industry company)	www.alphasyria.com
Obari pharmaceutical company	www.oubari.com

Currently, the Ministry of Health is developing a healthcare project within the framework of the Eumedis initiative and in collaboration with the HIAST. The project's name is PARADIGMA -Participative Approach to Disease Global Management, and it aims at formulating and publicizing a national and regional programme for initiatives related to public healthcare policies, through establishing an IT infrastructure that supports healthcare systems in the Euro-Mediterranean region. The studies, programmes and techniques will be applied to three widespread bacterial diseases in the Euro-Mediterranean region.

The countries participating in the PARADIGMA project include Italy (project management), England, Sweden, Turkey, Tunisia, Egypt, Jordan, Syria and the ESCWA member countries. The HIAST and the Ministry of Health in Syria are also taking part in this project.

B. TELEMEDICINE MEDICAL USE OF TELECONFERENCING

The telemedicine applications are still not available in Syria; however, it is within the plans of the Ministry of Health to enable medical doctors to exchange consultations as well as medical information through its Web site, which will contain the continuous medical learning lectures that are always given to doctors working in the ministry's hospitals.

X. DIGITAL ARABIC CONTENT

The Syrian Web sites are mainly those sites made by the private sector or individuals. The government's Web sites hardly exist except for the ones that include general information about some public institutions. On the other hand, one can find some Syrian portals that offer addresses of sites in various fields; however, generally speaking, the Syrian sites need to be more interactive and one cannot yet start talking about e-commerce or e-government applications.

Most Syrian sites are hosted by servers outside the country and mainly in the United States, with the exception of the SVU site, which is hosted in Dubai and mirrored in Damascus University. There is also the radio and television site, which is presumably locally hosted.

In the end of September 2002, the STE announced the start-up of the service of hosting sites on the .sy domain, which would certainly help public establishment in getting their own sites under .gov.sy instead of .com or .org domains.

Portals:

There are many Syrian portals, each providing links to a group of companies, whose sites are hosted and run by the company that manages the portal. The Syrian portals usually offer local information in many fields; especially those related to business and news, and some entertainment such as music, cinema, and television. Most of these portals allow for an in-site search or offer a connection to a universal search engine.

Some of the Syrian portals, and few examples of commerce and services sites are listed in the Tables 12 and 13.

TABLE 12. SOME SYRIAN PORTALS

URL	
www.syriagate.com	www.visit-syria.com
www.syiaonline.com	www.cafe-syria.com
www.syria-on-line.com	www.syriainfo.com
www.syria-online.com	www.syriamart.com
www.syrialive.net	www.syria-guide.com

TABLE 13. SOME COMMERCE AND SERVICES SITES

Content	URL
Chambers of commerce union in Syria	www.fedcommsyr.org
Damascus chamber of commerce	www.dcc-sy.com
Damascus chamber of industry	www.dci-syria.org
Syrian consultation bureau for investment & development	www.scbdi.com
Attorney bureau in Damascus	www.khordaji.com
Photography studio	www.syrianshopping.com/vs/ahmad.html
Textile industry guide in Syria	www.syr-textile.org
Fabrics and clothes industry guide in Syria	www.arab.business.net/syrian_textils
Syrian commercial sites guide	www.syriagate.com/syria/business_and_economy/trade
News guide and media services	www.syriagate.com/syria/news_and_media

Furthermore, there are Syrian sites for marketing, food, tourism and travel, and some cultural and entertainment sites, news agencies and Syrian newspapers sites, pharmaceutical companies sites and introductory sites for government establishments.

A. USE OF ARABIC LANGUAGE ON NATIONAL SITES

Precise statistical information on the number of Syrian sites is not available because most of these sites are hosted outside. A study conducted on a sample of these sites showed that most of them provide two interfaces, one in Arabic and the other in English, and some sites only use the English interface. The content of these sites is generally poor and not up-to-date (or relies on other sites for its updates), and contains many grammatical mistakes, especially in the English version.

B. OBSTACLES OF ARABIC CONTENT DEVELOPMENT AND WAYS FOR REMOVING THEM

The obstacles that impede the development of Arabic content are associated with many aspects, including the infrastructure and legislations, and the regulatory structure, which will be discussed hereafter. There are also other obstacles, such as the social and cultural factors, that fall beyond the scope of this study.

C. INFRASTRUCTURE

The telecommunication infrastructure in Syria is considered to be acceptable compared to that in the neighbouring countries and low-income countries. The basic fixed phone network services are also acceptable, although penetration is still fairly low. On the other hand, modern services, such as mobile phone and Internet access, still suffer from weak penetration rates and high prices, that add to the generally high rates of international calls. New services, such as the broadband services, are also weak in Syria, especially for business establishments. Furthermore, the pricing policy followed by the STE is not balanced. Another weakness lies in the market structure since, to date, there is no official body that works independently from the operators and takes the responsibility of organizing the communications sector. Furthermore, there is deficiency in the commercial capabilities, weakness in the customer oriented care approach from the main operator (STE), unavailability in the required well-qualified human resources, and difficulty in keeping the already available capable staff due to the low salaries and incentives.

D. HUMAN RESOURCES

The IT in Syria lacks the necessary qualified staff in ICT field; and the “competence/efficiency average” in the STE is estimated to be about 12 workers for every 1000 subscribers, which is relatively a low number when compared to the world average. There is a significant need to train the staff in the different ministries, establishments and companies in the IT and computer use, and in foreign languages, especially English language.

E. LEGISLATION STRUCTURES

The lack of laws and regulations that protect the privacy and security of communications is a significant obstacle in the way of developing Arabic content on the Internet. In addition to this, there is no general legal framework that governs e-transactions and e-documentation (example: e-signature). What is more important is the lack of a regulatory framework that defines the services given to ICT users and the profits that could be obtained by those who work in developing Arabic content on the Internet.

Despite the issuing of the presidential decree concerning intellectual property rights, there are no executive instructions for its implementation and enforcement. The absence of these instructions impedes the introduction of e-products, that require protection, into the country, and prevents the establishment of software industries that are specific to the internal market.

The detailed analysis of administrative procedures and the close cooperation among ministries are essential for the formulation and issuance of the laws, legislations, and regulations that permit the use of electronic tools in business operations.

F. REGULATORY OBSTACLES

The regulatory obstacles are clearly noticed in the lack of coordination among ministries or sometimes the various responsible departments in the same ministry. The absence of documentation and standardized work procedures that allow the progress of work towards a unified target, sometimes leads to the repetition of projects and waste of resources.

However, these obstacles can be confronted through some practical and applied mechanisms that suit the Syrian status and help in the movement towards an information society, which would eventually lead to the development of the Arabic content on the Internet. The most important of these mechanisms include the following:

1. Concentrating on collecting, publishing, and regularly updating information covering the social, economical and institutional themes. In addition, providing access to information and making efforts towards the establishment of information service centres.
2. Spreading and emphasizing the use of IT in a way such that it results with benefits to the society especially in the areas of e-learning, distant learning and e-health, and concentrates on initiatives in e-services.
3. Widening Internet access and use for all social groups, businesses and regions, in addition to establishing the English/Arabic portals that serve the economic needs of Syria, and starting cultural and intellectual portals, which will help Syria become a knowledge-based society with a solid economy.
4. Promote IT industry:
 - (a) Prompt the development of high quality professional software that helps the comprehensive and integrated automation of government establishments;
 - (b) Software Arabization, and the design and implementation of some Arabic related software, such as; automatic search and translation, and speech recognition.
 - (c) Preparing cultural and educational encyclopaedias in different fields, especially the historical, Arabic and Islamic fields.
5. Activation of computer and network equipments industry: Launching agreements and partnerships with some of the international companies to produce some hardware, in accordance with the international standards to help the marketing and export of these products to other countries, especially the neighbouring ones.
6. Orientation of primary and higher education towards IT:
 - (a) Pre-collage education: Encouraging the use of computers in teaching to motivate the new generation to use IT and Internet in the learning process;
 - (b) College education: Endeavouring to prepare and train specialized IT staff.
7. Encouraging training in IT and languages: Preparing national training programmes for both public and private sectors to develop the capabilities of employees, especially public-sector engineers, in the efficient use of information technology and the Internet.
8. Modernizing work procedures in the industry and economy sectors through the use of IT for attaining improvements in work performance and enabling the Syrian product to compete with its likes at the regional and international levels.
9. Focusing on e-commerce applications and finding ways to develop them: Starting e-commerce in Syria and developing its supporting infrastructure, such as; enhancing roads, developing postal services, and facilitating the mechanisms related to taxation and customs on imported goods.
10. Establishing technology incubators, resource centres, and centres of excellence in the field of IT, which provides the youth with access to the labour market. External aid and international organizations can help in financing these projects, and the experience of neighbouring countries could be of benefit. Moreover, the e-business incubators in general and the virtual incubators could be a good starting point for such initiatives.
11. Issuing laws and legislations for the IT sector:
 - (a) Enforcement of the Syrian intellectual property laws;
 - (b) Issuance of laws that regulate the import and export of software products, and make efforts to exempt software from taxes in an attempt to support the software industry;

- (c) Promote consumer protection regulations;
 - (d) Issuance of laws that regulate the exchange of information and network security at the national level;
 - (e) Issuance of special laws related to IT investments;
 - (f) Issuance of laws and legislations for e-commerce, and benefiting from similar experiences in other countries;
 - (g) Issuing laws and regulations for e-signature and authentication.
12. Developing government performance and encouraging the establishment of national data banks, and providing the necessary resources for that purpose.

XI. ROLE OF GOVERNMENT IN DEVELOPING THE INFORMATION SOCIETY

The government has an important role in formulating visions, policies, and national strategies, and making the necessary executive plans for movement towards the information society. Ministries in Syria are currently taking serious measures for formulating ministry specific policies that ensure this change. Furthermore, Information Technology-related ministries are trying to formulate the national ICT strategy, in collaboration with western countries or international organizations.

In 2001, the Ministry of Higher Education, in collaboration with the British Council, has identified the basic ICT needs for Syria. The assessment of ICT needs arrived to a number of important results that clarify the means of using these technologies for economic and social development, moving towards e-government, and incorporating e-commerce activities in Syria after creating the suitable enabling environment.

With the help of the UNDP, the Ministry of Communication is currently formulating the national Syrian strategy for the use of ICT in economic and social development. The first stage of this project has already finished, and it concentrated on the assessment of the situation and needs in many ministries, with the aim of defining the main features of the ICT national strategy in Syria.

The government also holds a significant role in giving the information society special importance in its annual plans and the national medium-term and long-term plans, and in all the economic sectors and vital fields.

The information society receives special emphasis in Syria, which is apparent in the economic reform programme that was issued in June 2002, and the ninth five-year plan, both of which have included a number of reforms that directly or indirectly serve the development of the Syrian society towards an information society. Some of the articles that relate to this development plan include the following:

- (a) Updating laws, and removing the bureaucratic obstacles that impede the flow of local and foreign investments and hinder the mobility of public and private capitals. Furthermore, promoting and offering better work opportunities to the private sector, and realizing public sector competitiveness in the external markets;
- (b) Using modern administration techniques and renovating administrative work in a way that meets the requirements of reform and economic and social development;
- (c) Administrative training and rehabilitation of staff to improve their qualifications and provide them with the required technical and administrative skills;
- (d) Establishing developed management information systems in the different ministries and public establishments. The systems would provide decision makers with the basic tools and the required information that could help them in solving problems and support them in the decision-making process.

- (e) Commissioning a central or a higher-level committee to formulate a plan to change into an e-government;
- (f) Introducing local producers in the different economic sectors to e-commerce and exploring the opportunities that could result with higher national exports;
- (g) Providing the suitable investment environment with its legal, financial, human, and banking elements;
- (h) Simplifying administrative governmental procedures for investors who wish to obtain project establishment permits. This could be achieved through the one-stop shop between the investor and the investment licensing body;
- (i) Giving special importance and treatments to economic projects implemented in rural and remote areas, and prolonging the tax exemption period for these areas. This could help in placing economic projects in dense labour-force areas and creating a balance in the distribution of projects among the Syrian governorates.
- (j) Examining the possibility of establishing specialized industrial, technological and scientific areas, which could support economic development, promote technology, knowledge and investments, and provide more work opportunities;
- (k) Developing the types of higher education (e-learning, open universities,.. etc).
- (l) Broadening information databases and quantity and quality indicators in the social services sector, and promoting their use and application, for the aim of monitoring population programmes. In addition, developing the technical skills of the national institutions and labour force working in the field of planning, implementing and following-up on the population policy;
- (m) Strengthening the role of women in social and economic development, and increasing her participation in public life and in decision-making positions;
- (n) Training workers in the media sector and utilizing IT techniques for the development of the media institutions;

The government also has a significant role in proposing certain national projects and programmes that help in the movement towards the information society, and in providing the necessary facilities and resources for the success of project implementation.

A. ROLE OF SOME MINISTRIES IN BUILDING THE INFORMATION SOCIETY

Ministries in Syria have different, yet integrated, roles to contribute to the movement towards the Information Society. The current role of some ministries is as follows:

Ministry of Communications: Improving the telecommunications infrastructure, spreading the use Internet and its applications in a way to serve economic and social development, and promote and guide the use of IT in the different government ministries and institutions.

Ministry of Education: Raising awareness in the proper IT culture, and preparing the new generation to use ICT in the everyday life.

Ministry of Higher Education: Preparing the required technical skills for developing the information society, especially in the ICT field, and qualifying university staff to use IT within their fields of specialty.

Ministry of Interior: Utilizing ICT for improving public services.

Ministry of Economy and External Trade: Organizing, activating and promoting e-commerce, and adopting electronic tools as one of the ways for commercial transactions and exchange.

Ministry of Finance: Reducing fees and taxes on ICT-products, such as computers and software.

Ministry of Justice: Building a database for ICT related laws and legislations.

Ministry of Industry: Using IT for improving the quality of industrial products and the overall performance.

Ministry of Health: Using information systems for the ministry's studies and statistics, and developing e-health especially in the fields of healthcare and medical consultation.

Ministry of Culture: Spreading culture in the society through the use of ICT.

Ministry of Tourism: Improving services and promoting tourism in Syria through the use of ICT.

All ministries have a considerable role in e-government and in the use of ICT to improve their work, services and performance.

B. MAIN GOVERNMENT ACHIEVEMENTS IN THE MOVEMENT TOWARDS THE INFORMATION SOCIETY

The most important ICT related achievements in Syria, in the last few years, are briefly listed below:

- (a) Establishment of computer engineering faculties and IT departments in the different Syrian universities, to prepare specialists to be the core of IT development;
- (b) Establishment of IT specialized intermediate-institutes to cope with the comprehensive development plans that rely on ICT;
- (c) Teaching IT subjects, using modern techniques, in the faculties of higher education institutions, and in the primary and secondary school education;
- (d) The national IT programme that enrolls up to 300,000 citizens, and provides curriculum leading to the ICDL;
- (e) The telecommunication infrastructure development projects;
- (f) The higher education network (SHERN) that links the Syrian universities to a data network, which is considered the backbone IT modernization and development in the institutions of higher education;
- (g) The Syrian Virtual University, which is considered to be a major leap at the level of higher education. It utilizes the highest technologies for providing specialized and advanced educational curricula in collaboration with international universities;
- (h) The smart medical card that allows a patient to carry his own medical record everywhere, inside or outside Syria, and can be updated through the Internet;
- (i) Automating civil registration project that helps providing many services to the citizens, such as; establishing the national number and issuing the civil record of citizens anywhere regardless of the place of birth.

C. CURRENT PROJECTS

- (a) National ICT Strategy project: The Ministry of Communications (MoC) in collaboration with the UNDP is preparing a draft for the national ICT strategy. Most of the data was taken from the preliminary studies made by the national work team and the government's ministries. Work on this project started in July 2002, and is expected to finish by mid 2003. The allocated budget is US\$ 40,000;
- (b) Programme for ICT use in economic and social development: The MoC in collaboration with the UNDP also carries out this programme. It includes the implementation of five different components that facilitate the use of IT in society. The components include electronic equipment standardization,

development of Internet portals to serve local and especially rural communities, establishment of Internet access and information centres especially in rural areas, specialized training programme for providing Internet services, and the setting up mobile training units. The budget allocated for the project is US\$1,250,000, and the duration of implementation is three years, which started in July 2002. The Ministry finished the first phase of electronic equipment standardization, and most of the data in this report was taken from the project's e-equipment report;

- (c) Public Data Network project (MoC and STE): The project has the capacity of 250,000 subscribers that can be expanded to 800,000 subscribers;
- (d) Public Computer Project: The project was launched by the MoC, in the middle of 2002, and aims at establishing a digital society in Syria through providing Internet access to many citizens (around 250,000 at a first stage). The project offers a package including a computer and a connection to the Internet, at a considerably cheap price (with a possibility of gradual payments). Many private ICT companies and public banks were contacted to finance this project;
- (e) Telecommunication Sector Support Programme (TSSP) (MoC and STE): The project aims at developing the STE's abilities and its general performance in ICT. Financed by the European Union, with 10 Million Euros, the project started in May 2002 with a 3-year implementation period. It includes 3 programmes, mostly in training, namely; the telecommunication development programme, IT development programme, and network improvement programme;
- (f) EUMEDCONNECT Project: The project aims at connecting between scientific research networks in the Mediterranean region and the European scientific research network, GEANT. This would therefore connect the Syrian network SHERN with the scientific research networks in the Mediterranean region. The project is implemented within the framework of the Eumedis initiative. In Syria, the Ministries of Higher Education and Communications and the HIAST participate in this project;
- (g) E-village (Ministry of Higher Education): The project aims at preparing Syria for the move towards the information and knowledge-based age and economy. Special feasibility studies were conducted to explore and verify the possibilities for project success, the scope of its sustainability and development, and its ability of being self-financed;

The e-village will have a highly developed ICT infrastructure, including:

- (i) National and international telecommunications, extending Internet applications services, storing data and others;
- (ii) Ordinary and virtual universities;
- (iii) Basic infrastructure, such as; electrical supply, suitable urban and environmental planning, and others.

Basic government services will be provided electronically. Furthermore, the required amendments to e-commerce laws that guarantee that the tax transactions in the e-village are similar to those in the investment laws 7 and 10.

The e-village will be built in the suburbs of Damascus, covering 350 hectares of land that is expandable to 600 hectares.

The investors in the e-village will primarily be the IT companies that perform a number of activities for software and content development and provision. These companies could significantly benefit from the available developed services and the highly IT qualified labour force in Syria.

- (h) E-library: The Ministry of Higher Education works on the establishment of a modern e-library that links between higher education institutions in Syria and a number of e-magazines, databanks and international indexes, which enables teachers, researchers and students of having an immediate

access to an immense source of updated information. This access to information is a principal requirement for an information society and a basic condition for the establishment of a knowledge-based economy.

- (i) The Ministry of Education Network links between the education departments in the Syrian governorates and the ministry, on one hand, and between schools and the education departments in the region, on the other hand. The whole network is then linked to the Internet;
- (j) The Virtual Museum in Syria (Ministry of Culture) aims at putting the map of Syria on the Web, in a special site designed to provide access the Syrian culture, tourism, and historical and artistic places of attraction. This includes the Syrian folklore, parks, and all other activities that attract tourists. This project is expected to significantly affect the way the image of Syria is presented to the world. Therefore, it is an extremely important project, and in order to achieve its objectives, it requires the cooperation and collaborative work between a number of bodies, including the Ministries of Tourism, Culture, and Information, and the private sector establishments. The project will eventually benefit the tourism and culture industry in Syria, and serve many other social and economic purposes;
- (k) The Information Technology Kiosks project (Ministry of Tourism): The project aims at placing IT kiosks in tourist information centres, museums, airports, and hotels, to provide tourists with information on the locations and rates of hotels, restaurants, and tourists places. Five kiosks will initially be placed in Damascus;
- (l) The Digital Maps Project: The project aims at producing and updating the digital maps of Syria, and utilizing them at the different ministries and establishments for adding information about Syria. The project will be useful in many government activities, and will be a basis for decision-making support systems;
- (m) Mediterranean by Internet Access Project (MEDINA-EUMEDIS): This project is financed by the European Union and aims at establishing a Euro-Mediterranean Information Society through the development of a tourist portal. Eleven European countries and six Mediterranean countries - Syria, Jordan, Egypt, Lebanon, Algeria, and Morocco, participate in this project. Participating countries can enter their data, according to specified scheme, on this portal, which will to marketed and made available to all tourists everywhere in the world. The project duration is 3 years, and its implementation started in 2002;
- (n) The Information Bank project (Ministry of Commerce and External Trade) includes information and reports that serve the Ministry's administrative procedures and help its decision-making process. The bank also includes internal e-mail, e-records and an e-archive for the important laws and legislations.

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Annex I

TABLE OF INDICATOR VALUES

Indicator	Y2000	Y2001	Y2002
1. Basic Background Indicators			
1.1 Population	16.19	16.61	17.04
1.2 Area	185180	185180	185180
1.3 Density	87	90	92
1.4 Urban population	54	-	45.1
1.5 Adult Literacy	74	75	-
1.6 Poverty	19.8		
1.7 GNI per capita	950	1010	-
1.8 GDP Growth	2.7		
2. Telecom Infrastructure			
2.1 Fixed lines (total)	1666982	1810756	2095508
2.2 Domestic (lines per household)	-	-	1717000
2.3 Urban (%)			1,675,000
2.4 Waiting list (total number)			2671412
2.5 Waiting time (average)	5 years	5 years	5 years
2.6 Revenue per line (\$)			195.6
2.7 Cost of local call (\$ per 3 minutes)	0.006	0.006	0.006
2.8 Cost of call within region (\$ per 3 minutes)	0.144	0.144	0.144
2.9 Cost of call to US (\$ per 3 minutes)	4.5	4.5	4.5
2.1 Number of fixed lines operators	1	1	1
2.11 ISDN lines	-	-	1386
2.11.1 Initial cost (\$)	-	-	40
2.11.2 Monthly charge (\$)	-	-	2
2.12 DSL lines	-	-	-
2.12.1 Initial cost (\$)	-	-	-
2.12.2 Monthly charge (\$)	-	-	-
2.13 Leased lines	-	-	-
2.13.1 Initial cost (\$)	-	-	-
2.13.2 Monthly charge (\$)	-	-	-
2.14 Cable	-	-	-
2.14.1 Initial cost (\$)	-	-	-
2.14.2 Monthly charge (\$)	-	-	-
2.15 Outgoing traffic (minutes per subscriber)	-	-	88.76
2.16 Incoming traffic (minutes per subscriber)			
2.17 Mobile lines	1.9	11.6	23.5
2.18 Number of mobile operators	2	2	2
3. Media Infrastructure			
3.1 Radios	4.15 million (1997)	-	-
3.2 Television	1.05 million (1997)	-	-
3.3 Satellites	2000000	225000	250000
3.4 Daily Newspapers	320000	340000	400000
4. Computers and the Internet			
4.1 Personal computers	245000	265000	300000
4.2 Personal computers in education	8200	8850	10000
4.3 Percentage of computers that are networked	8.1	9	10

Annex I (continued)

Indicator	Y2000	Y2001	Y2002
4.4 Internet subscribers	8000	10000	73000
4.5 Internet users	24000	30000	200000
4.6 Internet hosts	-	-	10
4.7 ISP's	1	2	2
4.8 ISP monthly charges (\$)	34	24	16.8
4.9 Telephone usage charges (\$)	4.8	4.8	4.8
4.1 Available national bandwidth	56 Kbps	56 Kbps	2 Mbps
4.11 Hosting availability	No	No	Yes
4.12 Secure servers	No	No	No
5. ICT expenditure			
5.1 Telecom expenditure (million \$)			
5.2 IT expenditure (million \$)			
5.3 Percentage of GDP (%)			
5.4 ICT per capita (\$)			
6. Capacity building			
6.1 Scientists and engineers in R&D			
6.2 R&D expenditure (% of GNI)			
6.3 ICT related university graduates per year			
7. ICT government and business environment			
7.1 e-readiness index			
7.2 e-government index			
7.3 IPR enforcement	Moderate	Moderate	Moderate
7.5 Compliance with WTO			
7.6 Basic telecom agreement			
7.7 Reference paper			
8. Laws and regulations			
8.1 Patent law	Yes	Yes	Yes
8.2 Trademark law	Yes	Yes	Yes
8.3 Copyright law	No	Yes	Yes
8.4 IT Agreement	No	No	No
8.5 e-Commerce law	No	No	No
8.6 e-Signature law	No	No	No
8.7 Piracy rate			
9. ICT Policy			
9.1 ICT strategy	Moderately Defined	Moderately Defined	Moderately Defined
9.2 ICT Plan of action	Yes	Yes	Yes
9.3 National initiatives	Yes	Yes	Yes