Distr.
LIMITED
E/ESCWA/ICTD/2009/12/Add.11
14 December 2009
ORIGINAL: ARABIC

**ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA (ESCWA)**

# NATIONAL PROFILE OF THE INFORMATION SOCIETY IN THE SUDAN

United Nations
New York, 2009

09-0552

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## Introduction

Sudan is the largest country in the African continent. It lies in the north-eastern part of Africa. The area of Sudan is about 2.5 million squared kilometers, which represents about 8.5 per cent of Africa. According to the 1993 census, the population of Sudan is 35 million; existing religions are Islam, Christianity, and local beliefs. Languages used are Arabic, English, and local dialects. Sudan consists of 25 states, as shown in Figure1, and the Capital is Khartoum.

**Figure 1 – Sudan administrative states**


Sudan suffered from internal conflicts which started with war in the south lasting for more than 50 years. Consequently, the process of development in Sudan was badly affected and late in pursuing the information and communications revolution. Other conflicts in eastern (Darfur) and western Sudan added more damage and contributed in a negative way. Due to security threats, the spread of ground cables and fiber optic lines was constrained. In spite of that, and because of the good efforts made by the Sudanese Telecom Company, work continued and the network was expanding over huge areas.

The Sudanese economy depends largely on agriculture and oil sectors. Together these two sectors form about 64 per cent of the total local product. The public sector now plays a growing role in the economy. However, the Sudanese government greatly encourages the private sector to participate in the national economy as well. In the last few years, the government has taken a number of initiatives to promote investment and capital flow in the development process. In this respect, the government issued a number of laws to encourage and attract investors, like exempting or reducing taxes of some imports such as transportation, construction equipment and factories.

Sudan is a strong believer in the pioneering role of information technology (IT) in the development and progress of the country. Therefore, Sudan is exploiting the best chances available for using IT for development, trying to be at the forefront in this field. This was evident in the forming of a national committee for following-up the implementation of the national strategy for information from within the Ministers' Council. It consists of a number of experts in the field of IT in Sudan. This committee launched several initiatives for making comprehensive use of information and communications technology (ICT). This is expected to help Sudan become a pioneering knowledge based society.

The government of Sudan recognized that there is a growing role for ICT and its services in the development and progress of nations. Since the early nineties, the government of Sudan has recognised the importance of ICTs and made every effort to reform and liberate the sector. This has led to big achievements and a step forward in the right direction.

## I. THE ROLE OF THE GOVERNMENT AND ALL STAKEHOLDERS

### A. NATIONAL INFORMATION SOCIETY POLICIES AND E-STRATEGIES

The efforts of the Sudanese government and its move towards establishing the society of information can be reviewed through the following:

#### 1. *Saving the economy program from 1990 to1993*

A conference in which all specialists in the field of economy, experts from all parts of Sudan and the Sudanese working abroad in international organizations, were invited to discuss an ambitious plan for the revival of Sudan in the field of communication. The conference recommended privatizing the communications and information sector in Sudan, giving the private sector the chance to participate in the revival of the sector, and launching initiatives in this respect to revive the sector and to modernize it. This was carried out in an effort to bring the sector up to current standards and inline with the latest developments in the field of ICT.

#### 2. *The formation of the National Telecommunications Corporation in 1991*

This corporation holds the responsibility of disseminating ICT and knowledge in various sectors of Sudanese society and services presented to the public.

#### 3. *The establishment of the Sudanese Telecommunications Company*

This was a big step taken for developing the Sudanese communications infrastructure, and to exploit the Sudanese revolution in communications and information in an effort to revive other sectors such as education, agriculture, health, etc.

#### 4. *The establishment of the National Telecommunications Commission in 2001*

After establishing the Sudanese Telecommunications Company, and the emergence of many other companies in the field of providing services to the public, it was apparent that there was a need for an independent commission to take care of regulating this sector. The establishment of the National Telecommunications Commission was agreed in 2001. This Commission carries the heaviest burden in presenting plans and supporting programs for implementing the strategy of the State, in an effort to benefit from the ICT revolution in serving the Sudanese. The establishment of the National Telecommunication Commission represented an important and fundamental step in the Sudanese government’s move towards taking care of the field of communications and information. In its early days, the Commission faced a number of difficulties and complications, which came as a result of the juvenility of the information field in the country, in addition to a number of economical and social circumstances that prevailed in Sudan at the time. As a result of the aforementioned challenges, the capabilities of the commission were constrained.

#### 5. *The establishment of the Ministry of Sciences and Technology in 2002*

The responsibility of overseeing the field of IT, namely in areas of research and technology was added to the ministry’s list of responsibilities, which include the other sciences, agriculture and animal research and technology transfer and development.

#### 6. *The establishment of the Ministry of Information and Communications*

It ministry was established after the peace agreement with the people's movement of south Sudan. Among its duties, one is to lay down the policies of communications and find ways of regulating them. The National Telecommunications Commission is one of its largest sub-organizations as well as the Sudanese

Radio and TV Corporation. The strategy of the Ministry concentrated on facilitating the communications services. The Ministry, through the National Telecommunications Commission, was able to launch several initiatives.

### 7. *The National Information Center*

The second World Summit for the Information Society, which was held in Tunisia, helped the Sudan to adopt many of the principles, goals, and recommendations of the summit. Ultimately, this led to the establishment of the Center. The Center is considered one of the largest institutions working under the command of the Ministers' Council and is the main implementing body for many strategies in the field of IT.

## B. PUBLIC/PRIVATE PARTNERSHIP (PPP) OR MULTI-SECTOR PARTNERSHIP (MSP)

The Sudanese national strategy was designed in a way as to strongly support the ICT industry. The recommendations of the 1989 conference of the economy sector pointed to the necessity of including the private sector in the national economy. The outcome of this conference, as a unique case in the Arab world and the region, was the establishment of the Sudanese Telecom Company, as a collaboration between the public and private sectors. The partnership started with the public sector holding 67 per cent and the private sector holding 33 per cent. In 2007, the public sector was holding only 26 per cent against 74 per cent for the private sector. Also, in the Sudanese Mobile Telephone Company (Zain), the public sector held only 15 per cent against 85 per cent for the private sector. This is clear evidence of the good partnerships in Sudan which encourage advancement in the application of the strategies of information and communications.

The following initiatives are currently in progress:

- "A computer for each family" project;
- "Schools computers" project;
- "E-Government support" project.
- "Universities information network" project;
- Including the establishment of total service centers to the plans of licensed companies’ across the country.
- The bank network project which is led by the banks union and includes smart card services and e-Banking.

## C. ROLE OF NON GOVERNMENTAL ORGANIZATION

NGOs play an effective role in developing the communications and information sector in Sudan to achieve the Sudanese information society. There are several NGOs in Sudan such as: the Gedaref Digital City Organization, the Sudanese Organization for Information Technology, the Sudanese Internet Society, and the Sudanese Society for Information Technology. NGOs cooperate amongst each other and with the public sector to implement several programs and projects in order to make use of ICT for development, in developing the software industry, in increasing the digital content on the Internet and increasing its effectiveness.

## D. PROGRESS ACHIEVED IN THE REALIZATION OF THE NATIONAL POLICIES AND STRATEGIES

The year 2001 witnessed the state's declaration and endorsement of the national strategy for building the information industry in Sudan. This was approved at the highest level, and it was endorsed according to the ministers council resolution number 19 dated 19 July 2001. This resolution ordered the formation of a high ministerial committee to follow-up the strategy and the formation of another technical committee, from ministries and other related institutions, to lay down the implementation programs and to recommend them

to the high ministerial committee.

The approved strategy adopted the following vision: "to achieve a society of information based on a strong base of informatics industry, which would enable all stakeholders in the society to access information means which would lead to the spread of information, its dissemination and use on the widest scale. This will lead to economical growth, growing wealth, increasing job opportunities, improving quality of production in all sectors, and eradicating poverty. It will also create an information and knowledge society capable of integration, interaction, and competition with the international information society and its economies".

The Sudanese government established the National Telecommunications Commission, the National Information Center, and prepared a complete strategy to make use of ICT. This strategy was based on several themes. The most important of which was the establishing of the institutional, legislative, and regulatory framework which would achieve an open and transparent structure so as to enhance competition, innovation, skills, capacity building, and develop human resources that are capable of responding and interacting with the requirements of the informatics age. This would be achieved through continued education, training and developing the infrastructures necessary to create information networks that guarantee easy access through a free competitive market using modern technology with its services and applications.

This strategy called upon the adoption of financial, economic, commercial, educational, industrial and information policies that encourage and support the targeted objectives.

TABLE 1 - PROGRESS ACHIEVED IN FIXED AND MOBILE TELEPHONE SERVICES, 1993-2007

| Type of service | Year | |
|---|---|---|
| | 1993 | 2007 |
| Fixed services | 60,000 | 580,000 |
| Mobile telephone lines | 0 | 9,968,877 |
| Total | 60,000 | 10,549,301 |
| Penetration rate of both types of telephone services | 29.3% of total population | |

The Ministry delegated to its commissions, which were established for this purpose, the task of implementing this strategy according to each of its specialties. One of these commissions is the National Telecommunications commission which aims at:

- Bridging the digital gap via ICT;
- Encouraging and regulating work in the information and communications sector so as to enable it to play its full role through laying down laws that regulate the work of this sector and monitor and control its practices through the Commission's divisions;
- Merging the rural communities through ICT in order to enhance development and modernization;
- Achieving the information society through establishing an advanced competitive environment and preparing a suitable environment for companies to compete amongst each other in serving our citizens;
- Developing and improving ICT industry on the national level;
- To work on transferring and using the advanced IT;
- Developing investments in the field of IT.

## II. ICT INFRASTRUCTURE

### A. INFRASTRUCTURE

As concerns the infrastructure, the steps for implementing the approved strategy has so far led to the following achievements:

- In order to create a fair competition, in 2001 a license which was granted to the Sudanese Telecommunications Company (Sudatel), for preventing competition in the field of mobile telephones. This license was cancelled and so was the license that prevented competition in the field of international communications (international outlets) at the end of October 2005;
- As well as the company Mobitel, a license was granted to a second operator in the field of mobile phones (Albacha'yer company, Areeba). As well as Sudatel, a license was granted to a second operator in the field of fixed communications (Canartel);
- Granting license to several ISPs and added value services;
- Establishing the National Information Center. The law for the National Information Center was issued in 1999. It is directly related to the presidency of the council of ministers. It works on projects related to ICT and effectively participates in developing and implementing the State's strategy in the field of information. It is considered the highest reference level in decision making, concerning policies, structures, financing, approving plans and projects and approving general performance reports. It consists of a president and 9 members;
- Creating experimental applications in the field of education and remote medication through the Sudatel network;
- Approving the transfer to wideband networks and working on keeping up to date with today's world which is characterized by the intertwining between the technologies and services of communications and information.

Sudan is connected through a fiber optic network, with a length of about 11,000 kilometres; it connects Sudan with Egypt, Ethiopia and Eretria in addition to the Chadian borders. Sudan is connected with a network across the Red Sea which links it to the world through a fiber optic line in Saudi Arabia.

As concerns the infrastructure and network, the Sudanese government established the national network which connects together 14 states. A number of stages of the Sudanese Universities Network were also implemented and thus12 universities were interconnected. This would assist and contribute to its connection with the Arab and international universities' networks. The project was under the patronage of the Arab Countries' League. Private sector companies were also given permission to establish informatics networks. This would enable economic communications that are approved and that use artificial satellite technology, television and radio networks and informatics transmission. Moreover, permission was given to more internet service providers (ISPs) to enable them to provide all services including telephone communications, e- mail, web pages and other services at convenient rates for the citizens. In the same framework, approval was given to a large number of both wired and wireless ISPs which amounted to 9 companies.

TABLE 2- THE INDICATORS OF FIXED AND MOBILE TELEPHONE LINES

| The indicators of fixed telephone lines | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | 1994 | 1999 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2008 |
| Density in thousands | 154 | 411 | 741 | 1224 | 1738 | 1965 | 2024 | 2024 | 2024 |
| Number of customers in thousands | 64 | 251 | 448 | 671 | 936 | 1029 | 670 | 517 | 600 |

| The indicators mobile telephone lines | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | 1994 | 1999 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2008 |
| Density in thousands | 0 | 0 | 91 | 211 | 527 | 1050 | 1866 | 3850 | 10000 |

*Source*: the National Telecommunications Commission, 2008

## B. INITIATIVES AND PROJECTS FOR ICT INFRASTRUCTURE AND DEVELOPMENT OF NEW SERVICES

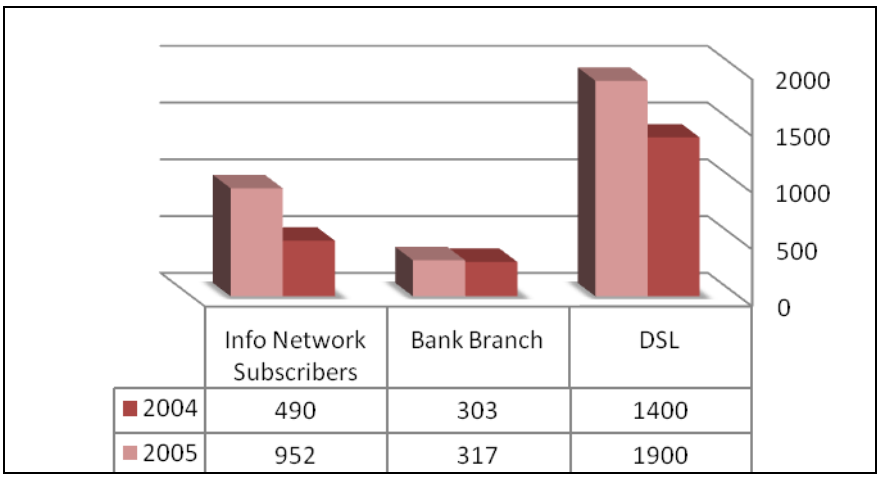
The private sector, working in the development of informatics in Sudan, represents a genuine part of the development of informatics and its progress. It contributed effectively to the infrastructure of information and communications, in addition to the big efforts made in providing information services to the State. Private sector companies were active in a number of fields including: communications, training and capacity building, internet services, consultations, devices and equipment, systems and software, networks and maintenance.

By looking at the ICT infrastructure of Sudan, we find it developing rapidly day after day. This is due to the huge development in the communications sector in Sudan and the foreign capital invested in this sector, such as: the Canar Telecommunications Company which was founded in 2005 and amongst its founders are Emirati, the element which made the development of this sector similar (to a certain degree) to the development of the communication sector in the Emirates. Another example is the Sudanese Mobile Telephone company (Zain) which became 100 per cent private in 2007.

In the framework of developing the society of informatics, Sudatel helped in building the infrastructure in various states of Sudan. Its works include the following:

- Exchanges FR, quantity 42;
- Exchanges ATM, quantity 4;
- Exchanges DSL, quantity 29. Through these systems it was possible to provide SHDSL & ADSL services which targeted several sites in different Sudanese states.[1]

**Figure 2 – Information Network**




*Source*: the Sudanese Telecommunications Company.

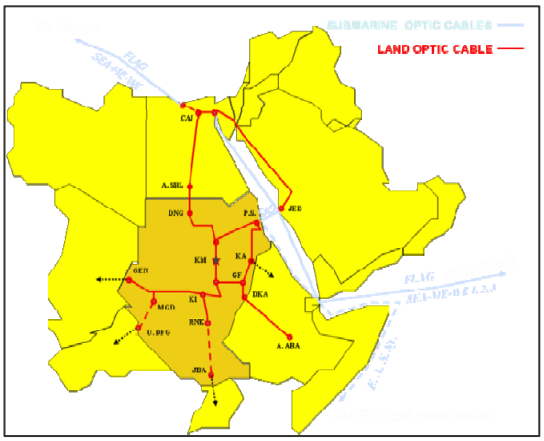
The Informatics Support Fund was founded in accordance with the ministerial decision number 7 for the year 2003, to be the source for funding the informatics development projects in Sudan. This Fund acts on providing support for the development of the communications infrastructure. It also provides this service in different parts of the Sudan irrespective of the economic situation, in an effort to bridge the gap between urban and rural areas in Sudan.

[1] Sudatel report, 2005

## C. ICT CONNECTIVITY

The need for ICT applications, the requirements of the informatics systems, the type of services provided by ISPs and mobile phone companies, the relative increase in electronic services offered by the private sector and government institutions, and the requirements for operation, processing, follow-up, and informatics security. These are all factors that have led to a correlation between telecommunications and information technologies in Sudan.

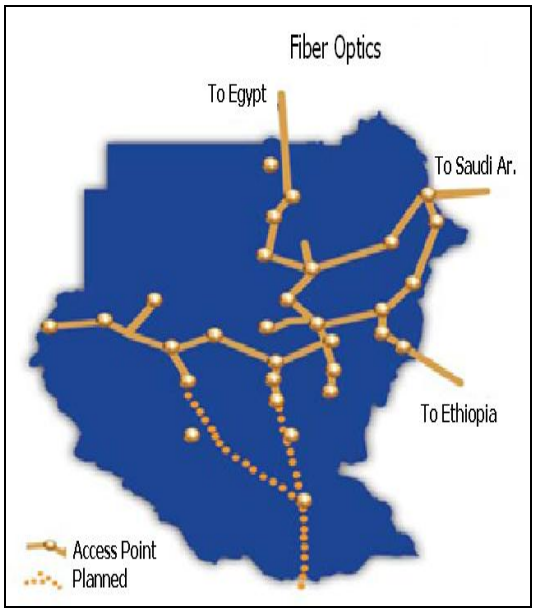
**Figure 3 – Fiber optic cables map**




One of the projects which was given great care by the National Information Center, was a Wide Information Network. In view of the nature of the Sudan and the great distances amongst its states, this network represented the backbone connecting the center with the various states via a permanent connection, which provides various services to users nationwide. The implementation of the network started in the year 2001 using the ordinary connection (Dial up) together with a mail server.

This was followed by introducing the DSL service to the national ministries and the Frame Relay to the states.

**Figure 4 – Fiber optics**




Source: the Sudanese Telecommunications Company.

In the field of communications, Sudan is connected with the following international traffic gates:

- A fiber optics line that connects Sudan with Ethiopia;
- A fiber optics line that connects Sudan with Egypt;
- A sea fiber optics line that connects Sudan with the Kingdom of Saudi Arabia and it starts from Port Sudan and ends on the Saudi port of Jeddah on the red sea;
- A fiber optics line that connects Sudan with all the countries of the world (FLAG) via the Emirates. It was founded and built by the Canar Telecommunications Company;
- The Um Hraz station for artificial satellites (Intelsat-Internet traffic),
- The Um Hraz station for artificial satellite (MIDNET) to connect Sudan with Africa via artificial satellites;
- The Um Hraz station for artificial satellite (ARABSAT) to connect Sudan with the Arab world via artificial satellites.

In the first stage, the use of the net was limited to e- mail only. After that, it developed to include databases and video conferencing.

**Figure 5 – Existing and new fiber optics**

National fiber track map

## D. ICT EQUIPMENT AND SERVICES

The demand for computers and accessories increased. According to statistics from the 2007 report on the implementation of the national strategy for information, 50,000 computers were distributed and a contract was made to distribute another 250,000 computers to citizens and students under the project. This was done through the Informatics Support Fund which supports the following four main areas:

1. Providing access services to both fixed and mobile telephones to all parts of the Sudan, so that it is economical and as up to date as the modern world technologies. Efforts are concentrated here on expanding the communications network backbone to all rural and remote areas through choosing the appropriate technology;
2. Providing advanced services like the Internet and the e- mail to all parts of the Sudan. In addition to providing the necessary computers, connecting lines and access. The fund also provides suitable support for training citizens from different parts of the Sudan on how to use modern technologies;

3. Providing support for economic development and opening new horizons for work. This is done by establishing projects which aim at making use of the communications structures in the different commercial and economic activities. In some cases, it may be extended to cover the establishment of commercial and economic areas in which communications plays an important role. However, in most cases it might be restricted to establishing centres for providing comprehensive services.
4. Providing direct support for the citizen's basic services such as education in all its stages, libraries, and training centres. It also covers health, hospitals, and medical services. The fund also cooperates with government offices in different areas and post offices in order to develop and extend its services through the use of communication networks and information.

### E. CONVENTIONAL MEDIA

The Sudanese Radio and TV Corporation, which is one of the arms of the Ministry of Information and Communications, plays an important role in developing the country's media, it utilizes the most advanced ICT. Since Sudan is a multi-cultural and multi-racial society, it holds a cultural heritage that is very rich in various customs and traditions. In the Sudan today, there are more than 25 local television stations in different states to meet the needs of the people there, as well as a satellite channel, a national channel and other specialized channels. There are radio channels which vary according to their field, some are medical others are concerned with sports in order to meet the tastes of their different listeners.

## III. ACCESS TO INFORMATION AND KNOWLEDGE

### A. PUBLIC DOMAIN INFORMATION

Government institutions started providing and publishing on their Internet sites information related to the services that they offer to individuals and companies. To date, the National Archives of Sudan have been updated. This is a division of the council of ministers and is one of the oldest archive houses in the Arab world and Africa. Its huge library has been computerized so that everyone can get the information he/she wants. Communication companies contributed to facilitating information access in various fields of knowledge at a very low cost, through the short message service (SMS).

### B. ACCESS TO INFORMATION AND PUBLIC INFORMATION

Many government institutions were interested in publishing reports, data, and statistics on their websites. These Internet services have spread more and more over the past few years. The government also encourages and supports related institutions in Sudan to establish specialized information centers in various fields. The mechanism which made information accessible to the public, particularly for universities, institutions, and public commissions such as the Children Information Center, was established by the Federal Ministry of Health through the National Council for Motherhood and Childhood Care. Its programs were approved by the council of ministers in 2008 through the national committee in following up the implementation of the national strategy for information industry in Sudan. Another example is the Information Center for the Handicapped, which serves a wide sector of the handicapped in Sudan. The idea of its establishment came from a civil society organization.

### C. MULTI-PURPOSE COMMUNITY PUBLIC ACCESS POINTS

The State is keen on building partnerships with the private sector and non-governmental organizations to provide community access points. This is carried out through the Information Support Fund, which acts to establish access centers providing communications and information services to areas that lack such services or to areas with low economic feasibility. The purpose behind these comprehensive access centers is to provide the best communication and information services, with the lowest cost, to the largest number of citizens particularly university students, secondary level students, businessmen, people with special needs, and farmers.

### D. USING DIFFERENT SOFTWARE MODELS

Many private companies and higher education institutions in Sudan use a number of different software. The general committee for implementing the national strategy for information adopted the use of open source software in many institutions and tried to encourage public institutions to use it too, in-order to break the block imposed by certain companies and also to encourage local talents, competition, and software development.

Similarly, another type of software started to emerge. It is web software that is provided by web hosting, blogs and e- forums which can be used to design and build websites easily. It provides various options for the user to choose from.

### E. FREE AND OPEN ACCESS TO SCIENTIFIC KNOWLEDGE

The academic and scientific institutions in Sudan started to reinforce accessibility to scientific knowledge through the use of ICTs like the Sudanese Virtual Library site, which allows higher education personnel accessibility to all information found in Sudanese university libraries through the Sudanese universities network[2] site. More attention is being given to publishing research, scientific papers and research summaries. The Sudanese Open University, the Sudanese Academy for Sciences and other academic and scientific institutions are among the research and scientific institutions interested in increasing accessibility to scientific knowledge. However, there are various obstacles presented such as the luck of sufficient funding.

## IV. ICT CAPACITY BUILDING

### A. BASIC LITERACY

The Sudanese government made great efforts to eradicate illiteracy. In this respect, the government founded the Adult Education Administration which adopted the slogan "everyone teaches one". The achieved results in this respect were good. Up to the end of 2007, the number of people who benefited from this program was 288,256 beneficiaries, divided into 96,181 males and 192,075 females. They were enrolled on 18250 classes and the number of trainers was 8591.

As far as the efforts made in the development of primary education, good efforts were made which were represented by the introduction of the computer course in the curricula of all stages of public education, forcing the education sector to disseminate the informatics culture. National educational networks were also established and electronic libraries specifically for public education while identifying the mechanism for establishing the informatics network "the electronic society". The sector also worked on publishing course materials, the curricula and the public education program "the primary education".

### B. ICT IN EDUCATION AND TRAINING

The ICT strategy for e-learning in Sudan aims at enabling the public to use this technology to improve their quality of life and to make a contribution to the social and economical development of the country.

Among the pioneering projects which achieved good results in Sudan we can list the following:

[2] http://www.suv1.edu.sd

1. *The eradication of technological illiteracy*

The eradication of technological illiteracy: launched in March 2002, was initiated by the National Union for the Sudanese Youth under the generous auspices from the first vice president of the republic. The presidential decree number 439 was issued to form a high committee to supervise the implementation of the project. It was headed by the minister of Sciences and Technology and among its members were several related ministers and institution managers.

The committee made a great contribution to the launch of the project and its dissemination to a number of Sudanese states, by the end of 2007 the total number of centers reached 117 and the number of graduates was (130,855) . The president/the first vice president of the republic is the direct supervisor of the committee which has the following responsibilities:

- Approving the plan/vision;
- General supervision of the programs' implementation through follow up, evaluation, and rectification;
- Providing necessary financing for the projects;
- Seeking help from others.

2. *The project of eradicating computer illiteracy for State employees*

It is one of the most important projects which witnessed a big leap in a short period of time. It relied on different methods for the training of government employees in the field of computers taking into account the differences in their specialty, grade and age. The project paves the way for implementing e-Government.

The project aims at promoting an ICT culture amongst government employees, and breaking the psychological barriers in dealing with computers. As well as giving employees basic computer application skills.

3. *Other projects*

- "A computer for every family" project;
- "School computers" project;
- "E-Government support" project;
- "Universities information network" project.

**Box 1. The project of eradicating computer illiteracy for state employees**

The methods used to implement the project:

- Having fixed laboratories in a number of government institutions;
- Having mobile laboratories which are moved from one institution to another for the purpose of eradicating computer illiteracy;
- Having computer institutes and colleges.
- Preparing a specialized curriculum and specialized trainers;
- Training during working hours.

The curriculum is delivered free of charge in 45 days, at a rate of 2 hours daily. The program consists of the following basic courses in the area of computers:

1. An introduction to operation/windows.
2. The MS Office applications: Word, Excel, Power Point.
3. Dealing with the web network.

The number of trainees exceeded 8000. The trainees included State leadership (ministers, consultants, deputies, and general secretaries) and employees at different levels.

The National Information Center aims at training all government employees during the period between 2007-2011, in the field of basic computer applications and internal e-mail. So far, all employees of the following federal ministries have been trained:

- Foreign Ministry;
- Power and Mining Ministry;
- Industry Ministry;
- External Trade Ministry;
- International Cooperation Ministry;
- Parliament Affairs Ministry;
- Human Affairs Ministry.
- Also all employees in the National Commission for Post and Telegrams in the central, northern and southern states.

The National Information Centre implemented this project in the States, so far training centres have been opened in the Northern State, the White Nile State, the Snar State and the Gedaref State. This was done after training a number of employees from relevant States in the field of information. They will act as trainers in their states and they will follow the curriculum and the method provided by the National Communication Center. This will be the first step towards opening new training centres in all the States of the Sudan.

### C. INNOVATION AND PATENTS

The Sudan established a number of public commissions to foster research and inventions in the field of computers and technology. It financed these and provided huge budgets to enable them to play their role in the best way possible. The Sudan also established "the Sudan Technology City" to become a center of excellence in research and applications and to attract technology companies from all over the world.

## V. BUILDING CONFIDENCE AND SECURITY IN THE USE OF ICTS

### A. USE OF ELECTRONIC TRANSACTIONS AND DOCUMENTS

Building confidence and security is essential to the use of ICTs, thus, it has become important to provide the standards that ensure confidence and security in the use of electronic transactions, particularly in providing protection for networks and sites from hackers. Several governmental institutions and private companies in the Sudan use tools and procedures that protect data and guarantee network and data security.

Some of the National Telecommunications Commission’s responsibilities are to protect the interests of the beneficiaries of the communications services, to control the performance of the licensees who provide communications services, and to take the necessary measures to force them to obey the licensing conditions. This includes controlling the quality and level of their services and monitoring and encouraging their development.

When providing communications services to the public, each licensee must establish a special office for receiving complaints from the beneficiaries and the subscribers. They must work on rectifying the causes of those complaints if they are related to the level, type or method of service. The licensee is not allowed to change their rates or prices, except after informing the Commission and announcing the new prices before they become valid, on condition that the prices are not in excess to what was mentioned in the license agreement conditions. If the commission receives a group complaint concerning:

- negligence on the part of the licensee;
- the existence of a conflict between the licensee and the beneficiaries in relation to the level of the service;
- the licensee is breaching the license conditions;

Then the commission has the right to inquire about the causes of the complaint and to decide on what course of action it sees appropriate, The commission's decision is considered final and binding to the licensee. Telephone calls and private communications are considered confidential and its privacy must not be infringed. Offenders will be liable to legal responsibility. The telephone service should not be withheld or cancelled except when the subscriber has caused material damage to the network, used the telephone in a law-offending way, or did not pay due rates and fares despite a written warning.

The general director, or whomever he delegates, has the right to enter any place suspected of containing unlicensed devices, networks, communication jamming devices or any place where activities that infringe the 2001 communications law are practiced.

## VI. ENABLING ENVIRONMENT

### A. LEGAL AND REGULATORY ENVIRONMENT

The initiatives of the Sudanese government in the field of IT require legislative protection in order to reassure citizens by increasing their confidence in institutions which use the Internet, as this is still a new culture. That is why there are a number of laws that protect Internet users such as the electronic transactions law, the informatics crimes law, and the electronic signature law. The electronic signature law is under approval and is going to regulate major issues like legal recognition, validity of electronic signature and the legal issues related to it. The Sudanese government is also a member of the World Intellectual Property Organization (WIPO) and has adopted several WIPO laws that are related to patents and rights.

## VII. ICT APPLICATIONS

### A. E-GOVERNMENT

In the framework of implementing the e-Government project in the Sudan, the year 2006 witnessed the first comprehensive nationwide survey exploring the readiness for the e-Government project. The survey covered the following:

1. The readiness of the government sector and the infrastructure, which includes:
    - Readiness of ministries;
    - Readiness of States;
    - Readiness of communities.
2. The infrastructure and accessibility to the world wide web.
3. The readiness of the country.
4. The readiness of the economy and the business sector:
    - The economic environment;
    - Policies and economic systems;
    - External investment;
    - Competition in the IT market;
    - The software market;
    - E-Business.

### B. E-BUSINESS

In the Sudan, e-Business at the level of the government is considered to be generally limited when compared with its economic activity in general. It is concerned mainly with electronic transactions with banks, electronic circulation of financial papers and electronic airline booking services. As concerns electronic buying and selling transactions, they are still inadequate at the Sudanese internal level despite its spread at the international level. There are some electronic marketing sites like (sabilsd.net) which is a site specialized in the electronic marketing of cars, and the Sariat Al Khartoum site which is specialized in marketing real estate such as renting, purchasing, and selling of houses and estates.

The site of the Sudanese foreign trade "Sudan Trade Point" allows for the exchange of commercial opportunities and the finding of agents for all goods advertized via the foreign trade website.[3]

### C. E-LEARNING

In the field of public education, the Ministry of General Education used ICT to develop educational resources, such as:

- Announcing results of the Sudanese certificate exams for the years 2007 and 2008, on the Ministry of General Education’s website and through short text messages SMS;
- Announcing results of the Sudanese primary education exams for the year 2008 on the Ministry of General Education’s website for the year 2008 (Khartoum and Nile river states);
- Requesting a copy of the Sudanese certificate. This is done by filling a special application form which is available on the site of the Ministry of General Education;

[3] http://www.tpsudan.gov.sd

- There is also an archive for the 2003-2007 Sudanese certificate exams together with their typical answers. One can retrieve all exam questions for these years together with their typical answers from the website;
- Joining the control and displaying the control results for the year 2008. This service is specifically for teachers who wish to join the exams correcting committees.

### D. E-HEALTH

The work in e-Health in Sudanese hospitals is restricted to database programs for current patients; however there are a number of plans to computerize work in hospitals and to apply remote medication or e-Health via video conferencing.

### E. E-EMPLOYMENT

IT and the Internet have been used at a very large scale in advertisement and receiving employment applications. A number of private companies and public institutions do advertize and receive employment applications through their electronic sites on the Internet. There are also sites specialized in e-Employment like sudanjob.net. See figure 6.

**Figure 6 – The Sudanese jobs site**

## VIII. CULTURAL DIVERSITY AND IDENTITY, LINGUISTIC DIVERSITY AND LOCAL CONTENT

### A. USE OF ICT IN SUPPORT OF CULTURAL AND LINGUISTIC DIVERSITY

In this respect, many local initiatives which were fostered by government and voluntary societies interested in Internet and IT were started. One such example is the project of the Sudanese content on the Internet, which was launched by the Sudanese IT Society and was directly supervised by the Minister of Culture and Information. A group of experts in the field of IT from the Sudan also participated in this project and came up with some recommendations, the most important of which was to hold a competition for designing sites for Sudanese heritage, history, culture, and arts. They also set up committees which were called the committees of digital Sudanese content on the Internet. These committees finished preparing their vision and plans regarding the increase of the Sudanese digital content on the Internet.

The most important recommendations regarding the support of the cultural and linguistic diversity in the Sudan are shown in Box 2.

**Box 2. Recommendations to support cultural and linguistic diversity in the Sudan**

- To provide content that reflects a positive bright image about the Sudan and its civilization, nature, and society; (For the sake of a rich content of a civilized country);
- To encourage and support innovators so as to employ their ideas and creativity on the Internet;
- To disseminate the Sudanese sites and to add them to international search engines like Google;
- To publish on the international Internet networks all information which gives a good picture about the Sudan and which is currently unknown;
- To support the institutions' and commissions' sites with full time personnel who are qualified to continuously update them;
- To carry on running seminars and scientific conferences that disseminate knowledge and awareness in the field of the Internet and IT in general;
- To provide services using the Internet (Service ministries);
- To define the priorities for improving the Sudanese content and to focus on the subjects and aspects which started to disappear from the Sudanese digital memory;
- To train and qualify those interested and concerned with the importance of the Internet and information dissemination;
- To identify the stakeholders who are specialized in IT (organizations and commissions) in order to develop the content industry;
- To identify and to be committed to the implementation of the Sudanese Internet content project and to specify a time frame for achieving that;
- To define the implementation mechanisms;
- To take care of the educational institutions with regard to pedagogy and content.

## IX. MEDIA

### A. MEDIA INDEPENDENCE AND PLURALISM

The constitution of Sudan guarantees the freedom of opinion, thinking, and expression through the use of available and legal means which is reflected in the freedom of information. The Ministry of Information and Communications acts on regulating the work in information and issuing regulatory lists. This is carried out through its main commissions like the Sudanese Radio and TV Corporation, the Sudanese News Agency, and the National Telecommunications Commission.

In Sudan, there are several private media institutions which act on issuing many publications, such as the Public Opinion establishment for Press and Publication and the Today's News establishment which publishes two newspapers. There are many other newspapers published by the private sector including sport newspapers.

As concerns visible and audible media, we find several television channels such as the National Space Channel and the local television channels. There are also many radio stations some of which are specialized in certain programs to cater for the different Sudanese listeners' needs and tastes.

### B. THE MEDIA AND ITS ROLE IN THE INFORMATION SOCIETY

Nearly all Sudanese information establishments are concerned with IT. All newspapers have their own websites, through which they transmit their publications, so that the readers can read the e-Newspapers daily after 12 am Sudan local time. In this way, sales will not be affected.

Information establishments, like television channels are interested in programs that provide IT awareness to citizens. One such program is the scientific journal which comes on the Sudanese space channel and has developed a section of its program called "the Sudan this morning".

## X. INTERNATIONAL AND REGIONAL COOPERATION

### A. FINANCING OF ICT NETWORKS AND SERVICES

In the framework of the governments' efforts to cooperate with the international society, friendly countries and brotherly nations, and especially the Overseas Development Aids ODA in order to develop the basic infrastructure, it was possible to attract external funding especially for e-Government. To this end, agreements for a funding of 11,165 million dollar were signed with the Korean Republic and China.

### B. INFRASTRUCTURE DEVELOPMENT PROJECTS

The Sudan is participating in several regional projects which are concerned with the development of the infrastructure. One such example is the use of fiber optic cables to connect with several parts of the world.

### C. WSIS FOLLOW-UP

The Sudanese government showed interest in following–up the implementation of recommendations from the world summits for the information society that were held in Geneva in 2003 and in Tunisia in 2005. This was carried out through a national committee in the council of ministers. Its members include IT experts and representatives from the private sector and academics.

The Sudan is following-up recent world and regional development in Internet management; especially in as far as the world summit decisions for information society are concerned. The Sudan participated in the Tunisia Summit represented by a delegation that was headed by the president of the republic. It also included a large number of representatives from institutions concerned with implementation of the States' ICT indicators and the private sector, with representatives from companies interested in communications and IT.

## XI. MILLENNIUM DEVELOPMENT GOALS

### A. PROGRESS TOWARD ACHIEVING THE MDGS

The Sudanese government was interested in integrating ICT in its development plans and strategies whereby many official, voluntary, and private institutions adopted communications technologies in their various works.

### B. USE OF ICT FOR ACHIEVING THE MDGS

The official, voluntary, and private Sudanese institutions, are working on using ICT applications in their various activities.

### C. ICT FIELD PROJECTS FOR ACHIEVING THE MDGS

There are several official and private bodies which implemented many field ICT projects that aimed at achieving the millennium goals. One of the most prominent projects is perhaps the technology education project which aimed at developing the pre-university education sector via IT. It is fostered by a committee from Sudan consisting of experts in this field.

The project of Technological City of Africa which aims at settling the software industry in Sudan is fostered by the Ministry of Sciences and Technology. There is also the e-Government project which aims at conducting services to citizens through the use of ICT.

## XII. BUILDING THE ICT SECTOR

### A. ICT FIRMS

The private sector in Sudan is considered a main partner in providing communications services. Its role expanded after the granting of three licenses to operate the mobile telephone network to three private sector companies, working in research, development and investment in the ICT field.

As concerns ICT research and development, the Ministry of Sciences and Technology in the Sudan is making good efforts through its sponsoring of all research inventions and initiatives in the field. In this respect, in 2006 and under its patronage, the Ministry established an institute that takes care of scientific activities in this framework. The institute is called the Technology Research Institute.

### B. CONTRIBUTION OF ICT SECTOR IN THE NATIONAL ECONOMY

The contribution of the ICT sector to the national economy of Sudan is minimal. Only a small percentage of communications companies are using IT projects, but there is no real contribution to the economy of Sudan from the information industry.

### C. GOVERNMENT FACILITATION

The Sudanese government is seeking to develop policies and procedures that guarantee a developed ICT infrastructure through legislations, the most important of which are: promoting the role of the private sector and encouraging private investments. The government provides financial loans through funds that encourage small industries. However, there are no clear procedures or implementation controls directed towards the support or the adoption of technological solutions by different companies.

There are also facilitations for those willing to establish investment projects in any sector, this is guaranteed by the law of investment and ICT is among these sectors.

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9. Ministry of General Education.
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## ANNEX 1. SELECTION OF GOVERNMENT WEBSITES

| No. | Name | URL |
|---|---|---|
| 1 | The Ministry of Finance | http://www.mof.gov.sd |
| 2 | The Ministry of Interior | http://www.moi,gov.sd |
| 3 | The Ministry of Irrigation and Water Resources | http://www.moiwr.gov.sd |
| 4 | The Ministry of Agriculture and Forests | http://sudagric.gov.sd |
| 5 | The Ministry of Federal Health | http://www.fmoh.gov.sd |
| 6 | The Ministry of Presidency of Ministers Council | http://www.sudan.gov.sd |
| 7 | The Ministry of Higher Education and Scientific Research | http://www.mohe.gov.sd |
| 8 | The Ministry of Parliamentary Affairs | http://www.pariamentary.gov.sd |
| 9 | The Ministry of Industry | http://www.industry.gov.sd |
| 10 | The Ministry of Science and Technology | http://www.most.gov.sd |
| 11 | The Ministry of Foreign Affairs | http://www.mfa.gov.sd |
| 12 | The Ministry of Information and Communications | http://www.minic.gov.sd |
| 13 | The Ministry of Investment | http://www.sudaninvest.gov.sd |
| 14 | The Ministry of Animal and Fish Wealth | http://www.maf.gov.sd |
| 15 | The Ministry of Tourism and Wild Life | http://www.sudan-tourism.gov.sd |
| 16 | The Ministry of General Education | http://www.moe.gov.sd |
| 17 | The Ministry of Social Care and Woman and Child Affairs | http://www.welfare.gov.sd |
| 18 | The Ministry of Federal Rule | http://www.federal.gov.sd |
| 19 | The Ministry of Transport and Bridges | http://www.mot.gov.sd |
| 20 | The Ministry of Alirchad walawkaf | http://www.irchad.gov.sd |
| 21 | The Ministry of Justice | http://www.moj.gov.sd |
| 22 | The Ministry of Labor and Public Service | http://www.molar.gov.sd |
| 23 | The Ministry of Human Affairs | http://www.moha.gov.sd |
| 24 | The Ministry of Republic Presidency Affairs | http://www.presidency.gov.sd |
| 25 | The Ministry of Power and Mining | http://www.spc.sd |
| 26 | The Ministry of International Cooperation | |
| 27 | The Ministry of Culture, Youth, and Sport | http://www.mcys.gov.sd |
| 28 | The Ministry of External Trade | http://www.sudantrade.gov.sd |
| 29 | The Ministry of Environment and Buildings Development | http://www.mepd.gov.sd |
| 30 | The Ministry of National Defense | http://www.mod.gov.sd |