INFORMATION AND COMMUNICATION TECHNOLOGIES ROLE IN DEVELOPING ELECTRONIC LIBRARIES AND INFORMATION CENTERS

ZOHAIR MALKI

Department of Information and Learning Resources, Taibah University, Saudi Arabia

Email : zmalki22@gmail.com

ABSTRACT

The researcher in his study addresses - after the systematic introduction - three key aspects; *first* information and communication technologies position within the knowledge society among its components and tools, *second* examples of some Arabic and foreign countries (Egypt – Saudi Arabia) seeking the advantages of information and communication technologies to build a knowledge society, *and finally* concentrating on how information and communication technologies can revolutionize libraries and information centers services with results and recommendations.

Keywords: *Information technologies, Knowledge society ,ICT in Saudi Arabia , ICT in Egypt , IT Tech. , Communications Tech. , Imaging and Printing Tech. , Information Professionals.*

1. INTRODUCTION

Recent decades have seen a universal progress in producing, processing and exchanging information, let alone analyzing, spreading and using them. Many researchers believe that this development can outreach what the Industrial revolution brought, because Information and Communications Technology (ICT) Infrastructure, programs and supplies play a critical system role to the community in modern life.

Information and Communications Technologies (ICT) is also considered one of the main pols in building the Knowledge society, as they represent the key methods needed to spread knowledge, in addition to developing and supporting scientific and cultural researches on the broader scale possible. In modern universally competitive environment, governments tend to – on regional and national scales – go to knowledge as strategic assets that lead to sustainable economic advantages and to the Knowledge society.

And of course there are the roles of public, private sectors and
the civil society organizations to reach the Knowledge society, yet without deep understanding of the knowledge content problem, digital or not, these roles will remain limited.

1.1 Questions and Problem Statement

This problem lies on figuring out the *ICT* position in the knowledge society and identifying some examples of studies and countries, especially Arabic countries, seeking the advantages of *ICT* and finally determining how *ICT* can revolutionize libraries and information centers services which are considered essential tools to organizations and also to serve different activities infrastructure or info structure.

We can sum up in the following questions:

1- What is *ICT* main concept, developing and components in libraries and information centers?

2- What is *ICT* position in the knowledge society?

3- What is ICT role in building the knowledge society: case study on the Arab world (Egypt – Saudi Arabia)?

4- Why does libraries and information centers need *ICT*, and what are the effects and challenges to information services in libraries and information centers?

1.2 Systems and Tools Used

The researcher follows descriptive analytical method by reading into facts of Arabic and foreign intellectual production and also The researcher follows descriptive analytical method by reading into facts of Arabic and foreign intellectual production and also searching in English databases and scientific circles.

1.3 Information And Communication Technologies (ICT)

According to (Blurton 1999) this concept is considered a parallel to the former IT concept, these technologies include; Satellite Telecommunication and its applications, Fixed Wireless Networks, Radio and TV networks and the Internet. *ICT* is also considered as tools and technology resources used for connecting, establishing, spreading, storing and managing information.

As for (Marcelle 1998) he thinks that *ICT* is a collection of industrial activities and services including IT supplies and wireless supplies and services, which includes Media, Radio, Internet services, libraries, business information providers, information services networks, etc.

(Hamelink 1997) puts a very distinctive definition; *ICT* is the technology that enables us to receive information and drive different shapes of communication, including Capturing Technologies, Storage Technologies (CD-ROM), Processing Technologies, Communication Technologies (LAN), Display Technologies (Monitors).

In conclusion, *ICT* is defined as the usage of telecommunications and microelectronics to do some supplying, retrieving, storage and spreading processes of information.

1.4 Knowledge Society

There is no one agreed upon definition for this term, the main element is considering knowledge as a strategic asset and the wealth of the progressive nations today depends on investing knowledge by the distinct human element, which represents the competitive part in production, so he uses both, modern information and experience (Tacit), that is why Knowledge society is the era of creativity and Innovation.

1.5 Definition of Technology, The Past And The Present

The use of the term "Technology" has vastly changed during the past two centuries. The term "technology" wasn't commonly used before, instead it was used to describe or study useful arts (Merriam – Webster Dictionary). Even more, it was almost always linked to technical education which is the case in MIT, USA.

Technology has risen in importance in the 20th century as a result of its association with the second industrial revolution. The definition of technology changed at the beginning of the 20th century in conjunction with the European and German uses of it, and its English translation as "Technology". During the thirties of the 20th century, the definition of technology in USA became as follows "technology comprises all tools, machines, vessels, weapons, housing equipment, clothing and transport." It even included skills by which it's possible to produce and make use of technology. There's another definition which is "Technology is the applied science, especially with scientist and engineers." Even if some don't see these tools only as a physical element, virtual technology as computer software and management methods can be incorporated in the definition of technology. However, when technology is associated with another definition as medical technology or space technology or even information technology or communication technology, it then refers to the state of tools and science in the field of medicine, space, information or communication. In contrast to the spread of the term "information technology" during the 20th century, the contemporary term for the 21st is "information and communication technology".

2. FORMER STUDIES

The researcher noticed many former studies in the field, but they use the IT term or the Internet as headlines and the content of these Theses. The researcher will also point to some modern Arabic and foreign studies which used the **ICT** term in different countries and subjects.

2.1 ICT Effect On Alexandria University Libraries: Field Study (Phd) Asmaa Hussin Mohamed El-Sayed, 2013.

The researcher addressed the topic theoretically by listing the advantages of *ICT* usage in university libraries and Alexandria University plan to develop the (ICTP) mentioning the most useful fields of ICT for developing education. Then practically by showing the actual ICT used in libraries (computers – Internet – CDs – scanners - printers), the budget, the finding, human resources, applying problems and effect of ICT on users and usage rates. She ended with a suggested strategic plan to activate the *ICT* in the university.

2.2 IT Usage By Researchers In Omar Almokhtar University: Field Study (Phd): Al-Mabrouk Abo-Bakr Abo-Naaema, 2010.

The researcher addressed the topic listing the motives behind the usage of ICT; he followed the descriptive analytical method and used polls to collect data, the most distinct results showed the presence of a statistical relation to the scientific specialists, as Pearson correlation coefficient reached (0.194) at (0.01) difference. Facilitating Internet and technology means from the

researchers' offices and the importance of generalization of the service in all the university libraries were the most important recommendations.

2.3 Perceptions Concerning IT Innovations And IT Training In University Libraries In Saudi Arabia: Proquest Dissertations And Theses:
Al-Zahrani Rashed Said, 2000

This study is concerned with librarians' opinions about what's new in ICT, and ICT training at libraries in Saudi Arabia.

The study included 147 librarians in 4 Saudi universities, Questionnaire were distributed through mail and field visits, also Interviews were made with libraries affairs deans to get to know the decision making process; the results came through applying two statistical methods; testing and differentiation analysis using (SPSS), the result are:

1. Positivity on the developing and understanding ICT scale at libraries in Saudi Arabia.

2. Vast spreading of the ICT through libraries in Saudi Arabia.

3. A need for more training on ICT in libraries in Saudi Arabia.

2.4 The Impact Of ICT In Nigerian University Libraries (Library Philosophy Practice): Krubu Dorcas & Osawaro Kingsly, 2011.

The study addressed many **ICT** advantages at the libraries of Nigerian universities, and providing new and fast information services to users such as: searching in the public dictionary, selective information spreading service, enabling Internet searching and last but not least the (OPAC) service.

The study aimed to identify the following:

1. Level of mechanization and automation of the Nigerian university libraries.

2. Resources of ICT at Nigerian university libraries.

3. Determination of the efficiency and effectiveness of ICT at Nigerian university libraries.

4. Staff's skills and knowledge of the use of ICT.

5. Challenges associated with the application of ICT at Nigerian university libraries.

2.5 Rooney, David Et Al (Eds) (2005) Hard Book On The Knowledge Economy. Heltenham: U.K: Edward Elagor

A report published by (Hearn and Mandevill) about the impact of information and communication technologies and their role in strengthening and accelerating the productivity of bodies and companies in the following ways: A. reducing companies' expenses. B. expanding the company's relationships with its customers. C. making information more attractive to customers. D. advertising and promoting the products and services of the company.

2.6 Kamogawa, Akiko (2003) Higher Education Reform: Challenges Towards A Knowledge Society In Malaysia African And Asian Studies, V.2 (4), 545-563.

The study addressed the Malaysian government's interest in human capital as the basis of wealth in this competitive world, the importance of ICT and their impact on knowledge in order to bridge the digital gap and to provide graduates to be considered as rivals to the foreign experts.

2.7 Ulrich, Paul And Chacko, James (2005) Overview Of ICT Policies And Strategies: An Assessment On The Role Of Governments… Information Technology For Development 8 V.11 (2), 195-197.

The report also addressed the general framework of ICT and the assessment of the role of governments, especially in developing countries, in terms of policies and strategies with a justification for large investments in ICT, which in turn they lead to an increase in national income and development of education, trade and competitive advantage in the universal market.

3. ICT AND ITS PLACE WITH THE INDICATORS AND COMPONENTS OF KNOWLEDGE SOCIETY

This part of the study has focused on the indicators and the components of the knowledge society, it is important to refer to the report of the Arab knowledge society, which five reports have been issued out of it from 2009 to 2013. Every report has focused on one aspect of knowledge society. Report 2008 focused on ICT topics in the Arab countries: tools and pillars of knowledge. Report 2010/2011 focused on: preparing future Arab generations for knowledge society. Report 2013 focused on Arab world competitiveness.

The term "Knowledge Society" basically refers to a group of definitions, Villavicencio (Villavicencio, D, 2010 et al) indicated that knowledge societies are characterized by the presence of the following indicators:

Infrastructure (telecommunications, computers and Internet) - advanced industries, cognitive tools and research projects related to new technologies and its

widespread use in these societies as well as that these societies have changed their behavior and mentality depending on the use of knowledge in the social, political and economic fields that lead to obvious advantages for the society as a whole. Villavncio's report also indicated that Spanish researchers, Sorlin and Vessuri (Sorlin and Vessuri 2007) have indicated that the term "knowledge society" does not have a clear definition with the exception that knowledge must be dominant in these communities.

That is, knowledge society is a Hypothetical society, its knowledge becomes primary inputs not only from the economic side, but also from the social unity (As for the Explicit knowledge that can be digitized and Tacit knowledge that is difficult to be digitized, but it refers to the personal experience. Knowledge generation, processing and broadcasting operations provide the society with a better group of tools that help solve the daily-life problems.

As for some close terms, such as knowledge economy and knowledge society, the researcher, Foray, 2004 indicated that knowledge-based economy is a platform or a base for the development of knowledge society through the establishment of industries that form the pillars of economic growth based on knowledge.

And this knowledge-based economy is characterized by comprising a large set of jobs created by intensive sectors in the knowledge, and that a large proportion of these sectors depends on intangible capital (i.e. investment to generate and transmit knowledge through training, learning, research and development, information and coordination between them in addition to the interest in the preservation of human capital).

As for the term "information society", UNESCO, in its well-known report about knowledge societies, warned of confusion between information society and knowledge society, and that knowledge society is an advanced stage compared to information society. Knowledge primarily includes two sections: phenomenon and human experience as well as more than fifteen items in this distinction (See Anwar Ahmed Badr, knowledge society, 2011).

As for the components of the knowledge society, the researcher, Villavsanko and his colleagues (Villavicencio, et al) see that these components differ from each other, such as its relation to the educational system / or institutional social system / economic system / public policy for knowledge /

technology and inventions / infrastructure / specialist human resources / as well as the cultural base that makes it possible to find shared hopes for a community related to the use and generation of knowledge. Moreover, knowledge society does not include only these components, but it also includes (ICT) as well as a contemporary role for the development of biotechnology, which appears as in the proposed graph. David and Foray, 2002 noted that there are local societies that are based on knowledge and not on global knowledge societies.

3.1 ICT As A Component Of The Knowledge Society, Study By Ferdirk Naumann And Estee Boss (From Villavinescu's Report)

Ferdirk, et. al proposed the contents of the knowledge society as seen in Figure 1. He supposed the following components of the knowledge society

- Economy System, such as Global Economy, Stability and Continuity, R & D and Creativity Initiations.

- Information and Communication Technology, such as Software and Hardware

- Education System such as Primary Education, Scientific and Technological Education, Public and Private Research centers, Governmental Projects and Universities and Productions

- Specialized Human Resources

- National Policy of Science and Technology

- Intellectual Properties (Patents)

- Infrastructure such as Providing Telephone services, Providing Computers, and Internet users

3.2 ICT Between The Components Of The Knowledge Society (A Study About Descriptors Of Internet):

Depending on the order of the descriptors of research and theses collected from a random sample on the internet and the frequency of these specifications for these components as shown in the following table taken from Ahmed Anwar Bader's book (2011). This table includes descriptors and previously referred terms in the previous study.

A. Intellectual capital.

B. knowledge management.

C. ICT

D. Teaching and learning.

E. Knowledge-based economy.

F. Innovativeness and knowledge-intensive foundations.

The main topics	Number of descriptors
A. Intellectual, human, social, organizational capital and intangible assets.	38
B. Knowledge management, organizational behavior, theories of organization and their effectiveness, models and culture.	34
C. Information science, information systems, information policy, knowledge networks and ICT.	32
D. Teaching, learning, quality, sustainability, its importance in research and development, higher education and educational policy.	30
E. Knowledge economy, economic development, competitive advantages, measurements, methods of assessment, political economy and post-industrial economy.	23
F. Other descriptors: innovative abilities - knowledge-intensive foundations - political science and public policy - journalism - mass communication - creative thinking - bank management - sociology - psychology - digital gap.	9
Total number of descriptors	166

4. ICT IN THE ARAB WORLD:

Knowledge report for 2009, fourth quarter, was intended for the pillars and tools of the knowledge society, 2009. The report contained a detailed presentation about the different activities of information and communication technologies,

Information and communications technology (ICT) play a highly significant role with regard to the production and restructure of knowledge in the Arab countries. Although some progress has occurred in the applications of these technologies in the Gulf Countries, the said progress is not adequate at all especially that there are many applications in the developed countries especially in the fields of education, health, media (means of communication), business administration, and other governmental services. Their primary usages include business administration, and marketing using the means of e-commerce.

Concerning the electronic governmental services, the Arab countries can be divided into three sections. The first section includes United Arab Emirates and Qatar as they enjoy a high level of electronic governmental services. In the second section come Mauritania, Egypt, and Bahrain as they could ensure an intermediate level of the mentioned services. The third section includes Kuwait and Algeria which offer a lower level of electronic services.

There have been initiatives started by some Arab countries to use these technologies (ICT) in the different educational stages. However, these efforts, in spite of their importance, are still lower than the required and possible efforts. This is because the lessons learned by the universal developments that result from the usage of ICT in education can be summarized as follows:

1- Including comprehensive changes in the educational curriculum and course so that they can be offered online.
2- Computer literacy for the employees working in the fields of education and educational management.
3- Equipping schools with suitable automated equipment (hardware) and depending on open source programs for self-learning.
4- Developing and distributing the concepts and tools of self-learning.
5- Supporting the participation of study, home, and society through the existing technologies.

Although the term "e-commerce" is a relatively new term. However, the usage of computers, and communications and data exchange networks date back to the sixties of the past century. In spite of the call for defining the role of the government in the economic activity matters and limiting it to the governmental institutions, these institutions must play a direct role in facilitating and organizing e-commerce and its activities as well as setting the solutions and the legality of facing challenges.
Using ICT technologies in medical care includes different medical fields and activities for performance enhancement and cost reduction as follows:
1- Administrative and statistical applications: for keeping medical records and these applications are available in a number of Arab countries.

2- Raising awareness of medical matters through multimedia and internet. The medical sector is

Arab digital content online requires suiting a number of the existing technologies.
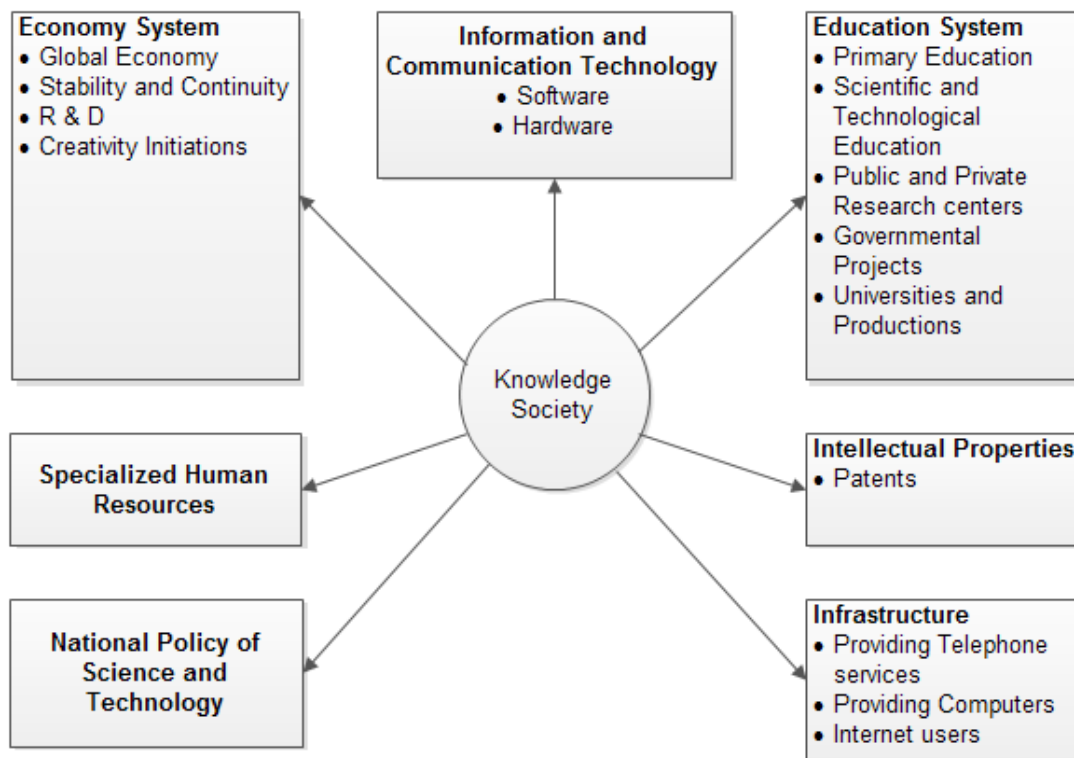

Figure 1 The knowledge Society study by Ferdirk Naumann and Estee Boss

the first sector to utilize ICT for the production and distribution of documents through the web to increase the awareness of those working in the field.

3- Distant medical consultations using video conferences in diagnosis and treatment.

4- Using robots in surgeries and connecting hospitals in developing countries to the developed ones whether in conducting a surgery or in medical guidance.

4.1 The Arab Digital Content

producing this Arab digital content allows the possibility of moving toward the knowledge economy and reducing the knowledge gap (knowledge divide) within and among the countries that depend on three bases namely content production/ content preparation/ content spreading. Production results in an economic return on the universal level which is associated with the language of the society. Moreover, spreading the

Finally, although the Arab Knowledge Report of 2009 focuses on only seven Arab countries not including the Kingdom of Saudi Arabia, the researcher prefers to refer to some recent activities in Saudi Arabia especially the data that is mentioned in the report of the Communications and Information Technology Authority of 2013 in addition to the activities and projects that took place in Egypt especially after establishing a special ministry for communications and information.

4.2 The Role Of ICT In Establishing Knowledge Society In Kingdom Of Saudi Arabia: Case Study

In the report of the Communications and Information Technology Authority (CICT) of 2013, important statistics on the following were mentioned:

- *Distant Mobile Telecommunications Market* the total number of mobile subscriptions has

reached 53 million by the end of 2012 with a penetration rate of 81%.

- *The Landlines Market:* stopped at 4.8 million by the end of 2012 including 3.4 million i.e. 70% home landlines.

- *The Broad Band Market*: has remarkably increased compared with the previous years due to the need of Saudi Arabia for those services specially with the strong governmental support of the high-tech projects, and the extensive use of the internet and hundreds of thousands of its applications using smart devices such as the social network, commercial applications, word processors, chat programs, security tools, and games. Broad Band services are offered through fixed and mobile networks and the latter has reached a number of 12.28 million subscriptions by the end of 2012 as it represents a population penetration rate of 42.2%.

- *Internet Services Market:* the number of internet users has reached 15.8 million by the end of 2012 with a population penetration rate of 54.1%.

- *The Returns of the Telecommunications Services Sector:* the returns of these services increased by 12% i.e. from 20 billion Saudi Riyals (15.3 billion dollars) in 2001 to 71 billion Saudi Riyals (18.9 billion dollars) in 2012.

- The amount of expenditure on the communications and information technology is estimated by the Authority (CICT) to be approximately 94 billion Saudi Riyals in 2012 compared to around 21 billion Saudi Riyals in 2002 i.e. at a growth rate of 14%.

  Expenditure of information technology formed about 30% of the total expenditure amount. The said expenditure focused on automated organization (hardware) and information technology services. It is expected that the expenditure on ICT technologies in 2013 would increase by 10% for smartphone services, high-speed networks, and interactive applications. This led to an enormous increase in the ICT sector investment i.e. according to this report, Saudi Arabia has the biggest market for supporting these services which amounts to more than 70% of the ICT market of Gulf Countries.

- The contribution of information and communications technologies (ICT) to the Gross Domestic Product (GDP National) as the growth of the development and investment capital is clear. Moreover, ICT networks have contributed to the Gross Domestic Product due to the release of the distant communications sector and open its market for competition. There is a direct comparison between the predominance of Broad Band services and the Gross Domestic Product.

4.3 An Overview Of Education And Scientific Research Development In The Kingdom Of Saudi Arabia

Investing in the sector of education and scientific research is considered to be the best investment as investing in education is enhancing the efficiency of people who are the sources of wealth. The intellectual capital in general along with the human and organizational capital it contains forms the modern wealth of nations (Bradly, K, 1997). Also, scientific research at the domestic level solves the domestic issues in the various agricultural, industrial and service sectors. Consequently, it does what is known as research and development which forms, along with education especially higher education, competitiveness with the other countries as well as creativity and increase of innovation. In 2009, Nariam Metwalli handled some aspects of education and scientific research development in Saudi Arabia. We can refer to some of these aspects in which the researcher uses multiple sources as follows:

- The traditional Saudi education is no longer suitable under the variables of the digital world because this type of education which is based on the knowledge hierarchy in which students turn to negative recipients who have no place in the society of knowledge. This is because the current and future labour market requires a special type of educational outputs that can deal well with digital technologies.

- The Saudi Ministry of Education starts its first practical steps for dispensing with textbooks with the intention of shifting to the stage of preparing digital curriculum and electronic books as well as developing an electronic educational portal for curricula in order to achieve distinguished education and building generations that are capable of coping with growth, development, and the society of knowledge.

- Among the examples of case studies in the developing countries is a study on the educational science laboratories in Singapore

and the change in sustainable education in information and communications technology. The study points out that the field of teaching and learning faces fast developments and changes through the technological developments that shall end the traditional educational systems which are practiced in schools and which will be replaced by revolutionary developed changes that face the challenges of the economy based on knowledge.

- An amount of 1.16 American dollars is allocated to finding smart schools in Singapore after making sure that the information technology is a superior learning tool. Also, teaching and learning strategies, which are characterized by creativity and attracting talented students, have been introduced.

- Teaching and information technologies have their positive impacts on making the students acquire the necessary skills for self-learning i.e. teaching students how to learn and making education a lifelong process.

- The Project of the Future Plan for University Education (Afaq) is considered to be the first project of its type in Saudi Arabia. The Ministry of Higher Education has assigned the research centre in King Fahd University of Petroleum and Minerals to implement the project and preparing studies to make a futuristic plan for the university education which scope covers 25 upcoming years. The methodology of implementing this project on the domestic level includes two sides: the theoretical side of studies in addition to the practical, applied and training side for encouraging scientific research and serving society. Afaq project aims at: - upgrading the efficiency of university institutions – upgrading the achievements of university education – paying attention to the quality and constant update of academic programs – increasing harmonization between the university education outputs and the current and futuristic needs of the Saudi labour market (http://www.daralhavat.com)

The sector of research and development is considered to be a primary sector among the sectors of information and knowledge. It advanced quickly in the Kingdom. Also, the annual expenditure on research and development is witnessing remarkable growth in the Kingdom due to the impact and value of scientific research with regard to supporting the processes and plans of development. It is the main base for sustainable development which the Saudi society seeks to achieve. The research and development are in this way a promising form for the Kingdom to achieve the society of knowledge. This is through the knowledge technologies that include and extensive and complicated range of technologies especially those associated with hypertext and interactive digital media. Both of them have their importance with regard to the development of the educational process, education, creativity, and problem solving and they are not merely supplementary tools of the educational process.

4.4 The Role Of ICT In Establishing Knowledge Society In Egypt: A Case Study

The researcher Sherif Kamel (Kamel, Sherif. 2009), participating dean of business and economics and communication in AUC, has conducted this study which he started by stating the importance of the emergence of information and communication technology (ICT) during latest decades. This comprises a greatly valuable tool for social and economic developments. It even brought on some new forms of foundations that were no longer bound by geographical or temporal restrictions.

Egypt has realized the importance of the potentials of these technologies since the sixties of the past century. Egypt's investment in establishing both infostructure and infrastructure has increased. By the late nineties, it was a part of Egypt's national agenda to enter the society of knowledge, which proves the importance of the contribution of these ICT technologies amongst other developments. These Egyptian developments were put into some tables, which include:

Table No. (1) About the development of information society in Egypt (Kanel,2007)

Program	Year
Open Door Policy	1974
Economic reform program	1985
Information project in Prime Ministry	1986
Reformative initiative for information and national administration	1989
Egypt information highway	1994
Main plan of national technologies for information and communication	2000
Egyptian initiative for information society	2003

The Ministry of Communications and Information Technology was founded in 1999 with information and communication technologies as its main concern. This lead to increase of investments and establishing of infrastructure. As a result, the growth of information and technology industry has achieved some big leaps during the first decade of the 21ˢᵗ century.

Table No. (2) explains the results of this growth which reflects the statistical development in 2008 in Egypt.

Indicators	May, 2008
Internet users	9.17 million
Internet bandwidth	148.6 Mbps
ADSL users	427.085
Telephone users	
Density (users per 100 population)	15.2
Mobile phones	33.285 million
Landline phones	11.255 million
Prepaid TVs	58.002
Information technology clubs	1.742
ICT Companies	2.452
Information technology companies	1.991
Communication companies	251
Service companies	210

It should be noted that this study for Sherif Kamel was conducted years ago when population was 75 million, now it's 85 million. The researcher's statistics suggest that among these 75 million there are about 28% registered in educational programs, 19 million representing the labor force, and about 6 million working in governmental sector.

Total domestic product is formed as follows: agriculture 17%, industry 32%, service sector 51% (it's noticed in this study that the researcher doesn't mention the percentage of information or knowledge sectors, as information sector is currently considered part of agriculture, industry and service sectors in USA, with service sector having the highest percentage)(This could be referred to in the following reference (Nariman Ismael Metwalli, 1995).

There are numerous efforts exerted by the government and private sector to develop information and communication technologies so as to reform main sectors as education, health and governmental services. This is also accompanied by working on bridging digital gaps (www.idsc.gove.eg).

The researchers continues to explain in his study, titled *"Towards a knowledge dependent society"*, where he explains that information networks are a means of obtaining information and knowledge, and that there's a huge investment in establishing the infostructure in different countries where investing in humans became an organizational priority.

Knowledge dependent societies have also become a universal village and an essential element for change in universal society. It should however be considered that movement towards a knowledge dependent society is a highly complicated process that requires new forms of sharing and cooperation between public and private sectors.

It should be noted that information and communication technologies are not the only element required for establishing knowledge dependent societies. There are other elements such as total domestic product, efficient infrastructure, reducing levels of illiteracy and obtaining information sources like newspapers, TVs, internet… etc (ESCWA, 2007). Culture is also considered one the most important factors in establishing a knowledge dependent society in collaboration with universities, colleges and training institutes in both public and private sectors.

While knowledge dependent societies form the second development of information society, these are concerned with providing everyone with information and necessary technologies. They also aim at generating knowledge, using it and creating essential culture for operation using information and communication technologies and internet. Also, the goal of reaching a knowledge dependent society is not only to respond to social needs and generating wealth, but also to improve the quality of life and to conquer poverty.

4.4.1 Developments and projects in the field of IT & ICT in libraries and information centers in Egypt as

Some developments and projects in the field of IT & ICT in libraries and information centers in Egypt as follows:

- *Establishing digital libraries:* Egyptian libraries have strongly participated in several

digitalization projects. We find that Egyptian National Library initiated massive projects for digitalizing Arabic heritage. It also contributes to the universal digital library project. Also, The Library of Alexandria does several digitalization projects, the most important of which is the Arabic digital library project and the million book project.

- *Escalating attention from libraries towards establishing websites and portals:* these could be owned by the libraries or a part of websites and portals of foundations that own the libraries. Some of these are the websites of Egyptian National Library and The Library of Alexandria.

- *Expansion of electronic publishing* of books and periodicals, as some publishing houses publish Egyptian books and periodicals in a digital form. An example of which is The Ask Zad portal which offers the full text of numerous books for Egyptian authors, as well as providing full text for a great number of periodicals.

- *Expansion of using integrated automatic systems,* and the increase of dealing with electronic information sources and databases, as well as available indexes online.

- *Transfer of some big libraries to new buildings* which required an obvious change in services and resources and benefiting from new technology. The most prominent example of this is the transfer of Cairo University's Central Library, whose building dates back to 1932, to a new building in the campus which was established according to the latest architectural rules for libraries. Clear care for information and communication technologies and infostructure was taken into consideration (Mohammed Fathy Abdul Hady, 2008).

The most important project of development in this field is: Information and Communication Technology Project (ICTP), as the Ministry of Higher Education has financed this projected which includes these axes starting 1/7/2009.

1. He role of info structure which includes increasing internet speeds in universities to 1000 Mbps instead of 55 Mbps.
2. Construction and development of infrastructure of information centers in universities.
3. Completion of infrastructure of the network of Egyptian universities in Supreme Council of Universities.
4. Development of information center in the bureau of Ministry of Higher Education.
5. The axis of administrative information systems (especially in universities and technological faculties).
6. Foundation of an electronic portal for universities and technological faculties.
7. The axis of e-learning and digital libraries.
8. Completion of establishing the standardized index of academic libraries.
9. Foundation of a digital depository for academic researches and dissertations.
10. Training for usage of information and communication technologies.

5. COMPONENTS OF ICT IN LIBRARIES AND INFORMATION CENTERS

The researcher Chisenga (Chisenga, J, 2004) suggests that ICT resulted of a digital convergence of computer and remote communication technologies, along with other media and communication technologies. The researcher (Tarek Mahmoud Abbas, 2003) suggests that information and communication technologies were the result of combination of three revolutions, which are:

1. Information revolution characterized by a huge expansion of knowledge and massive amounts of resources in countless forms, specialties and languages.
2. Communications revolution characterized by the development of modern communication technologies.
3. Computer revolution and digitalization which spread to all aspects of life and sources and combined with all communication aspects.

According to a study by Shariful Islam (Islam, Shariful, 2006), it includes ICT technologies, computer technologies, micrographic technologies and printing.

The following will be the researcher's detailed explanation of some of these technologies as mentioned in Shariful Islam's latest study.

5.1 Computer Technology

The categories of Computer Technology are

- *Workstations* these are powered by powerful, costly computers to service engineers, and they include:

- o Mainframe computers: which have an exceptional ability to store data and quickly preparing it.
- o Super computers: those have tremendous abilities, they are said to be the fastest computers ever invented.
- o Mini computers: have small sizes and have become more and more important as servers in networks.
- o Personal computers: which are either Desktop or Mobile (Laptops) for ease of use of software like word processing.

The researcher Shariful Islam also includes the following as a part of computer technologies:

- *Microchip technology*: which is a minute piece of silicon that contains thousands of electric circuit components called transistors.
- *Artificial Intelligence (AI):* includes a number of concurrent technologies which try to develop machines to emulate human characteristics in education, communication or eyesight and hearing abilities.
- *Software technology:* includes step-by-step instructions to give orders to computer to boot. There are multiple software packages for different applications in the field of libraries, information and administrative services.
- *Documentation system (Integrated cds/isis):* which is a library software programed by UNISCO to store and restore information and windows form from (cds/isis) which is (WiNisis).
- *Minisis:* supports searching in text, indexing, and controlled indexing terms.
- *Libsys:* the most comprehensive software in libraries as it supports different activities related to feed, indexing, series, articles… etc.
- *CD-Rom (Compact Disc Read Only Memory):*it's an optical disc with diameter of 120mm on which recording occurs using laser beams.

Here are some advantages of using computers in librarian and information related work:

- *Speed:* computers can execute orders in less than a second. Searching for information, making bibliographies and current state newsletters, cataloging and preparation are done by computers in few hours.

- *Storage:* human brain can store information but in obvious limits. In contrast, computers can store massive amounts of data.
- *Accuracy:* computers execute functions with unmatched accuracy.
- *Reliability:* computers and other related technologies have a long life span as long as it's preserved in suitable environment, let alone the reliability of data.
- *Repeatability:* computers can be used repeatedly to prepare information.
- *Compactness:* contemporary computers are small sized which is completely different from what they were in the beginning.

5.2 Communication Technology

These include both communication and remote communication technologies used it information transfer as signals between distant places. It includes audio technology for radio receiving which is replaced by frequency modulated FM receivers. These can be used in libraries and information centers in children's stories and learning in addition to audio-visual technology and its use in eyesight and hearing. These include: motion-picture which are a dynamic source of information, innovation and updating. Also TVs and Cable TV which is a communication system of cables from the center to houses. Videodisc is used for streaming software and digital database and educational programs such as information recovery systems on direct line where information is stored in computer files then made available via a remote control link. Cellphone or Mobile phone, fax and e-mail to exchange messages electronically, voice mail and teleconferences, which are conferences done between people remotely. There are five types of teleconferences which are: post-audio, post-visual, post-computerization, document-oriented and personal video conferences.

Lastly, satellite technology. Satellite orbit the earth at a height of 22.000 miles in the space. The internet which connects computers and other communication devices to make data transfer from one place to another possible, and its subdivisions like Wide Area Network (WAN) and Local Area Networks (LAN).

Some sociologists and politicians think that technologies, especially those related to communications, change people's culture. Actually, technological reality has become the contemporary substitute which includes communication and

information technologies. This is described as (Technology is the new ideology). What's meant here is that developed countries depend on science, technology, information and knowledge for its international competitiveness. That's contrary to developing countries which are still establishing parties of left and right middle. As a result, it's hard for them to catch up to developed countries. Even more, digital and knowledge gap will keep increasing.

We conclude this part by suggesting that not all aspects of technology can be beneficial to culture or politics. That's because it can be used by settlers in political, economic and social injustice, in addition to using military technology to oppress people. (Look up Technology in Wikipedia, the free Encyclopedia).

5.3 Reproduction Technology

This includes three types:

A. *Reprographic technology*: the term "reprography" was used to refer to information processing field which deals with technologies and preparations related to documents' reproduction.

B. *Micrographic technology:* this field takes advantage of microform, microfilm and microfiche.

C. *Printing technology*: a printer is a machine that transform computerized products into printed images. It has different forms like Laser printers, Dot matrix printers, Bubble-Jet… etc.

6. THE IMPORTANCE OF ADOPTING ICT COMPONENTS IN LIBRARIES AND INFORMATION CENTERS

The most important reasons that in general made libraries and information centers use and apply information and communication technology:

1. The massive increase in intellectual production as it doubles greatly every year.

2. The change of need for information due to scientific and social progress, and as a result of interaction and integration between scientific specialties. That led to focusing on information whatever form it's in, whether it's in a book, a website… etc.

3. Relieving the burden of routine manual work and developing productivity while depending on the smallest number of workers.

4. Developing librarian and informative services and taking advantage of automated indexing services specially in routinely released scientific editions and non-traditional sources of information.

5. Taking advantage of information banks and their databases, and accessing information, restoring it, streaming and copying it easily and rapidly.

6. Participation in establishing cooperative, informative and automated systems and networks between libraries, universities and scientific research centers.

7. Finding a solution to the problem of lack of space, which is a problem experienced by most libraries, no matter how big they are.

8. Keeping pace with the development of the knowledge society and the information revolution in order to develop practical research.

9. Rationalization of expenditures to provide better services at lower costs and facilitating access to high costs traditional information references such as encyclopedias, indexes and abstract… (Asmaa Husain Al-Sayed, 2013)

6.1 The Impact Of Information And Computing Technology On The Fields Of Library And Information Centers

The information technology and communications revolution has affected the development of libraries and information centers and the basic components of these libraries; It also affected the preparation of libraries' specialists, and its influence extended to the quality of information services provided, as well as technical operations, also on forms of information objects that varied inside the libraries, some of these features is presented as follows:

6.1.1 Information services

These services are the true mirror of the libraries; they reflect the ability of the library to meet the needs of its beneficiaries, i.e., it is proof of the success of the library, It is worth mentioning that the information and communication technology has contributed in its first phase in the development of traditional services for libraries, where the use of computers in indexing operations, record keeping, lending, adjusting journal subscriptions, abstracting indexing and reference services. Then the libraries benefited from information and communications

technology to provide new information services as well as the developing other services they offered and presenting them in a modern way like Selective transmission of information and Current Awareness. These services became easier and faster under the Information Technology. In addition, of the Services of information and communication technology that showed the possibility of researching in remote library indexes, as well as in global databases shared by the library through the digital library projects and the possibility of research in electronic information sources available on the Internet, To sum up, the information and communication technology has influenced in a positive way in the provision of information services in a new way through the development of traditional services, and the introduction of new services that were not available before, it's also influenced the ways to deliver information to beneficiaries at high speed.

6.1.2 Technical Operations

The information and communication technology have contributed in the performance and development of the technical operations like indexing and classifying in a better way. In addition to providing book-borrowing service easily and quickly, one of the basic functions in the library that was affected by the information technology is supplying. As a result of the provision of information in machine-readable databases, the library has changed its approach in supplying from the strategy of owning information to the strategy of accessing to information (access over ownership), also, electronic publishing impacted the way of lending between libraries, where electronic sources lending and mutual exchanging networks have appeared (Sabah Muhammad Kālu, 2000: 85), It also helped university libraries to enter Library consortium through university libraries unions and digital library projects.

Information Objects: The information and communication technology have influenced information objects available in libraries, it is no longer limited to manuscripts, publications and audio-visual material, but added Magnetized and Laser objects which are the product of the use of computers in libraries, add to them online networks and information databases and electronic information objects (Ghada Muhammad Rashed 2001:56) so there were electronic books and periodicals, as well as some electronic references like dictionaries, encyclopedias and directories, and other electronic information objects.

6.2 Beneficiary Services That Depend On Information And Communication Technology

Some of the beneficiaries of the libraries adopt electronic habits by using new technologies, including computers, the Internet and the Web, extranet and others, and as a result These beneficiaries placed new demands on libraries because of the need to provide the latest information and resources as well as to benefit from the executions, which are guaranteed by information and communication technologies, and some of the advantages and facilities stated as follows:

- Providing the beneficiaries with information quickly and easily.
- Allowing access to distant sources to the beneficiaries in various places.
- This should be around the clock, meaning 24-hour.
- Flexibility of the individual according to his needs.

In addition and in conjunction with the services provided by libraries and based on (ICT) which include the following:

A- Providing access of the Web to Opac: Modern Libraries provides (Online public Access Catalog Opac).

B- Delivering documents electronically: Modern Libraries applies the system of sharing books between libraries depending on (ICT) technology. Where it use electronic network in delivering copies of periodicals and other documents in a digital format and in portable document format PDF.

C- Networked Information: Modern Libraries allows the beneficiaries access to networked information sources, and they are the databases and the scientific periodicals and encyclopedias and government information determined by publishers.

D- Delivering information to the beneficiaries: this leads the professionals in information and librarians to use desktop computer environment whatever the geographical location is.

E- Digital and information awareness On-line: Modern Libraries uses library programs and reference service programs that include searching for sources online like Service information via the Web for new collections and revisions.

F- Advisory services for readers On-line: Libraries now offers advisory web-based services, as well as reference services, which include supplying, reviews and recommendations, as well as providing

facilitations to readers to interact with the staff of reference services which is called : (Virtual Reference Desks)

It is clear from the previous exposition the impact of information and communication technology on the libraries and its effect on the information revolution, this technology provides us with added value with information services it provides for its beneficiaries, and also the availability of information sources has become the dominant form of digital storage and retrieval of information, and the term Library doesn't refer to buildings, the libraries have become virtual and digital and you can access it from anywhere. Libraries now does not represent physical sources but it represents digital sources. And access to it can be done anytime of the day, which mean that the beneficiaries are no longer restricted to working hours of the library, but they have access to the sources around the clock through networks and the internet. The libraries broke the barrier of distance through (ICT), the beneficiaries can access what they need in short time and get the needed information to the reader in a timely manner. This obvious effect of (ICT) requires new skills for the professionals in information.

The use of information and communication technology has raised some challenges to the libraries and these challenges relate to the role of libraries and the new features and managing copyright and access to information and preserving digital sources and filing legal sources.

This technology has changed the reading habits and the use of information sources, and it even changed the intellectual rules of the beneficiaries and the information specialist in informational activities in the libraries and information centers.

7. ADVANCED PREPARATIONS FOR PROFESSIONALS IN INFORMATION

University education should be developed in line with the conditions of the modern era and with the changes that have occurred in the community in the forms of life, according to the scientific and technological revolution in which we live and the revolution in information and communication. We should also utilize the information and communication technology for the purposes of education, which was called the bulletin of information and communication technology for development in West Asia: (Information and Communication Technology for Education) which

abbreviation today is (ICTFE). The aim of university education in the era of information and communication technology must be:

1- Meeting the current and the future needs for the community development and labor market and production.

2- Creating graduate who has the required specifications for this era, which include:

- Developing self-learning and continuous-learning skills.
- Integrative construction scientifically and technologically, intellectually, culturally and continuous development.
- The ability to utilize the tools of scientific research and the development of scientific capability.
- Developing effective communication skills. Confirmation of self-confidence and having the competitive capabilities.
- The ability of critical thinking and problem solving.
- Preservation of the cultural identity and the national language along with mastering a common foreign language.
- Making sure that researchers and students understand the available technology and using it efficiently.
- Searching and exploring useful information for the beneficiaries' community.
- Prepare summaries that help the beneficiaries identifying previous studies in their area of specialization and benefit from them (Ghada Abdelmonem Mousa, 2010:51).
- Using the Internet and dealing with digital information and systems related to it.
- Developing and managing websites (Programing)
- Training beneficiaries to use electronic sources and analyzing information.
- Preserving, maintenance and protection of digital information (Hesham Farahat 2008: 89)

8. RESULTS AND RECOMMENDATIONS

In this section we present the proposed study results and then we briefly introduce recommendations

8.1 Results
These results are the answer to questions asked by a researcher at the beginning of his study.

- *About the concept of information and communication technologies and its development.*

It was shown that this modern concept is the parallel evolution to the previous term of information technology; researchers did not agree on a unified concept, as some consider it the techniques for networks and applications, while others see it as a group of activities and services including remote information and communication technology equipment, and finally some of them see it as capturing and processing techniques which carry out supplying operations, storing, retrieving, transporting and broadcasting information.

- *The position of these technologies in the indicators and the components of the knowledge society.*

There is no agreement among researchers on one position; some sees it focused on knowledge as preliminary inputs in the economy knowledge (shown and internal) as a role of developing intellectual community, which includes a large proportion of the intangible intellectual capital.

Intangible (Human Capital)

Finally, it is integrated with what some researchers find as the components of the knowledge society which is represented in intellectual, social, and organizational Capital and in knowledge management and organizational behaviour also in teaching, learning, research, development, knowledge economy, innovative capabilities, creative thinking, digital gap and others.

- *As regarding the role of information and communication technologies in building a knowledge community*; the researcher observes that there is a strong focus on this relationship, since some researchers may consider that it represents the pillars and the necessary tools to build a knowledge community, and this is clearly mentioned in the Arab Knowledge Reports 2009-2013.

  These reports include the e-government services, education, learning and their use in e-commerce and medical care as well as Arabic digital content. The researcher focuses on the importance of these techniques as case studies of Saudi Arabia and Egypt.

- *About the role of information and communication technologies in developing library services and information centres*: This aspect has taken a major part of this study, since this part tackles the components of these

technologies in the libraries (Computing / Communication / reproduction and publication) and then their impact on the provided services in the technical operations ,information sources and beneficiaries services, and then the need of the advanced preparing for the information professionals.

8.2 Recommendations

These following recommendations are based on the conclusions of this study:

A- The need to focus on the preparation of the information professionals to absorb the business requirements of digital libraries and the Internet.

B- To keep up with the continuous developments in the information and communication technologies field for the interaction and productive cooperation with the outside world as well as the development of local performance.

REFRENCES

[1] Ibrahim Bakhti (March, 2005). Manufacturing information and communications technology and their relationship to the performance development and improving -International Scientific Conference on the organizations and governments' outstanding performance.

[2] Ahmad Anwar Badr (2011). The knowledge society between the intellectual framework and the practical applications, Cairo: Egyptian Saudi Publishing House.

[3] Asmaa Hussein Muhammad Al-Syed (2013). The impact of information and communication technology on the use of the University of Alexandria's libraries. PhD Thesis supervised by Ghada Abd Al- Mun'em Mousa. University of Alexandria.

[4] Iman Ahmad Hamad (2004). Information technology in the Arab libraries and research centres at the University of South Valley - Suhaj Branch- study of reality with planning for the future, MA thesis, University of the South Valley Faculty of Arts, Department of Library and Information.

[5] Sabah Muhammad Kalo (2000). Information and communication technology and their reflections on the IT institutions, king Fahd national library magazine.6, 2, 90-59.

[6] Tarek Mahmoud Abbad (2003). Digital Information Society. Cairo: Al-Asil Centre for printing and publishing.

[7] Abd Al-Mun'em Youssef Bilal (2003). Communication and Information Technology in Egypt: Reality and Future till 2020. Cairo: Academic Library.

[8] Ghada Abd Al- Mun'em Mousa (November 2010). The New Roles of the Professionals in Information and the knowledge In light of the Contemporary Technological Challenges: king Fahd national library magazine, 16, 2.

[9] Ghada Muhammad Rashid (2011). Information Technology Articles in libraries and information departments in Egypt: Field Study, PhD Thesis, University of Alexandria, Faculty of Arts, Department of Library and Information.

[10] Muhamad Fathi Abd Al-Hadi (Dec 2008) Manpower in the Area of Library and information in Egypt: a field study of the labor market and setup and training programs in light of recent developments in information technology and the digital environment, The magazine I'lam, 2.

[11] Nariman Isma'il Mutwali (2009). The Integrated Impact between Saudi Arabia development plans and information and communication technologies to reach the knowledge society. King Fahd national library magazine, 15, 2.

[12] Nariman Isma'il Mutwali (1995). The Economics of Information - Cairo: Academic Library.

[13] Nihal Fou'ad Isma'il (2010). The New Directions of the Libraries and Information Technology - Alexandria: Dar Al-Ma'rifa Al-Jami'ia.

[14] Hashem Farhat (July 2008). Modern functions to libraries and information specialities : an analytical study in light of the needs of the labor market in the United States of America and the benefit from them in the teaching Library and Information Science in the Arab world. fahd national library magazine, 14, 2.

[15] Adam, L. (2003) information and communication technologies in Higher Education in Africa initiatives and challenges. JHEA/RESA v. (1) p 195-221.

[16] Aiman Alnaggar (2008). Towards gender equal access to ICT, Information Technology for Development v. 14 (4)., p 280-293.

[17] Arab Knowledge Report (2012), Information and Communications Technologies in Arab Countries: the pillars and tools of knowledge.

P   143-178. http://204.200...211..31/update_March_2012/akr%202011/akr%20english.pdf

[18] Arab Knowledge Report (2013) The Arab World Competitive ness.

[19] Blurton, C. (1999) New Directions in Education ????, UNESCO's world communication and information 1999-2000 Paris UNESCO 46-61.

[20] Bradley, K (1997) Intellectual capital and the new wealth of nations. Business strategy Review, v. 8(1), p 53-62 and 8 (4), p 33-44.

[21] Butcher, Neil and et al (Dec. 2011) ICT. Education development, and the knowledge society: thematic paper prepared for Gesci. P. 1-67 (African leadership).

[22] Cheng, Pet al (2004) knowledge repositories in knowledge cities institutions and knowledge sub-networks Journal of knowledge management, v. 8 (5), 96-106.

[23] Chisenga, J (2004) ICT in Libraries An overview and general introduction to ICT in libraries in African available:

http://www.inasp.info/isp/ict-workshop-2004/sessionchisenga.ppt

[24] Communication and Information Technology commission (2013) ICT Indicators Report End of 2012 (Saudi Arabia Communications and Information Technology Authority)

[25] ESCWA: Economic and Social Commission for Western Asia (2007) The Information Society from Declaration to implementation.

[26] Foray, D (2004) Economics of Knowledge. London: MIT Press.

[27] Gretton, P. et al., (2003) the effects of ICT and contemporary innovations in Australian productivity growth. Canberra, Australian Government.

[28] Hamelink, C. (1997) New Information and communication technologies. Social Development and Cultural Changes Discussion Paper. Dp. 86 UNRISD, Geneva.

[29] Hooker, M (2010) Concept note: Building leadership, capacity for ICT knowledge Societies in Africa. GESC.

[30] Islam, Shariful Md and Islam, Nazmul Md (2006) Information and Commuinication Technology (ICT) in Libraries: A New Dimension in Librarianship. Asian Journal of Information Technology, v. 5 (8), p. 809-817.

[31] Kamel, Sherif H. (2000) The Role of ICT in Building a Knowledge based Society. Retrieved 12, 2012 from.

http://www.studymode.com/essays/the-role-of-ict-inbuilding-1333963.html

[32] Khaled Almabrouk (2009) An Analysis of the Major issues for successful information technology transfer in Arab Countries. J. of Enterprise information Management v. 22 (5), p. 504-522.

[33] Nadira Kamel and Thahira A. (April 2010) ICT in Higher Education: Canadian Journal on Data, Information and Knowledge Engineering., v.1 (1).

[34] Pradhan, M.R. (2004) Developing Digital libraries technologies and challenges. Library Herald, New Delhi, v. 42: 100.

[35] Punie, y. and Cabrera, M. (2005) The future of ICT and learning in the knowledge Society-Report on a Joint DG JRC-DG EAC workshop held in Seville, 20-21 Oct. 2005.

[36] Rahman, L. (2003) Global Context of ICT Development and Bangladesh. The Proceedings of the National Conference of inter university IT professionals in Bangladesh, p 1-22.

[37] Schmidt, Mogens and coudray, Sylvie. Future challenges to Building Knowledge Societies Future Challenges of Information Societies.

[38] UNESCO (2005) From the Information Society to Knowledge Societies. Paris: VNESUO Publishing.

[39] Villavicenio, Daniel et al (2010) Indicators of the Knowledge based Society. http://www.eulaks.eu/EULAKSDeliverable-D.2.1-UAM-EU-LAC-Comparison-Indicators.pdf

[40] Zainab, A.N., Abdullah, A. and Edzan, N.N. (July 2000) Information and Communication Technology (ICT) Enabled 42 knowledge based Malay Society, Malaysian Journal of library and Information Science, v. 7 (1), p. 1-15.