

# Success Factors for Adopting E-learning Application in Sudan

Haysam A. Ali Alamin, Eltyeb E.Abed Elgabar

*Abstract - This paper aims to highlight the main factors that support the use of E-learning technologies, and the benefit of such applications in developing countries as general and in Sudan as a particular situation, toward the achievement of E-learning goals such as reaching the maximum number of customers "Students", Improving the quality of the services "Education", and better interaction with full and part-time students. All these goals lead finally to students' satisfaction. The factors that this paper discusses will be mainly divided into two main categories, 1- The technical factors, or the infrastructure of the Information & Communication Technology (ICT) in Sudan. 2- Social factors that cause the success and popularity of the applications of E-learning in Sudan.*

**Keyword:** E-learning, Sudan, ICT infrastructure, Popularity, Social factors, Technical factors

## I. INTRODUCTION

Educational organizations are seeking toward the switching to E-learning technologies, for the achievement of higher levels of quality, reaching the maximum number of students, reducing classroom and facilities cost, training cost, travel cost, printed materials cost, labor cost [1] And reaching student satisfaction, and in case of governmental education institution to fulfill the nation approach to move to the E-government concepts. Now many developing countries have expressed an interest to implement e-learning [2] In the case of developing countries in general and in Sudan as a particular case the switching to the E-learning application may become more important to help finding a solution for a number of problems such as the absent of security due to civil wars and tribal disputes just like the African Virtual University's distance learning initiative in Somalia which show how ICT-enhanced learning even in the most desolate and abandoned regions of the continent.[3] also E-learning is important in Sudan to help finding a solution for the problems of lake of qualified teachers, and the far distance between the production area and the highly populated areas. These problems and others factors enforce the adoption of the E-learning concepts. In case of developing countries the governments are held responsible of that adopting and development of the E-learning application, because there are normally no private sectors in these countries capable of adopting such application, although the building of the communication infrastructure can be done by the cooperation between both the public and private sectors. This paper focus on a number of factors that insure the choice of E-learning in Sudan.

**Manuscript received January, 2014.**

**Dr.Haysam Elshakh Ali Elamin**, Assistant Professor(2010) Computer Science Faculty of Computer Science and Information Technology, Information Technology Department - Khulais - King Abdul Aziz University- Jeddah - Saudi Arabia

**Dr.Eltyeb Elsamani Abd Elgabar Elsamani**, Assistant Professor(2009) Computer Science Faculty of Computer Science and Information Technology, Information Technology Department - Khulais - King Abdul Aziz University- Jeddah - Saudi Arabia.

## II. ENVIRONMENT BACKGROUND

Sudan witness one of Africa's longest civil war between North and South Sudan which ended by Comprehensive Peace Agreement in 2005 between the government of Sudan and Sudan People's Liberation Movement (SPLM). Following the Comprehensive Peace Agreement a referendum held in January 2011 ended with secession of South Sudan in July 2011. Since then the GDP growth declined from 5% in to 2.8% due to the secession of South Sudan reducing the population by about 20% and oil revenue by 75%. Average inflation surged to 20% in 2011, up from 15% in 2010, owing to the rise in food prices and the depreciation of the Sudanese pound. The current account deficit fell to more than 7.5% of GDP in 2010. Sudan's budget deficit was 5.0% in 2011 and is estimated to increase due to the loss of oil revenue, intensifying armed conflicts and increased security threats, the creation of new states and the financing of peace agreements. As a result of US sanctions as well as Sudan's heavy debt, external borrowing options are severely limited and internal borrowing is likely to increase .Also Darfur conflict which is a civil war that broke out in 2003 and didn't end until now, leading to the deaths of tens if not hundreds of thousands of Darfuris and the displacement of nearly two million. In the fighting between the Government of Sudan and militias and other armed rebel groups[4][5][6] All these facts directly affect the total government spending on education leading to poor education outcomes, which means the need of a quick and cheap solution for improving the quality of the education process within the limited resource available.

## III.EFFECTIVE APPLICATION OF E-LEARNING APPLICATIONS

In order to achieve large popularity for E-learning concepts and application, and guarantee the use of this application by students and learners we must address the key factors for the success of these applications considering that a number of institutions tried the application of E-learning without any mentioned output. The main success factors for the E-learning include:

1. The true understanding of the real needs of the learners requirements, which lead the institution to build a powerful application that addresses these needs, making the E-learning system more useful [7]
2. Student satisfaction should be considered in evaluating the effectiveness of e-learning. The degree of student learning satisfaction with an e-learning environment plays an important role in the adoption of e-learning or blended learning. Learners' satisfaction can have repercussions on whether learners like to use systems or not [8].
3. The availability of ICT infrastructure that minimize the cost of the application of E-learning.

4. The use of well known technologies such as mobile phone and SMS especially in environments such as Sudan due to the low cost of such services and its popularity among students and learners which inherent this popularity to the application of E-learning. Figure(1) shows the students demand for e-learning programs in Gadaref city-Sudan[9][10][11]
5. The design of the services that student actually use, such as the displaying of test and exam results, the admission and registration process, because students must use these services, and by transferring it to electronic services the students will examine the change and become more familiar with it.
6. Accuracy which indicate that the output of the electronic system must match the result of traditional system in order to build the confidence in using the new system.
7. The use of easy language, drawings and diagrams on the application level to achieve usability features.
8. Dissemination of technical culture in the education institution.



Fig.1 students demand for e-learning programs Gadaref - Sudan

#### IV. TECHNICAL FACTORS FOR E-LEARNING & MOBILE LEARNING SUCCESS IN SUDAN

Technical factors are the backbone and the main base which any mobile and electronic application runs on. Many studies reported that Technical and infrastructure are important factors for e-learning implementation[9]. We also include in our technical factors the management decision which also supports the building of a powerful infrastructure. The following are the main technical factors:

1. The existence of a large fiber network in Sudan which encourages new Telecommunications Companies to invest and to inter the competition without the need to risk large amount of money in building new networks, because new companies can start by renting the existing networks. Figure(2) illustrates the size of the fiber network in Sudan with the total of 12000 Km (Sudatel 7000 Km, Canar 5000 Km) reaching Egypt, Ethiopia, Chad and Eretria borders and Saudi Arabia via sea cable.[12]

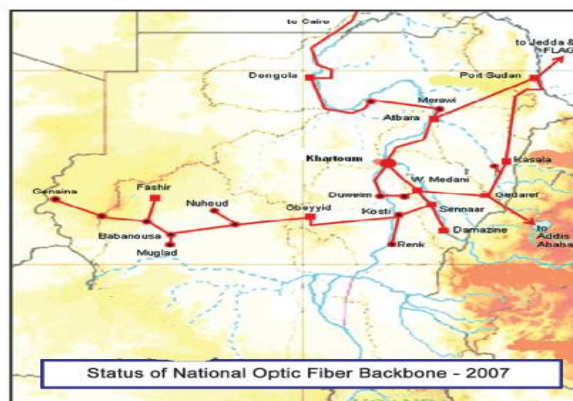


Fig.2 Fiber Network in Sudan

2. The availability of Sudanese technical staff on a high degree of qualification and responsibility, forcing telecommunications companies to reduce expenses and foreign cadres cost, reducing the cost of accommodation, subsistence and subsequent, which in total reduce the operation cost. In addition to knowing the local nature and geographical areas, the hotbeds of tribal conflicts and the nature of the climate.
3. The great financial benefits for telecom companies operating in Sudan, not one company had announced that it's having financial problems, which motivates investors to enter the Sudanese market.
4. The geographical nature in Sudan, most of the Sudanese territories are flat lands, which facilitates the delivery and management of communication networks, without the need to get around the mountains or cross the valleys and rugged areas. Figure(3) illustrates the topography of Sudan.



Fig.3 Sudan Topography

5. The nature of the concentration of population in the Sudan on the Nile River, which will reduce the distances required for networking, rather than the need for the network tree as is the case in many countries, where the scattered populations of those countries randomly stationed, population density in Sudan on the Nile River, which means that networking line as close as possible to the straight line, Figure (4) shows the distribution of population in Sudan. Fiber-optic network with only a length of 12,000 kilometers and including the duplication of network as belonging to two communications companies (Sudatel + Canar) was enough to link 80% of the country's population

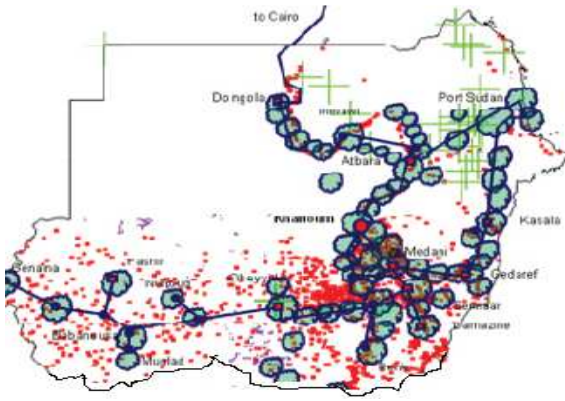


Fig.4 Distribution of population in Sudan

6. The large population density in the Sudanese cities, this means building relatively limited networks to cover a large amount of the population and this in turn reduces spending on equipment and increases profits. Figure(5), Table(1) shows the distribution of population density in Sudan States and Cities

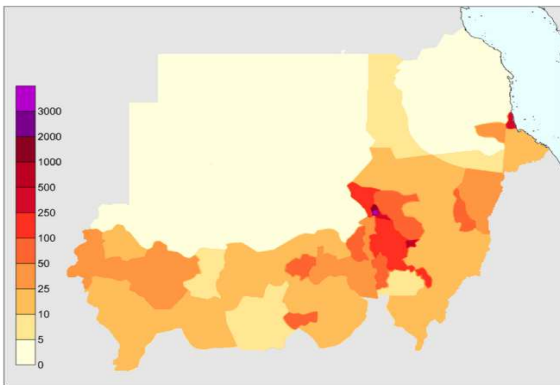


Fig.5 The relative distribution of population density in Sudan States

| N.o | City           | Population | Percentage |
|-----|----------------|------------|------------|
| 1   | Great Khartoum | 5,274,321  | % 17.072   |
| 2   | Portsudan      | 517,338    | % 1.6745   |
| 3   | Niala          | 565,000    | % 1.8288   |
| 4   | Madani         | 345,290    | % 1.1176   |
| 5   | Obaied         | 340,940    | % 1.1035   |
| 6   | Gadaref        | 340,000    | % 1.1005   |

Table (1) Distribution of population density in Sudan's Major cities

7. Sudan strategic location, where Sudan is located next to a number of countries and overlooking an important sea port, which encourages global communications companies to invest in Sudan, in order to open up new markets in the region, taking advantage of the Sudan central location in the regional market.

All of these technical factors drive the infrastructure for further development, which confirms to decision maker the existence of a strong platform for e-learning, in addition to the continued expansion of internet capacities and data transfer via this infrastructure, growing up from dial-up access to the Internet in the nineties with a speeds not exceeding limited bits per second, to reach speeds of nearly tens of megabits today.

## V. SOCIAL FACTORS TO THE SUCCESS OF E-LEARNING APPLICATIONS IN SUDAN

Sudanese social nature differs from many of the neighboring countries, leading to the growth and popularity of telecommunications market in Sudan. Through this study we will identify a number of key elements that support the adoption of the concept of E-learning in Sudan and ensure that the application of this concept will positively contribute to the improvement of the quality of educational services provided to students, and these factors are:

1. The number mobile user in Sudan, which is a strong motivation for telecom companies to invest large sums in infrastructure for communications and information networks. Due to the great financial payoff, statistics shows that 71% of the populations are already mobile users.[13] Table (2) shows percentage of families having one or more mobile phone. Table (3) represents the number of mobile phone users by communications companies until the year 2009.

| State          | Percentage |
|----------------|------------|
| Sudan          | 95.40%     |
| Western State  | 95.50%     |
| Southern State | 97.60%     |
| Middle State   | 97%        |
| Khartoum       | 97.90%     |
| Eastern State  | 82.50%     |
| Northern State | 99%        |

Table(2) percentage of families having one or more Cell phone

| Service                  | Operator         | Users      |
|--------------------------|------------------|------------|
| Fixed phone              | Sudatel          | 83,371     |
|                          | Canar            | 287,521    |
|                          | Total N.O        | 370,821    |
| Cell Phone               | MTN – Sudan      | 3,191,776  |
|                          | Zain – Sudan     | 6,743,812  |
|                          | Sudani - Sudatel | 3,191,776  |
| Total mobile subscribers |                  | 13,127,364 |

Table (3) represents the number of mobile phone users by communications companies until the year 2009



Fig.6 Cell phone charging in a village – Sudan

2. The nature of citizens with a high degree of social cohesion and the presence of strong family relationships, impose on individual a great deal of communication, making people more popular with the use of communication technology, leading for a higher acceptance for this technologies in the field of learning Table (4) shows the volume of SMS messages sent

during the year 2008, with more than 1.5 billion messages, Figure (6) mobile phone charging a village in Sudan

| Company   | N.O SMS       |
|-----------|---------------|
| Company A | 180,000,000   |
| Company B | 1,207,553     |
| Company D | 1,303,041,361 |
| Company C | 168,453,936   |
| TOTAL     | 1,652,702,850 |

Table (5) number of SMS sent from the telecommunications companies for the year 2008

3. Consumer Nature, referring to the nature of consumption for members of the community in Sudan, most individuals have a great portability to pay large sums of money to pay mobile phone bills. The bill rates in Sudan are very large if compared to neighboring countries, which stimulates telecommunications companies to expand their networks to cover the pressure.
4. although civil wars and crises experienced by Sudan in previous periods, The literacy rate in Sudan is 70.2% of total population, male: 79.6%, female: 60.8% [14] which means that the awareness levels and the degree of learning is very reasonable, and such high levels make the proportion of beneficiaries and students who are able to deal with systems Mobile continues to increase.
5. the state policy in telecommunication area. by linking ministries to gether and rehabilitation of managers and officials [15] and facilities provided by the State for companies operating in this field, which led Sudan at the end to enter the field of ICT, and involve major companies from many countries including, for example (Kuwait - UAE - Saudi Arabia - China - Uganda) to help in the development of the field of telecommunications in Sudan

### VI. CONCLUSION

The application of the concept of e-learning contributes significantly in finding solutions to the problems that stand in the way of the dissemination of science and knowledge in many countries of the world especially in the third world countries. These applications have a very important impact on the students in terms of enhancing their motivation for learning. Taking into consideration factors such as understanding the needs of students, the use of attractive, cheap, popular and well-understood technologies, as well as providing an acceptable degree of accuracy will make e-learning more effective. In addition to all that, using a simple language that is easy to be understood by the learners is required. Furthermore, the e-learning applications have facilitated the access to information for students especially in the regions and outlying provinces. No doubt that the general environment and the exceptional circumstances in Sudan created by wars and conflicts over many years, and resulting in the division of the country into two states, represented a principal reason for the shortage in the financial resources and labor force . All these reasons among others constitute a fertile ground for the start of the e-learning applications where a number of technical and social success factors support the building of these

applications. E-learning applications effectively contribute in attracting large numbers of students who were deprived of studying during the periods of conflicts and wars. They also give the opportunity for the members of the community to have easy access to science and knowledge in general. The environment in Sudan constitutes a fertile starting point for the success of this type of applications. In addition to all that , the mobile applications can be adopted to include different sectors of society such as health and business, banks and other institutions .

### REFERENCES

- [1] Thomas ülsmann ,Low Cost Distance Education Strategies: The use of appropriate information and communication technologies, ,IRRODL,(2004)
- [2] Grönlund, Å, & Islam, Y. M. , A mobile e-learning environment for developing countries: the Bangladesh virtual interactive classroom. Information Technology for Development,2010, 16(4), 244–259.
- [3] African Virtual University (<http://www.avu.org/Press-Releases/african-virtual-university-oer-voted-best-emerging-initiative-by-the-global-community.html>)
- [4] Larry Attree, China and conflict- affected states Between principle and pragmatism, case study, Saferworld,(2012).
- [5] Shanmugaratnam, Nadarajah. Post-war development and the land question in South Sudan. Norwegian University of life sciences (UMB). Noragric, (2008).
- [6] Jon Lunn, Sudan: Peace or war, unity or secession, House of Commons Library,2010.
- [7] Horton, William. E-learning by design. Wiley. com, (2011).
- [8] Zhu, Chang. "Student satisfaction, performance, and knowledge construction in online collaborative learning." Journal of Educational Technology & Society 15.1 (2012): 127-136.
- [9] Bhuasiri, Wannasiri, et al. "Critical success factors for e-learning in developing countries: A comparative analysis between ICT experts and faculty." Computers & Education 58.2 (2012): 843-855.
- [10] Wei, June, J. Zhuo, and Hongmei Zhang. "Development of a mobile learning model with usability features for online education." International Journal of Mobile Learning and Organisation 2.1 (2008)
- [11] Gedaref Digital City Organization, <http://gedaref.com/ADB/CP/recov/newone/index.php>,Sudan
- [12] The National Telecommunication Corporation, First Telecommunication Book, Sudan,NTC,(2009)
- [13] The National Telecommunication Corporation, <http://www.ntc.gov.sd/images/stories/mobileindicators.pdf>, Sudan,NTC,(2013)
- [14] The Central Intelligence Agency, [https://www.cia.gov/library/publications/the-world-factbook /geos/su.html](https://www.cia.gov/library/publications/the-world-factbook/geos/su.html),2013.
- [15] Awad Haj Ali Ahmed and Abu Bakr Baize, Sudan Sudanese experience in the trend towards e-government, the Faculty of Computer Science, Neelain University, 2002.



Dr.Haysam Elshakh Ali Elamin  
Assistant Professor(2010) Computer Science  
Faculty of Computer Science and Information  
Technology, Information Technology  
Department - Khulais - King Abdul Aziz  
University- Jeddah - Saudi Arabia  
Assistant Professor in Computer Science at the  
Department of Computer Science, Faculty of Computer Science and  
Information Technology - Alneelain University - Khartoum - Sudan. . Main  
specialization is Software Engineering .



Dr.ELTYEB ELSAMANI ABD ELGABAR  
ELSAMANI  
Assistant Professor(2009) Computer Science  
Faculty of Computer Science and Information  
Technology, Information Technology Department -  
Khulais - King Abdul Aziz University- Jeddah -  
Saudi Arabia.

Assistant Professor in Computer Science at the  
Department of Computer Science, Faculty of Computer Science and  
Information Technology - Alneelain University - Khartoum - Sudan. . Main  
specialization is Information Security in particular and Encryption in  
specific.