Strategies For Developing a Sustainable ICT Management System For Distance Learning In Kenya. The ODL Model

Kimutai James

P.O. Box 3900 Eldoret, Kenya
kimdeltoit@gmail.com.

Abstract—**Majority of developing countries are grappling with enormous pressure on how to resolve rising enrolments pegged on the bed occupancy in many public universities. The problem is compounded by the limited or lack of meaningful quantitative expansion of infrastructural facilities to accommodate rising student population whom compete for already over stretched facilities and resources. However, the rapid advancement of information and communication technology (ICT) has resulted in the world becoming a global village. Moreover, ICT in the educational sector is growing at a steady rate as institutions of higher learning recognise the capabilities of ICT to supplement, enrich, expand, integrate, and support existing traditional mode of learning. This paper investigated the concept and relevance of an ODL model in Institutions of higher learning. This paper further explores the components necessary for a functional ODL. Therefore, the results show that the design and development of an ICT management system for teaching and learning through ODL delivery is not only inevitable but viable as ODL provides a platform for expanding access to higher education opportunities.**

Keywords— **ODL, ICT Management System, teaching and learning, digital divide.**

I. INTRODUCTION

Digital divide refers to the gap between those that have access to technology and those that do not[1].Recent technological innovation, inventions, and advancement have completely changed the way people carry out their daily life activities. IT has virtually pervaded our way of living in a manner that people nowadays mostly rely on to conduct efficiently the day-to-day tasks and activities. The Internet has played a phenomenal role in developing a global village by improving the access and delivery of products and services. In addition, the convergence of technology coupled with faster Internet speeds has changed our social culture by narrowing down the digital divide inherent a couple of years ago before the beginning of the 21st Century. This is paramount in this era of implementation of Vision 2030 pillars as Kenya involves countrywide needs assessment and provision of infrastructure and equipment needed for ICT [9].

In effect, these technological advancements and fast Internet speeds are at present deeply rooted in developed countries. Open and Distance Learning (ODL) can be defined as a learning experience in which the student and the instructor are separated in time and space, use synchronous communication, and employ mixed-media courseware such as print, video, radio, television broadcast, computers, and telecommunication to provide a framework to deliver educational and instructional content [3].

The concept of ODL is currently widely spread in Europe and North America. The quantitative expansion of higher education as well as the rising enrolment in developing countries especially in Africa has hindered access to higher education by the masses. Consequently, bound by limited resources and minimal funding by African governments, institutions of higher learning have had to seek alternative means to remain competitive while ensuring that they continue with expansion efforts to meet the educational needs of the population.

The telecommunication liberalisation in some African countries such as Kenya and the exponential growth of Internet technologies has provided an attractive alternative means for institutions of higher learning to leverage on information technologies to advance the concept of ODL models. Consequently, digital convergence and fast internet speeds should spur economic development and ultimately narrow the digital divide in developing countries.

The ODL model should provide an opportunity for institutions of higher learning in developing countries to narrow down the digital divide gap by allowing its population to access a great deal of electronic journals, articles, research studies and ensure that qualified candidates access higher education regardless of their geographical location. The ODL model should also facilitate partnership and provide a backbone for research collaboration with other institutions of higher learning across the globe.

II. STATEMENT OF THE PROBLEM

Adopting a suitable functional ODL model by harnessing the capabilities of an ICT management system improves and increases access to higher education within the socio-economic and political structure of developing countries. Access to highly marketable degree programmes and Science-based programmes remain limited due to high cost [9].ODL model would alleviate this problem.

The concept of ODL is still current. ODL is currently widely spread in Europe and northern America.ODL growth is facilitated by fast internet speeds supported by sound

information technology infrastructure in place. The development of additional infrastructure and facilities also known as quantitative expansion of higher education, and the rising enrolment in developing countries especially in Africa, has hindered access to higher education by the masses. Consequently, bound by limited resources and minimal funding by African governments, institutions of higher learning have had to seek alternative means to remain competitive while ensuring that they continue with expansion and to offer quality education to a varied population. Democratisation, peace and stability in several developing countries are also playing an instrumental role in providing a solid ICT platform as an attractive alternative means for institutions of higher education to leverage on the benefits of ODL models.

However, the major challenge so far is to adopt effectively an ICT management system that will be fully used to advance not only the ODL concept but also to help boost economic growth of a country, for example, by producing a society of learned people.

III. OBJECTIVES OF THE STUDY

The following research objectives were used to a guide this study:

1. Identify a sustainable ODL model to be used in developing countries.
2. Establish elements that make up an effective ODL model.
3. Examine how ODL can bridge the digital divide.
4. Establish how ODL model can increase and improve access to education in institutions of higher education.
5. To make recommendations for an effective ODL model.

IV. CONCEPTUAL FRAMEWORK

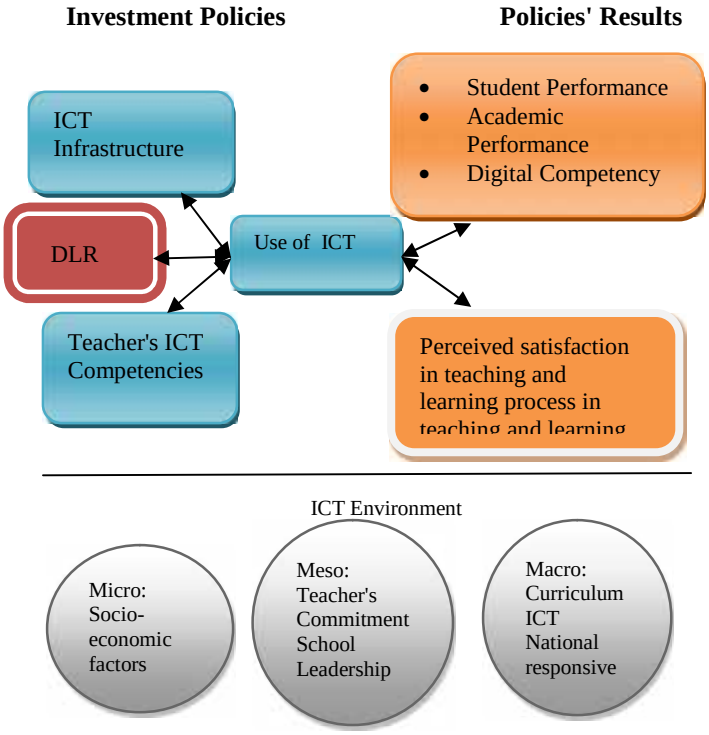

Fig.1 Analytical Framework for Assessing Development, Use and Impacts of DLR.

The model as presented in Figure 1[5], suggests that the use of ICT/DLR/ODL could have a final impact on the educational system by allowing students achieving higher educational attainment, developing stronger digital competences and improving access policy results. It implies development of Sound ICT infrastructure, DLR/ODL, teachers ICT competencies. This would facilitate use of ICT and ODL within the ICT environment (micro:-socio-economic factors, Meso:-Teachers commitment-School/institutional leadership, Macro:-Curriculum-ICT national responsiveness).

V. FACTORS NECESSARY FOR ODL ADOPTION

The following factors are necessary for ODL adoption: correct business environment, infrastructure, social economic structure and cultural environment.

1. Business environment.

The difference between developed countries (DCs) and less developed countries (LDCs) is business environment in terms of ODL and ICT adoption. Distinctive nature of business environment and learning from mistakes of DCs is paramount [11].

2. Basic Infrastructural Requirements.

Electricity, Internet connectivity, educated workers are necessary. Commitment from government and other policy makers should be put in place.

3. Social and Economic Structures

Social development (including political) and economic infrastructure play role in ODL adoption. Personal income (GDP per capita) inflation, income inequality plays a role in developing nations. A wide difference persists in structures among nations of Africa. For example in 2000, Inflation of Equatorial Guinea was 52.17 percent and Ethiopia 1.4 percent.

VI. RESEARCH DESIGN AND METHODOLOGY

This section explains and justifies the research design and methodology that was used to guide the study. It presents procedures used in investigating the problem and their rationale. It comprises sections on Research Design, Target Population, Sample and Sampling Procedures, Description of Research Instruments, Validity and Reliability of the Instruments, Description of Data Collection Procedures and Description of Data Analysis Procedures.

A descriptive survey design could be used “to describe the incidence, prevalence or amount of particular characteristics present in a population” such as demographics among others [4]. A descriptive survey was used to study a suitable ODL model for developing countries, Kenya in particular. Therefore, descriptive survey was an appropriate plan for collecting information on identifying a suitable and

sustainable ODL model for developing countries. The questionnaire was divided into two sections:

1. Section A for demographic information,
2. Section B for respondents to use the 5 point likert scale to answer a series of questions and statements.

The first part of the questionnaire, section A was designed to gather demographic data such as age, country, category, and level of education of respondents. Subsequently, the interview schedule comprised of five questions determined to collect data from the expert group specifically the IT staff. The designed questions asked in the interview scheduled to cover Designing and Developing an ICT Management System for Teaching and Learning.

A. Target Population

The study targeted population drawn from Selected Universities in Kenya- Moi and Strathmore University which comprised of two broad groups namely:

1. Experts: This group of users included information technology staff and teaching staff.
2. General Users: these section-included students.

B. Sample and Sampling Procedures

A sample is defined as a group of units selected from a larger group (the population). A sample is generally selected for study because the population is too large to study in its entirety. This sample should be representative of the general population. This is often best achieved by random sampling [13].

Strathmore and Moi universities, Kenya constituted the sample of the study. The study used a total population of 130 to gather and collect data for analysis. This study employed simple random sampling technique to select the sample size. Simple random sampling is the basic sampling technique where select group of subjects (a sample) for study from a larger group (a population)[8]. Each individual is chosen entirely by chance and each member of the population has an equal chance of being included in the sample. Every possible sample of given size has the same chance of selection.

To determine if developing countries could benefit from an establishment of an ICT management system to facilitate learning and teaching via the ODL model, an interview schedule was used to capture pertinent suggestions and opinions through a series of questions. Subsequently, the interview schedules were administered mainly to the expert users for their opinion on various ICT factors affecting ODL.

C. Validity and Reliability of the instruments

Validity of instruments addresses correctness - did the instrument measure what it was supposed to measure? Qualitative view of reliability is the degree of dependability and consistency. The question then becomes whether the results are consistent with the data collected.

I. Validity

The structured questionnaires made it possible to conduct a pilot test survey to ascertain the validity and accuracy of the content of study. Some questionnaires were administered to a university that is not a part of the sample to determine the adequacy and relevance of the content in relation to the easiness of filling out the questionnaire. This process was meant to detect and establish the validity of the questionnaires

II. Reliability

A test-retest procedure was employed to determine the reliability of the instrument. The Test-retest reliability of a survey instrument…is estimated by performing the same survey with the same respondents at different moments of time. The closer the results, the greater the test-retest reliability of the survey instrument ... values of the correlation 0.7…0.8 are considered as satisfactory or good [12]. A sample of 9 respondents was carefully selected to participate in taking the survey twice over a span of one week. When the results were entered into the SPSS computer statistical package and the reliability test was generated, the results indicated a reliability coefficient scale of 0.8. The data instrument was, therefore, considered to be reliable for its intended purpose.

D. Description of Data Analysis and Procedures

The researcher employed several statistical procedures. First, the researcher used descriptive statistics to generate frequencies and percentages. Secondly, the researcher used correlation cross tabulation analysis to measure and determine the relationship among dependent and predictor variables. Cross-tabulation analysis and inferential statistics is used to determine the relationships among the predictor and dependent variables. Data from the interview schedule was collected, transcribed, and analysed in a narrative format. The researcher used SPSS computer statistical package version 19.0 to analyse the data collected from the study in compliance with the research questions.

VII. DISCUSSION OF THE FINDINGS

The findings indicate that an ICT infrastructure is essential to the design and development of a sustainable ODL model. It also emerged that management support in IHE is crucial if a sustainable ODL model is to be effectively designed and developed. The research findings also indicate that training of instructors and support staff was instrumental in sustaining a reliable and efficient running of an ODL model. In addition, it emerged that adequate teaching and support staff to support the whole ODL model was necessary if learning via ODL was to be achieved.

1) *Availability of Infrastructure*: An Internet-reasonable bandwidth, physical and technical. It also includes social and human skills which would create an enabling environment of ODL. Africa relies heavily on satellite communication that is very costly and limited in bandwidth upgrades. In fact, one of the goals by New Partnership for African Development (NEPAD's) in the educational sector especially in distance education is to harness the benefits of high-speed internet to

provide real time interaction amongst students and instructors, avail the sharing of digital libraries and research journal databases and allow universities to support research activities [4].In 2012, Kenya landed its fifth underwater optic cable [6] reaffirming the importance of leveraging on high speed internet to transform the country into a knowledge based economy.

2) *Political and Economic Environment:* ODL and ICT are heavy investments which requires political and conducive environment for its funding and adoption. Private individuals and organisation cannot really implement or adopt. Sound ICT policy and political goodwill necessary. Private funding by government through public ex-chequer, academic institutions and other player like UNESCO, World Bank is necessary.

3) *Education for Access*: Sensitisation, need analysis through education by the Government and other players. The analysis of the research findings revealed that training of ODL instructors and support staff is critical to the continuity and reliability of learning through ODL. In addition, adequate staffing was also identified to be essential for the success of an ODL model. Based on the discussions and findings the study therefore, shows that for ODL to exist in the first place an existing ICT infrastructure needs to be in place. The Government in developing countries in partnership and consultation with IHE's need to identify, establish, and implement a suitable ICT infrastructure as precursor to designing and developing an ODL model. According to the Kenya Vision 2030, this will go a long way in promotion of access:

Currently, youth and adult learners are required to contribute to their own learning through cost-sharing. This leads to potential learners to weigh between enrolling into education programmes or use that income to meet their demands of life [9].

VIII. CONCLUSION

Technology, ideology, and economics as driving factors that have led to the growth of ODL on both industrialized and developing nations[10]. With the right environment for ICT infrastructure, ODL policy, adequate staffing and continuous training of instructors and support staff, the researchers believes that the most suitable ODL model for developing countries is a mixed model. The concept open and distance learning (ODL) "reflects both the fact that all or most of the teaching is conducted by someone removed in time and space from the learner, and that the mission aims to include greater dimensions of openness and flexibility, whether in terms of access, curriculum or other elements of structure [13].The mixed ODL model is sort of a hybrid of single mode and dual mode ODL model given that it combines characteristics of both by affording users the capability to experience a wider variety of choice. ODL can bridge the digital divide through interaction of learners, instructors and other stakeholders. This is achieved through teleconferencing, Skype, telephony and general ICT With the right environment for ICT infrastructure, ODL policy, adequate staffing and continuous training of instructors and support staff, the researchers believes that the most suitable ODL model for developing countries is a mixed model.

IX. RECOMMENDATIONS

The following recommendations can be derived from research findings:

1. Respective governments, institutions of higher education (IHE's) and other stakeholders need to be proactive implementing and reviewing ODL policies in line with their visions, missions, goals and objectives.

2. A systematic system of measuring and evaluating the ODL system for performance and functionality should be established to ensure the sustainability and longevity of a functional ODL model with relevant content, programmes, user friendly ODL system, accessible and affordable. Human and physical resources including appropriate environment for effective ODL model should be in place. Governments should provide ICT and ODL enabling environment through funding 3.Establishing and Providing training programme or workshops for ODL instructors, support staff and other personnel. ICT enhances and supports existing mode of learning in IHE. Teachers in IHE are positively embracing ICT as a tool to advance and sustain their existing activities[7]. Provision of training will enhance full deployment of the ODL model by ensuring that students obtain the value for their education from capable and qualified ODL professional users. This will bridge digital divide.

4. The Government should engage in an awareness campaign to sensitise and educate the population especially those in marginalised areas about the existence, functionality, accessibility, and opportunities available of ODL as a vehicle for learning. The need to involve all stakeholders in IHE's and form partnerships with other private or non-profit organisations to support financially the establishment and maintenance of the ODL model is paramount.

5. Developing a comprehensive ICT policy that not only recognises emerging ICT technologies but includes a clear provision and future direction of how ODL in IHE can continue to leverage on ICT. Laying down and installing appropriate ICT infrastructure such as high broadband internet, rolling out wireless technology, such as WiMAX and ICT equipments like, video, teleconferencing, radio, and televisions, should be a prerequisite to designing and developing an ICT management system for teaching and learning through the ODL model.

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