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# Technology Adoption:  Issues and Challenges in Information Technology Adoption in Emerging Economies

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## ABSTRACT

*Recognizing the need, effect and importance of Information Technology (IT) in any society, this study explored some of the challenges in the transfer and adoption of IT in developing countries. In Advanced countries, IT has generally revolutionized all facets of life, including technology, business, education and the global economy.  Developing countries have not fully participated in this global revolution.  This paper discusses some of the challenges that developing countries and donor countries encounter in the transfer and adoption of IT in developing countries.  Some of these challenges include government policies, infrastructure, training, and culture of the recipient countries.  The study also high lights some solutions to these challenges and calls for the full involvement of the government and people of the recipient nations and the International community.*

## INTRODUCTION

The digital processing and transmission of information is now generally referred to as Information Technology (IT).  Information Technology (IT) demands design, installation, configuration, training and maintenance of infrastructure. Information Technology (IT) makes the management of information more efficient and effective.  IT is now a force and driver of modern technological development and globalization, and is generally accepted as a key enabler of economic and technological growth.  IT adoption has shown to propel the economies of nations to greater productivity and creates jobs.  Modern global economy is built on Information Technology and telecommunication infrastructure which now serves as a platform for national and global development. Information Technology has such great potential to improve business operations, education, technology and economic growth. This technology could help contribute to poverty alleviation in developing economies if used to meet local and national needs.  There is an unequal access to Information and communication technology between developed and developing nations (Macharia & Gituru,  2006).

There are now global efforts from different international organizations, governments and companies to make IT available to developing nations.  However, in making IT available to developing economies, there are some major difficulties experienced by implementers.  The objective of this study is to increase knowledge about some of the challenges associated with the adoption of Information Technology in developing nations.

## LITERATURE REVIEW

There is now a global increase in Internet penetration due to government led initiatives and private efforts, (Andrade & Urquhart, 2009).  In developed countries, IT has been used to create

strategic advantage in business and various operations (Apulu & Lathan, 2009).  Information Technology (IT) plays a vital role in leveraging productivity and efficiency in private organizations, governments and research (Al-Gahtani, 2003)**.** Remarkable results from the application of IT in education, health, agriculture, and technology in developed nations show that such positive results can be replicated in African countries.  The value of IT in any organization depends on its infrastructure.   IT infrastructure is a set of shared tangible and intangible resources composed of computers, network and telecommunication technologies, data and core software applications (Duncan, 1996).  It is important that IT is properly designed, deplored and effectively utilized. Flexible IT infrastructure is vital in developing sustained competitive advantage, (Byrd & Douglas, 2001), and is a source of business value, (Fink & Neumann, 2009).  Global networked economy is in constant change.  Globalization require people and institutions to continuously acquire new knowledge and skills to keep up with the change, (Haddad & Drexler, 2002).Frequent changes in business, government, science and public organizations can be quickly accomplished only if the Information Technology infrastructure is able to accommodate this change in an effective manner, (Fink et. al., 2001).

Business Managers, Researchers, and Scientists now show great interest in understanding how Information Technology help to create competitive advantage for organizations and nations, (Bhatt & Grover, 2005).  The importance of IT in training programs cannot be over emphasized.  Success factors in training policy are identified in such areas as flexibility in time management for training, creation of quality content, and promotion of interactive participation by trainers, (Gasco, Llopis, & Gonzalez, 2004). Oxfam Education Report (2002), noted that Information Technology facilities provide better teaching and learning opportunities for teachers and students, thus improving the quality of education.  Unfortunately, there are challenges in the transfer and adoption of Information Technology in emerging nations.

## THE SOURCE OF CHALLENGES IN INFORMATION TECHNOLOGY ADOPTION

### *Government Policy*

Governments are to provide strategic policy framework for the acquisition and use of IT for social and economic growth.  The development of IT infrastructures in emerging economies has been lagging behind those in developed countries because of poor policies and insufficient investments in the IT sector, (Laryea, 1999).   Most developing countries have ineffective information technology policies and this has created problems in the growth and application of Information Technology.  Governments of these countries acknowledge the need and importance of IT, but little concrete action has been taken in this area, (Enakrire & Onyenania, 2007).  Developed countries have been investing in the development and maintenance of IT infrastructure, while developing countries have done little.

Most developing countries do not have the resource to develop Information Technology in their respective countries.  Rather, they depend on substantial foreign aid to ensure the development of Information Technology.   Developed countries have also not done much to assist emerging nations to develop their information technology infrastructure, (Laryea, 1999)**.**  Nwaka, (2005), noted that funding from developed countries has been ineffective because they try to find local problems to suit pre-package assumptions and solutions, and do not incorporate local expertise in the process of solving the problems. Akubue, (2002), stated that many developing countries

import technologies and its innovations without modification to suite their environment and culture.

In 1996, member states of the African Information Society Initiative (AISI) adopted an objective of creating an African Information Infrastructure through access to a global information infrastructure for development needs and to build their own National Information and Communication infrastructures.  This has met with limited success.  The Nigeria Information Technology Developing Agency (NITDA) developed a national IT policy to make Nigeria a key leading player in the information and computer technology by the year 2005.  Some of the objectives of the policy include developing IT infrastructure, integrating IT into the mainstream of education and training, empowering Nigerians with effective IT skills and preparing them for global competitiveness.  These objectives have not been fully met.  In stressing the importance of effective national policy and adequate IT training Aniebonam (2005), called for a Nigerian Civil Service Enhancement with particular reference to IT capacity which will increase productivity and make Nigeria digitally competitive.

## *Infrastructure*

Information Technology infrastructure consists of computers, software and all components of telecommunication systems necessary to facilitate efficient data transfer and management (Enakrire & Onyenania, 2007).  It also includes IT experts to design, install, maintain and fix systems, and skilled IT personnel to operate the system efficiently (Laryea, 1999).  Poor Basic Information Technology infrastructure is the major cause of stagnation to the development of Information Technology in African and other developing countries (Omekwu, 2003).  The essential infrastructure and networks to facilitate IT transfer, implementation and development is lacking in developing countries.  This has made the accessibility to affordable telecommunication, computer and Internet difficult (NEPAD, 2003). Basic national IT infrastructure which is accessible to the people and connected to the world is of utmost importance in any country, and should be effectively integrated into the socio-economic and business life of the country.  These IT resources are still scarce in many developing countries including access to hardware and software.

Omekwu, 2003 noted that inadequate telecommunication infrastructure poses a major hindrance to IT adoption in developing countries.  Some developing countries have only a few telephone lines.  These are only in the big cities and they are unreliable.  These telecommunication problems vary from one country to another, depending on the level of development.  Nigeria has a comparatively low teledensity in sub Saharan Africa even though there has been a substantial increase recently (Akpan-Obong, 2007).

Data on Internet usage and population shows that while Africa has an estimated population of 1,073,380,925, the latest internet usage as of June 2012 was 167,335,676. This is 15.6% penetration, with a user percentage of 7% (Internetworldstats, 2012). This is very low compared with other regions of the world as shown in Table 1.

**Table 1: Global internet usage statistics.**

| World Regions | Population ( 2012 Est.) | Internet Users Dec. 31, 2000 | Internet Users Latest Data | Penetration (% Population) | Growth 2000-2012 | Users % of Table |
|---|---|---|---|---|---|---|
| **Africa** | 1,073,380,925 | 4,514,400 | **167,335,676** | 15.6 % | 3,606.7 % | 7.0 % |
| **Asia** | 3,922,066,987 | 114,304,000 | **1,076,681,059** | 27.5 % | 841.9 % | 44.8 % |
| **Europe** | 820,918,446 | 105,096,093 | **518,512,109** | 63.2 % | 393.4 % | 21.5 % |
| **Middle East** | 223,608,203 | 3,284,800 | **90,000,455** | 40.2 % | 2,639.9 % | 3.7 % |
| **North America** | 348,280,154 | 108,096,800 | **273,785,413** | 78.6 % | 153.3 % | 11.4 % |
| **Latin America / Caribbean** | 593,688,638 | 18,068,919 | **254,915,745** | 42.9 % | 1,310.8 % | 10.6 % |
| **Oceania / Australia** | 35,903,569 | 7,620,480 | **24,287,919** | 67.6 % | 218.7 % | 1.0 % |
| **WORLD TOTAL** | **7,017,846,922** | **360,985,492** | **2,405,518,376** | **34.3 %** | **566.4 %** | **100.0 %** |

(Source: Internet World Stats, 2012)

In most developing countries, Internet cafes are the source of access to the Internet, and these cafes are mostly located in the big cities. In Ghana, one of the reasons for low Internet is lack of access to the Internet (Colle, 2005)**.** Few people own personal computers, so access to the Internet is provided through public operated Internet services which are available in the cities. Individual access to the Internet is limited**.** This suggests that access to the Internet in other parts of Ghana is difficult. The challenge then is providing access to the rural areas where majority of the people live and improving delivery of services to this people who live in small towns and villages. Tusubira et al. (2005) noted that not many people in Uganda use the e-mail because of poor computer skills or lack of access to Information Technology. In other East African countries such as Tanzania and Kenya, access to the Internet for information and communication are available mainly through public operated Internet services. In Tanzania, only 2 percent of all households have a computer and about 15 percent of these are connected to the Internet (Gilwald, 2005)**.** Penetration is the measure of how many people of the population are able to connect and use the Internet. The figure for Africa is low when compared with other parts of the world. This is shown in Figure 1.
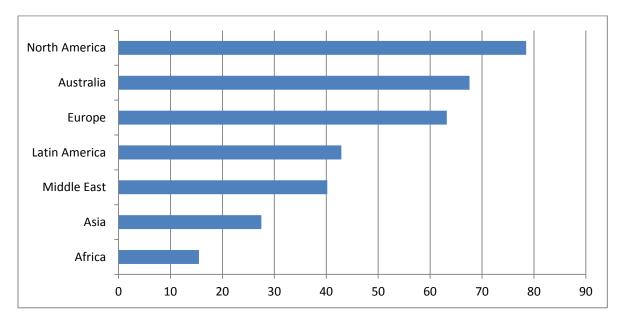
**Figure 1:   Penetration rate per population (%).**



(Source: Internetworldstats, 2012)

In terms of broadband, while there are efforts to increase its availability to large segment of the internet population in the developing regions, these regions are still far behind when compared with other regions of the world. Fibre optic networks are the infrastructure which all nations shall require in future. For all cities and countries interested in internet technology broadband is the only technology that can handle their requirement. To deploy fibre-based infrastructure developing countries need vision and recognition of the fact that many of their problems can be solved with ICT. About 120 countries, realizing the importance of broadband now have policies in place and recognize that broadband infrastructure is vital to their social and economic development (Wansink et  al., 2012).

There is a significant lack of adequate power supply in most developing countries because electric generating power sector of sub-Saharan countries is not well developed compared to other regions of the world.  The erratic supply of electric power make IT adoption a challenge. Only 24 percent of the people of sub-Saharan countries have access to electricity (IMF, 2008). The region generates about 68 gig watts (GW) of electricity, (World Bank, 2010), which is grossly inadequate for the region.

*Training and Qualification*

Developing countries lack enough skilled IT persons who can design, program, install, configure and maintain Information Technology in this constantly changing industry.  Lack of qualified and globally recognized IT professionals in this region is seriously hampering IT adoption and development. The acquisition of some professional and technical skills by few professionals in developing countries, or the relocation of advanced technical equipment from industrialized nations to developing countries does not constitute technology transfer. Udo and Edoho (2000) noted that technology transfer takes place when the recipient country has corresponding technical

information to enable it use the hardware in an effective and efficient manner.  This would make it easy for effective communication and interactions with the transferring agents.  It may be easy to relocate equipment; it is more difficult to transfer capacity which is human-embodied. Development skills should be aligned with development goals, and both require human skills. Developing countries do not have enough graduates and technologists in science and technology, though there is now a growing awareness of the importance of Information Technology for development**.**  Despite global availability of the Internet, universities and polytechnic institutions have limited access to the Internet and modern computing (Mutula, 2003).

## DISCUSSION

In any government or organization, the successful launching and advancement of technology requires leadership and organization defined by an effective policy (Mentz & Mentz, 2003). This policy should address technology in general and IT in particular in order to achieve national development and international IT collaboration. This policy should set goals for the transfer, development and adoption of IT.  Lack of adequate funding (private or public) has also caused IT projects to be abandoned or not started. The costs of Information Technology are high, so a large capital outlay is needed for the initial acquisition, development and maintenance. Government policies that enact high tariffs, duties and license fees raise the cost of investing in telecommunication and computer services.  Developing countries should encourage privatization as a way of attracting investors and alleviating capital expenditure that could be used in carrying out other social project.

The policy makers and stake holders in developing countries should also initiate government-private partnerships in technology training and development to produce skilled and globally recognized IT professionals.  Governments could provide financial incentives in the form of liberal tax laws for companies willing to invest and import IT products.  Non-Governmental Organizations (NGOs) should be established and encouraged to help in connecting and integrating African countries into the global network technology. These partnerships could help create and provide support for IT infrastructure deployment and use within the economy and for global connectivity.  IT policies must be made to enable IT investments be translated into resources for sustained competitive advantage.

Computer prices are falling, so people should be able to own computers or have easy access to computers, new or used.  In developing countries where individual or house-hold incomes are low, government and Non-Government Organizations (NGOs) should help in the acquisition and distribution of used or new computers.  In areas where computers are available, connectivity is poor.  Analog Links are still used in many developing countries instead of broadband links which are faster.   Analog Links are slow, unreliable and difficult to integrate with modern communication technologies.  In setting up the underlying supporting infrastructure, these issues should be addressed.

The challenge to universities and colleges in this region is being an active player in contributing to the realization of the Millennium development goals which states that a country should reap the benefits of the new technology.  Universities in developing countries should redefine their mission and review their curricula to produce graduates with universally recognized IT skills, able to meet national and international needs and standards. These countries should focus on training and developing Information Technology professionals who can manage IT projects and

be able to analyze and adapt the innovative experience of developed countries. They need indigenous technical manpower base that understands the technology, can search the global technology markets and identify the system that would meet the needs of the country, (Udo et al., 2000).  Broad IT training that is offered by the universities should prepare the graduates to meet with industry needs.  Enrollment and number of IT graduates in tertiary institutions are the parameters to use to determine the level of human capital base.  IT professionals are expected to be produced through the process of education, training, experience and continuing education.  In Nigeria, IT education takes place in the universities and polytechnics.  Universities might integrate IT certification courses in their curricula in order to help prepare students who want to be IT certified. This is not usually the case.

University faculty often see IT certification as meeting vocational needs rather than academic need.  Changing this perception would necessarily entail pressure from their governments and a prevalence of information and communication.  Ngambi (2006) noted that Teacher training curricula should help teachers see past the technology to the pedagogical and educational gains that use of technology will bring to the classroom.  These training programs should be assessed to meet the needs of the nation and to see that IT graduates and employees are able to integrate their newly acquired IT knowledge into their jobs.  IT qualified and globally recognized professionals in developing economies will help accelerate the development, maintenance and adoption of Information Technology.  Education, training and IT certification are important tools for the adoption and evaluation of IT in any country.  The issue of globalization therefore makes it necessary for IT professionals to have a universally accepted IT certification, which has traditionally been viewed by industry in a positive limelight.  Such certification makes it easier to attest to the professional capabilities of IT professionals in developing countries, and so attract out sourced IT projects.  Out sourced IT projects will contribute to technology transfer and adoption in this region.

Universities should also see to the indigenization of computer knowledge.  There is a lack of attention to cultural differences and their impact on IT adoption. Advanced countries should modify their approach to technology transfer to developing countries.  Udo et al. (2000) noted that a successful approach to technology transfer, attempts to fit the technology to the recipient country's cultural environment, and not the reverse which has hitherto been the case.  Studies have shown that culture influences technology adoption (Loch, Straub, & Kamel,  2003; Al-Oteawi, 2002). For any knowledge or technology to be adopted, the challenge of language and cultural barrier must be overcome. In South Africa, a group is working on translating computer application to local languages of Xhosa, Zulu and Venda in order to overcome language barriers in the use of computers (Mutula, 2003).  Experience has shown that force-feeding the culture to the new technology can create an unfavorable climate for the acceptance of IT in developing countries (Albirini, 2006).

## CONCLUSION

This study is a continuous effort in investigating and highlighting the challenges in Information Technology adoption in emerging nations. Sustainable development and the role of IT make it imperative for developing nations to acquire and adopt the use of Information Technology. Ineffective government policies, poor infrastructure and inadequate training and qualification are contributory factors in creating challenges in IT transfer and adoption in this region.  The

insights gained in this study are helpful in understanding the difficulties associated in IT transfer and adoption in developing countries, and provide areas for future research on this issue.

A critical examination of government policies in selected countries with a view of professing suggestion will be one area of future study. Infrastructure in terms of provision of uninterrupted power supply and the availability of broadband media for Internet should also receive attention. Lastly, the dynamic nature of IT requires that educational provision to supply manpower in it must be an evolving one. Most of the developing nations do not have dynamic IT curriculum to keep them abreast of new development in hardware, software and communication. A study to bring out the nature of future infrastructure will greatly assist the developing nations.

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