

Obstacles in Bridging the Digital Divide in Tanzania

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Abstract

This paper presents the primary findings of a study carried out in Tanzania. The study aimed to investigate the main obstacles in addressing digital divide initiatives in this developing country. Data collection techniques such as questionnaires, group discussions and interviews were employed to gather data used in this study. More than 20 rural areas were also visited to study the state of communication facilities in the country. The aim of the paper was to investigate the digital divide initiatives from technical, economical, social, cultural, habitual and institutional perspectives. The results of the study suggest Low financial power to be the key source of the gap which results into blocking the bridging initiatives and ultimately impairs the technical ability to provide connectivity to users. The willingness of people to adapt the use of the Internet still remains a challenge. The move to bridge the divide will hugely rely on government initiatives and support. This paper gives the reader the current situation in Tanzania, pointing out different challenges facing the initiatives to bridge the divide. It explains the effects that financial differences in society have on digital divide. It also explains how a significant lack of technical means increases the gap to information access. Although the study was conducted in Tanzania, the findings may be generalized to other developing countries with similar economical, geographical and demographical settings/framework

Keywords: Digital divide, Tanzania, developing countries, rural connectivity, access challenges.

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I. INTRODUCTION

Information and Communication Technology (ICT) is an umbrella that covers many forms of technology related to information transfer. These technologies are now playing a key role in the modern world by processing and sharing information. However, developing countries are still far behind their developed counterparts in the way these technologies are being utilised (Shih et al., 2008). The old electronic means of communication transfer and ways of receiving data are now becoming inefficient to fulfil the world's rapacious demand for access to communication. The type of information being transferred via radios, televisions and magazines is only a one-way type of information. In television, for example, viewers can only watch and listen to what is being broadcast.

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At the moment, the developed countries are utilising the flexibilities offered by modern technologies to access the information they want. This is not the case for communities in developing countries. The number and type of communication options available in developing countries are limited, contributing to communication inequalities between the developed and developing countries (Brown, 2007). Connecting million users worldwide, the Internet is becoming the modern way of communication by facilitating the connections to a vast amount of information. The lack of access to the Internet service means lack of access to a large deposit of information and their associated benefits (Thomas and Parayil, 2007, Acilar, 2011). It is also viewed that, while the digital divide gap between developed countries and developing countries is increasing so is the gap between communities or social groups within countries (Talukdar et al, 2011).

The motivation behind this study was to examine the challenges faced by the initiatives aimed at bridging the digital divide in developing countries. The study aimed at understanding the key issues which act as obstacles in bridging the digital divide initiatives and the extent to which these issues emit the challenges.

Tanzania is an East African country located at the coast of the Indian Ocean with a population of nearly 40 million. The country has witnessed a slow economic growth rate of 6% in 2009 compared to 2009 where the economy grew by 7.5%. Since the country's population also grew, the per capital income was Tsh. 693,185 (USD 433)/- per day (USD 0.93). The communication sub activity recorded the highest economic activity in the past six years by growing by 21.9% in 2009 compared to 20.5 in 2008, contributing 2.1% in GDP (National Economic Survey, 2009).

Despite the growth in the communication sector, Tanzania is facing a number of technical and non-technical challenges. Sedoyeka and Hunaiti (2008) in their recent work on WiMax realized the importance of adopting the new technological approach with a modern technology. They pointed out a number of challenges that face ICT industry in Tanzania (fig 1)

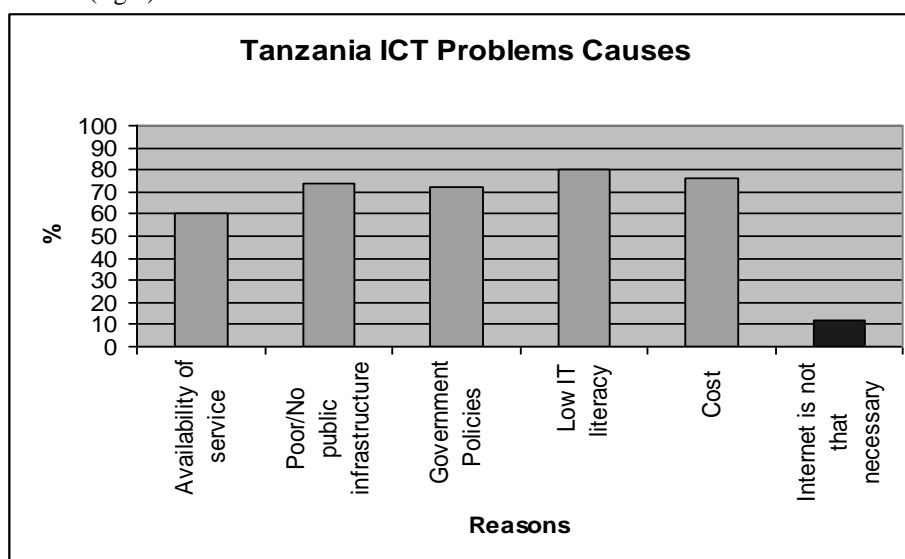


Figure 1. Major reasons of a low number of Internet users in Tanzania (Sedoyeka and Hunaiti, 2008)

After the introduction (part I), this paper will discuss the concept of the digital divide by visiting relevant studies on the subject in part II. Later, the approach and methodology used to conduct the survey is explained (part III), which includes the key relevant findings in part IV. Challenges and opportunities uncovered by the study and proposal of their solutions are presented in part V. Part VI will conclude this paper.

2. RELATED STUDIES ON DIGITAL DIVIDE

The World Summit on Information Society (WSIS) defines the digital divide as the unequal access to information and communication technologies. "The Digital Divide separates those who are connected to the digital revolution in ICTs and those who have no access to the benefits of the new technologies" (WSIS, 2005). WSIS acknowledged that the digital divide happens across all levels of life, on the international level and at the community level. WSIS also puts emphasis on turning the digital divide into digital opportunities for all, especially for the marginalized communities who face the risk of being left behind even more. WSIS also identified a number of goals concluding with objective number 10, which is to ensure that more than half of the world's population has ICT access. This is because ICT has the potential to accelerate economic growth of a

country (Dound and Ho, 2012). WSIS names governments, the private sector, civil society and international and regional institutions as the key partners (WSIS, 2005).

Studies suggest that governments have a major role to play in bridging the digital divide. Even in developed countries, policies set by governments are more likely to address fundamental sources of inequalities than providing computers to low-income households or subsidizing Internet access in rural areas (Ono and Zavodny, 2007). In developing countries the role of governments is even bigger, especially in assisting ICT diffusion in these areas. Shih et al. (2008) argue that ICT diffusion in developing countries is highly linked with ICT investments in the areas, and that policies need to be changed with emphasis on increasing government loans and spending into ICT projects.

There are different ways in which governments can participate and influence the use of ICT. Governments can adopt mobile government (m-government), Interactive Voice Response System (IVRS), government call centres, public information kiosks and many other means to get closer to citizens. These will not only improve government efficiency, but also take information closer to citizens and directly help in reducing communication inequalities (Singh and Sahu, 2008). Governments can also invest in libraries and enable them to provide access to computer and Internet access for those who do not have those facilities (Aqili and Moghaddam, 2008). ICT also plays an important role in achieving sustainable social-economic development in transitional economies hence bridging the gap will also impact the economy (Odamtten and Millard, 2009, Acilar, 2011). However, all these possibilities often face a number of challenges which is what this paper addresses.

Although the theoretical account of digital divide is still lacking (Wei et al, 2011), digital divide is part of a larger developmental problem in which developing parts of the world are deprived access to ICT and the benefits that come with it (Thomas and Parayil, 2007, Yamin, C et.al., 2011). The perspective that digital divide is a technological access problem is a limited view of the actual problem since digital divide has different social, political, geographical and economical determinants (Nishida and Pick, 2011). In their study conducted in Andhra Pradesh and Kerala in India, Thomas and Parayil (2007) concluded that having access to ICT does not guarantee general community wellbeing. Presenting their six-step strategy to tackle the digital divide problem, Fusch and Horak (2008) also argue that digital divide cannot be solved only by tackling technological issues, but also by emphasising the societal need to change. They cited South Africa as an example with advancement in technology, yet the society is highly digitally-divided because of social-ideological issues. Kvasny and Keil (2006) looked into the issues (challenges) that arise even after access to the Internet is being provided. They looked at two case studies in two American cities, Atlanta city and LaGrange, that attempted to bridge the divide in their communities. They recommend that the prerequisite requirement should be made which should include general education like basic arithmetic and simple algebra. Both initiatives certainly help a number of people to get connected and they can be improved and adapted elsewhere.

The way that Internet materials are presented can sometimes become a source of divide to some marginalised groups (Wei and Hindman, 2011). The majority of web contents are mostly text-based, which becomes a barrier to people with learning disabilities (McKenzie and Clin, 2007). Even for those without disabilities, a lack of local content repels some users from the Internet. Local content would help to reduce the increasing gap between the rural and urban divide by giving information to schools, local NGO's, entrepreneurs and the community (Akca et al., 2007). In many developing countries, however, stakeholders miss out in many ways, as the reporters from developing countries do not have the means to participate in online reporting or creating local content (Brown, 2007). It has now been witnessed that digital inequality affects many areas such as healthcare, education, business and general wellbeing of communities (Denizard-Thompson et.al, 2011, Yamin et.al, 2011, Barth and Veit, 2011, Elzawi and Wade, 2012)

Initiatives and studies that aim to reduce communication inequalities and the digital divide often face opposing views. On one side, there are those who view the digital divide from policy studies. Kling (1999) observed that the policy study approach takes the system rationalist perspective, where the emphasis is on technical capabilities, cooperative adoption, computer skills and an understanding of the potential benefits of ICT. On the other hand, there are those who view digital divide as a collective subject involving cultural, social, political and historical factors (Nishida et al., 2011, Fero et al, 2011). Literature has shown that researchers and scholars view the digital divide problem differently. Kvasny et al., (2002) approach the subject from both technical and social perspectives. They argue that the digital divide cannot be adequately understood without taking into consideration social and cultural issues. Using Bourdieu's theory of cultural and social reproduction, they propose a model for examining digital inequality, which has five major dimensions:

- Technical Means – this refers to the connectivity and availability of physical access points, technical know-how and related hardware like computers and printers, telephones and other technical issues.

- Cultural Capital – this is the knowledge acquired through cultural expression learned from the family socialization and education institutions.
- Economic Capital – These are the issues that have financial implications in an attempt to get connected, for example the purchase of a computer.
- Social Capital – This refers to the social networking and relationships benefits one can get from participating in certain social networks.
- Institution Reform – These are the issues that mediate all of economic, political and social life. These include bodies that enable and support the initiatives to bring the Internet access.

A number of researches have pointed out that a multidimensional approach is needed to address digital divide (Fero et al, 2011). This paper takes a similar approach by looking into Tanzanian challenges using Kvasny's proposed framework and adds another dimension, *habitus*, into it. This is because it was discovered that individual or societal attitude towards ICT highly affects their interest and participation into ICT related activities. It was observed that although Kvasny discussed the matter in her other paper (Kvasny and Keil, 2000), her model (Kvasny 2002) omitted the *habitus* issues. The author believes these issues are of great importance in addressing barriers of bridging the divide especially in developing countries. This study points out six main angles from which digital divide challenges in developing countries could be tackled. It gives the current situation in Tanzania underpinning the problems found on the ground with literature from a number of studies. It gives a picture of the effects the financial differences in society have on digital divide. It also explains how a significant lack of technical means increases the gap to information access. The study also examines cultural, social and habitual issues and their effects on Tanzanian local communities whilst emphasising the role of institutional reforms. Since the study was conducted in a typical developing country, it is believed that the findings are also relevant to other developing countries, which shares economical, geographical and demographical aspects with Tanzania. All the issues studied can be found in the majority of developing countries especially African countries.

3. METHODOLOGY

The study involved different data gathering techniques mainly questionnaires, group discussions, interviews and site visiting. The activities under this study are categorized in two phases and were conducted in four regions over a period of two months. Phase one started with public lectures, which introduced the issues regarding the digital divide. The lectures were followed by group discussions in which participants were encouraged to discuss issues which limited their access to the Internet. The issues discussed included availability and accessibility of the Internet services, price, level of quality they experienced and their desired quality. Other issues included helpline facilities, social and cultural issues. The participants also raised some issues and aired their opinions and suggestions. A total of 8 public lectures and 15 group discussions were conducted. Participants were also asked to fill the questionnaires, which gathered specific data about them, their experience with ICT and other issues. More than 800 people participated in this phase, most of them living in urban areas but originating from rural areas.

Phase two of the study involved travelling around the country to see the way ICT is being used in everyday life. It was necessary to see the extent of the digital divide mostly amongst Tanzanians. A researcher mainly visited Internet cafes as these are the service points for most Internet users in Tanzania due to lack of public places such as public schools or libraries to access the Internet. At these places, we conducted informal interviews with staff and customers. The respondents were asked about their experiences, motives, challenges and other things that affect them whilst accessing the Internet. The researcher also visited local government offices and interviewed government officials about their plans on ICT. Different qualities of service tests were also conducted on these areas to investigate the quality of service experienced in these areas. During this phase, the study opened doors to online community participants who joined and completed the online questionnaires. More than 200 participants participated in the second phase.

4. RESEARCH FINDINGS

Most participants of this study were hailing from Dar-es-Salaam, majority being students and professionals. About 72% of the participants were in their mid twenties with a monthly income of less than Tsh300,000 (\$200) (fig 2 and 3). Of the 800 participants who filled the questionnaires, males were the dominant group comprising of 73%. This could have been caused by the nature of sample used where majority were computing and ICT students, the situation which is common in Tanzania.

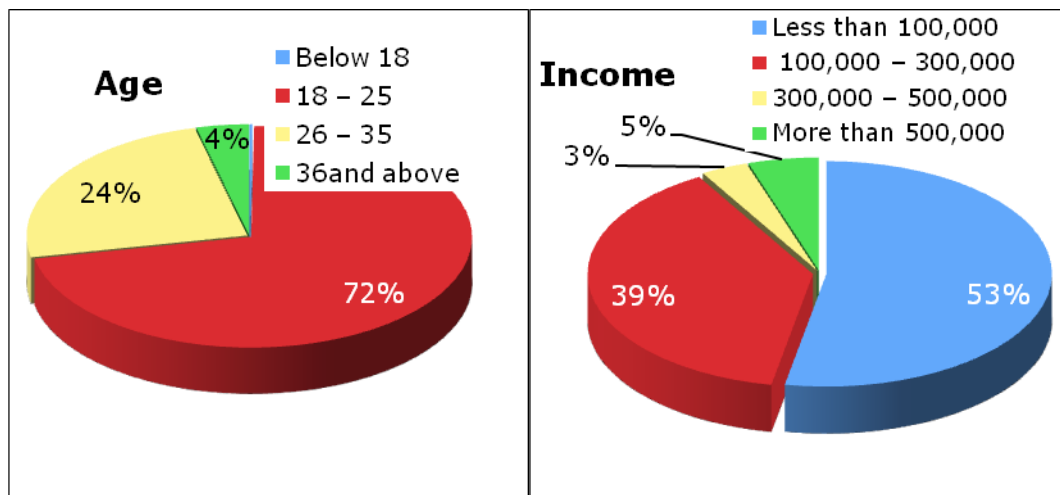


Figure 2: Participants' age

Figure 3: Participants' income

The findings of this study are organised around the main issues considered to have been limiting factors to bridging the digital divide. The researcher analysed the challenges of the digital divide from a number of perspectives reflecting what were encountered in the field. This article approaches the obstacles from (1) economic capital, (2) technical means and (3) habitus, (4) social capital, (5) cultural capital, (6) institution reform perspectives. The findings are presented around these dimensions.

4.1 Economic capital

Economical difficulties have a major impact on most Tanzanians' everyday lives. Most of the participants pointed out high costs as amongst the main obstacles hindering them from getting access to the Internet. Internet users in Tanzania are categorized into two major types with different cost challenges. The first category is comprised of users who get connected from homes or offices. The main expenses of this category are the initial connection charges and service charges. The initial cost is equivalent to half a month's salary of a middle-class employee, and that does not include the cost of computer, which exceeds a monthly salary. The service charges can either be monthly or pay as you go. About 35% of the participants pay their service charges per mega byte (MB) monthly while the remaining 65% have opted pay as you go approach. When participants were asked about their perception on the prices, figure 2 reports that about 57% considered the prices to be either expensive or very expensive

The second and largest group are those who use Internet cafés for accessing the Internet. This group consisted of average and minimum wage persons, and students. Again when this group of participants were asked about the way they perceive the Internet service charges, 57% of participants found the prices to be expensive, the findings which are presented in figure 4

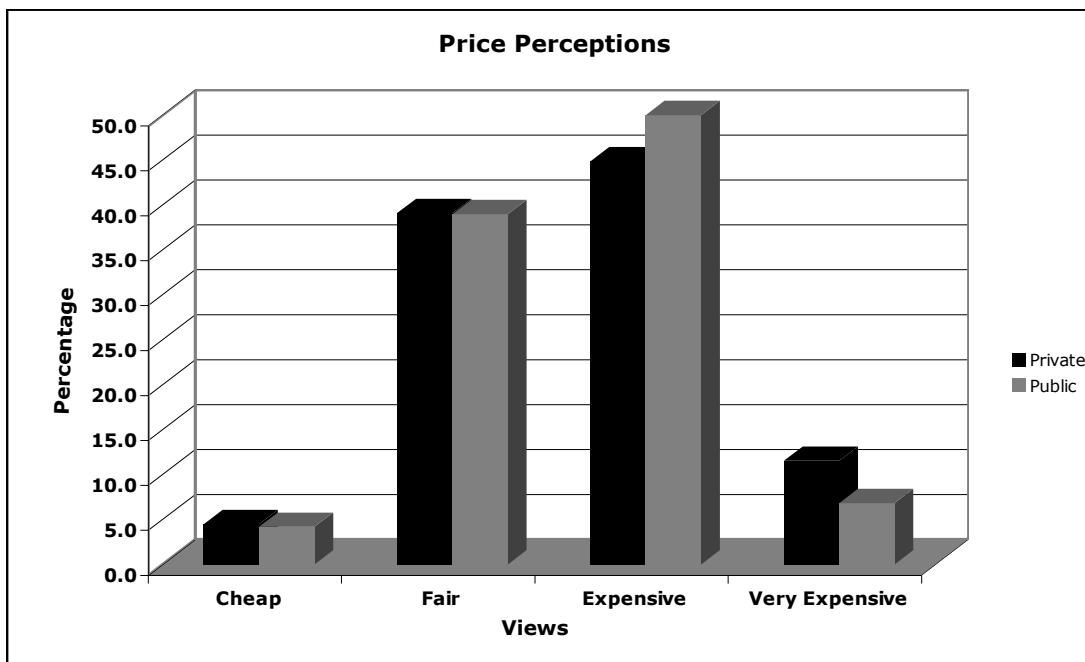


Figure 4: Public access participants expressing their views about the service prices

Participants who access the Internet at Internet cafés identified high computer prices and the initial cost for Internet connections as the main limiting factor for the access of Internet service from their homes. The study found a direct relationship between income and frequency of usage. For example, more than 90% of participants who earn more than Tsh500,000 per month access the Internet daily, compared to 12% of those who earn less than 100,000 per month (see figure 5). The study highlighted the financial constraints as one of the main reasons for communication inequality in Tanzania.

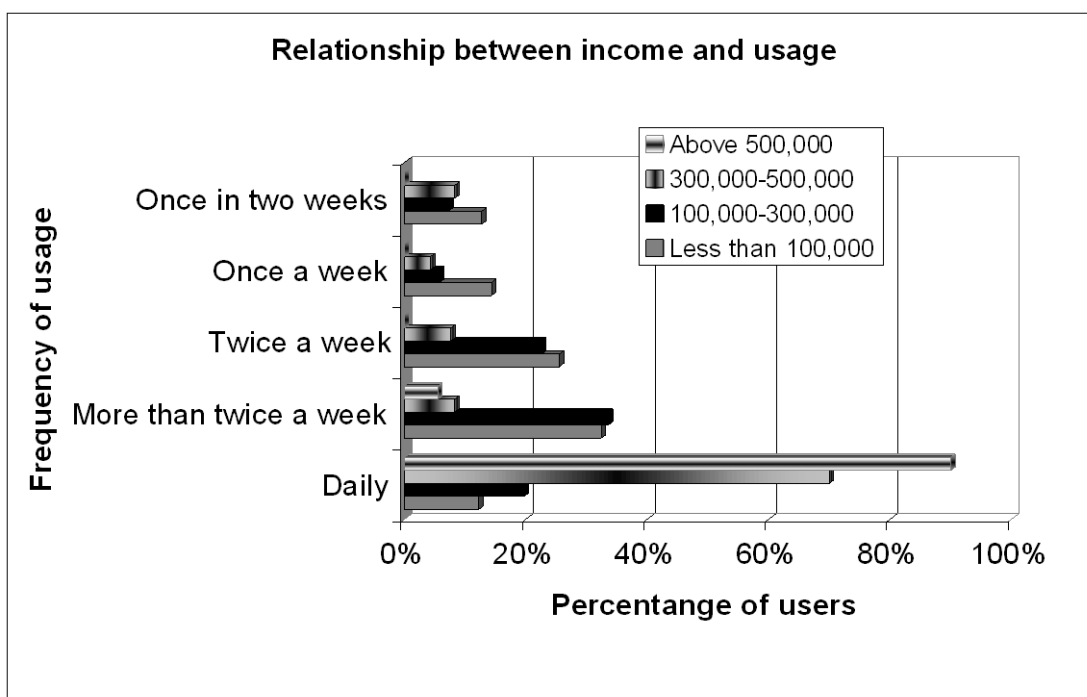


Figure 5: The relationship between income and frequency of usage

4.2 Technical means

Access to computer can be a vital factor to access into information pool (Gyabak and Godina, 2011). The state of the ICT infrastructure is one of the biggest challenge fuelling digital divide (Velaga et al., 2012). Internet connection requires a computer connected to the network which ultimately has an Internet connection. However, only a small number of the population in Tanzania live in areas where there is adequate ICT infrastructure. The main network operator, Tanzania Telecommunication Company (TTCL), provides connectivity to most of the urban areas, where less than 20% of the population reside. This leaves a good number of community members unconnected. As a result of the poor state of the network, many organisations rely on v-SAT links to get connected to the Internet. Previous studies such as Ngalinda and Mutagahywa (2005) report that, only 2% of all households in Tanzania had at least one working computer in 2005. Although the number of computers in households and those connected to the Internet has increased since then, their number is still negligible compared to the country's population. The old wired PSTN network poses economic infeasibility to many of the Internet service providers; hence they do not take the service to remote areas.

This study shows that most of the Internet users get access from the Internet cafés (76.2%), while only 16.4% access the Internet from home. There has been an increase in the number of people who access the Internet via their mobile telephones. With more than 11 million mobile phone subscribers, a good number of people have the technical means to get connected to the Internet. Figure 6 shows that more than 31% of participants access the Internet using their mobile phone. Although this can be viewed as a positive move, its impact to the actual use of the Internet is still under scrutiny since only a few applications can be run via a mobile phone. Most of the participants pointed out that they use their mobile phone for chatting and reading mails only. However, with the rapid change in Internet technologies, the computer is still the main tool for accessing the word's information through the Internet.

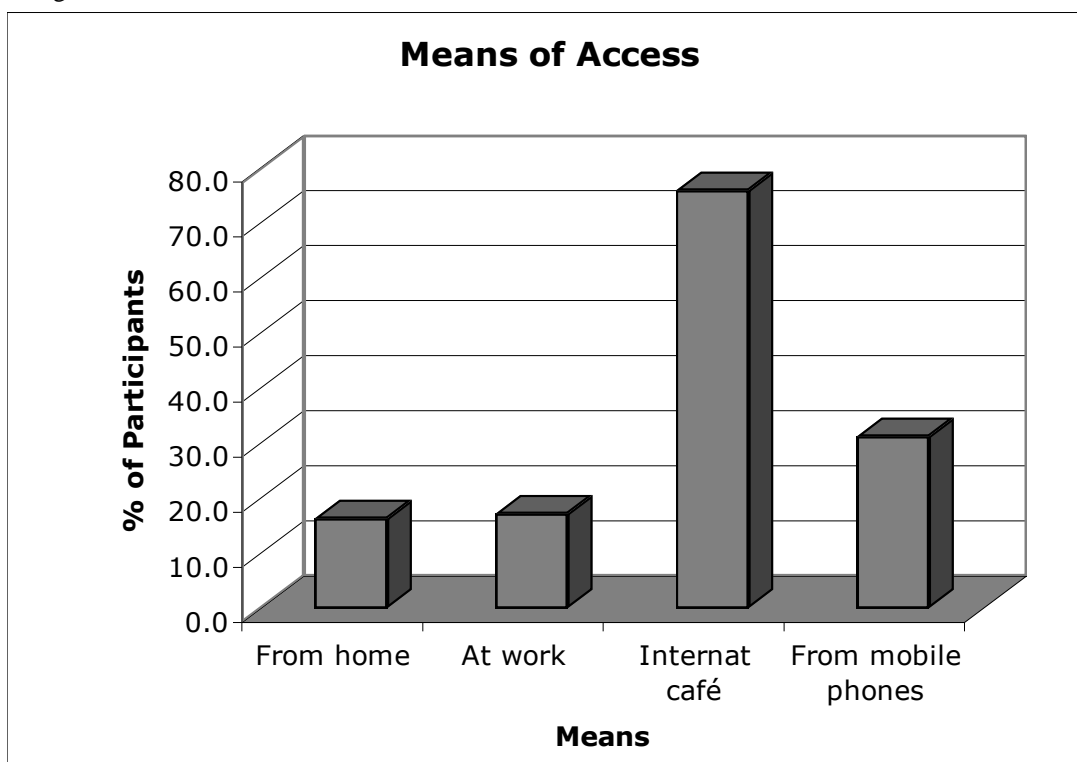


Fig 6. Means of access to the Internet: Majority use Internet cafés.

The availability of Internet cafés varies with geographical location. Those who live in urban areas have access to these cafés when needed, unlike those who live in rural areas where there are no Internet cafés. This introduces the inequality caused by the lack of technical means based on geographical locations. Given the lack of the major tools (computer and connected network) for getting connected to the Internet, most Tanzanians are technically unequipped to face the communication challenges.

4.3 Habitus

This refers to the individual or societal attitude towards ICT (Kvasny and Keil, 2000). Habitus is the willingness of an individual to engage in computer usage or any technological applications. Some of those who participated in the group discussions expressed a view that ICT was not for them. Some pointed out that they only use the

Internet for chatting and it does not have any strategic impact in their daily lives. When the age of the participants was considered it was learnt that the more mature and less ICT-literate participants, the higher their reluctance in learning computers. In face-to-face interviews, many participants expressed their fear of being seen as computer illiterate as a major factor which keeps them illiterate. Some perceive modern innovations such as mobile phone applications as specially designed for the younger generation. Some of the participants do not send text messages simply because they find the procedure complex, and they would rather make a phone call. The lack of local content on the Internet is considered by the older generation as another reason for not embracing the Internet. Since most of the contents accessed through Internet are from outside the country, and mostly the western ones, Internet is sometimes viewed as one of the pillars of westernization and moral decay of the local societies.

In Tanzania, there are few community centres where people can go to learn the basics of computer applications. Many rely on expensive commercial training centres and institutions, which brings the issue back to economics. The government in its daily operations has also contributed much in limiting the adaptation of ICT. Through interviews with the government officials, the study revealed that most of them do not even have e-mail accounts. Some of them pointed out that they simply do not see the need for them. This situation sends a negative message to the public, as the government is considered as the mirror. Despite these barriers, most of the participants expressed optimistic opinions after being told how ICT, and especially the Internet, could positively impact their lives. Most of the professional participants did not have a problem in recognising and appreciating the power of the Internet. Students were considered as the group of participants who reflected the most positive view about ICT. It came into the researcher's light that more than 85% of students often use ICT for research and education purpose as presented in figure 7 below.

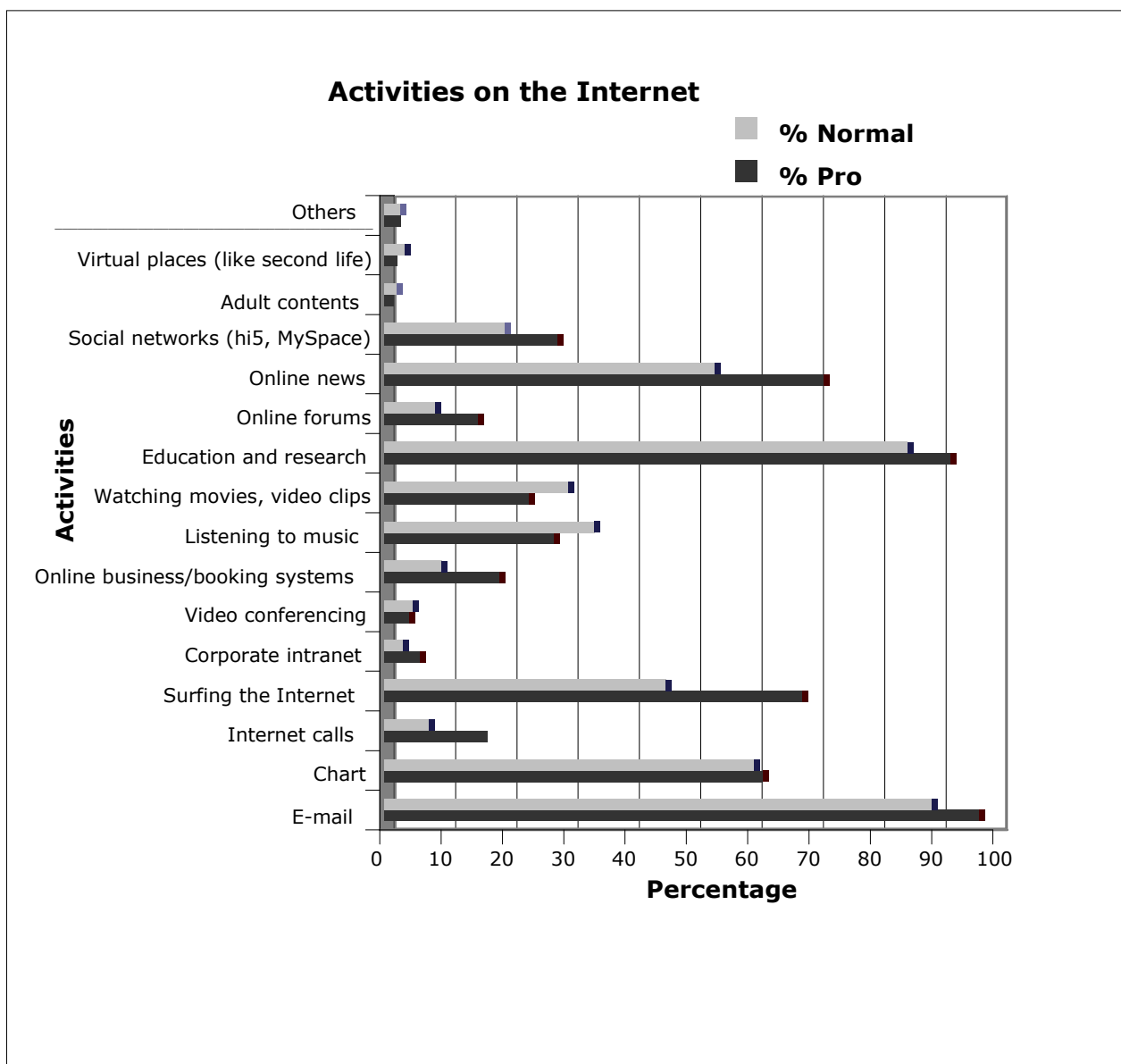


Figure 7: Participants showing which activities they mostly do on the Internet

4.4 Social capital

These are the social issues that would in one way or the other influence individual participation in ICT. These include social networks like a group of friends, church members, or members of a local football club. In their case study, Kvasny and Keil (2000) met participants who went to community computer centres to socialize with friends. Participants also shared knowledge, exchanged cooking recipes, job leads and other general information. Social networks introduce many people into computer centres and other public places (like Internet cafés). The social nature of these networks transforms these places into comfortable places for new comers (Liff and Steward, 2001).

However, since there are few Internet users in Tanzania, the impact of social networks that influence introducing new users to the Internet remain minimal. For example, many families do not even have a single member of their family using the Internet. Most of the people in the rural areas do not know what the 'Internet' means. This situation leaves some networks without a 'seed', which would introduce that network to the Internet community. This leaves some communities unaware of the Internet, therefore widening the inequality amongst local communities. Even amongst those who use the Internet, only a few use it as a social networking tool. This study shows that only 22% of our participants identified accessing a social networking site as one of the five main activities they perform on the Internet (fig. 7). This however can be viewed as a technological and awareness problem, since 70% of the participants use the Internet for chatting, which means they are connecting

with friends. A total of 32% use the Internet to listen to music, while 27% watch video and music clips. Given time, more Tanzanian Internet users will engage in social networking and other social-related issues, raising the number of Internet users.

In the interviews conducted, many participants confessed that if it were not for their friends, they would probably not have known about the Internet. Some were introduced to computers, then to the Internet by members of their family. Social networks also introduce barriers into the spread of ICT, especially the Internet. Some churches, for example, view the Internet as a source of moral degradation and discourage their members from using it. Some participants pointed out that their church strongly disagrees with most of the content found on the Internet. Given the lack of local content, some of the arguments by these churches could not be ignored. Generally, it was noted that social capital introduces both the opportunities and challenges in addressing the digital divide.

4.5 Cultural capital

This refers to the issues linked to an individual's background and social and economic class. It is a collective value of knowledge, skills and investments in education that influence success (Kvasny and Keil, 2000). Although it can be enhanced through education, cultural capital will automatically be generated in one's everyday life. Normally, culture is influenced by many things including economic and social factors and religious belief. It is normally passed from one generation to another through societal channels and values. Some cultures are born with time. For example, some families have a culture of watching television during and after dinner. In local communities in which ICT is still a new phenomenon, the 'ICT' ways of doing things does not exist.

Although cultural capital was not pointed out frequently in this research, there was evidence that the participants did not have a culture of accessing the Internet. Even for those who have access at home, only 41% actually use the Internet on a daily basis, and 35% use it twice a week (figure 8).

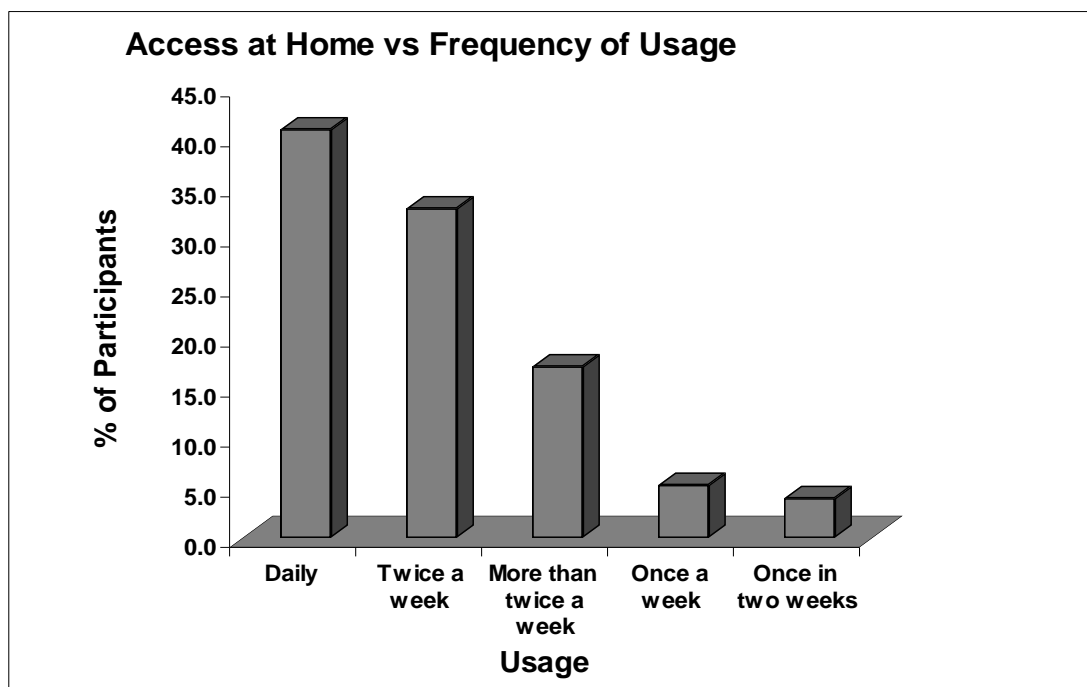


Fig 8: The frequency of use for participants who access the Internet from home

Adopting and blending the Internet into communities might take time. Some government officials, for example, confessed that they had not even switched on their computers in months. Cultural beliefs also play a role, as they define a way of life for most Tanzanian communities. Some participants believe that western countries invented the Internet for bad intentions. Some communities have colonial wounds still affecting them, and there are stories still being passed through generations about the dangers of embracing western ways such as music, lifestyle, attitudes towards other people, and now, the Internet. Although this could be used to the advantage of helping to bridge the divide, cultural capital still possesses some challenging questions on how to convince Tanzanians to adapt the Internet as an important tool in the modern world.

4.6 Institution Reforms

These are the positive changes that collectively affect the existence and growth of ICT in the society. They include socio-political and policy-making bodies which regulate ICT development. During the discussions, the study found that all the participating parties in ICT development require major changes in the way they participate in reducing information inequality. For example, the policies available do not stimulate the spread of ICT awareness in the country. Improving the policies so that they can support ICT initiatives will have a major impact on many communities. Participants pointed out that the policy change towards ICT adaptation should start with the government itself. If government departments were to improve their efficiency by becoming computerised with Internet connection, it may attract admiration from the public and local businesses and small organisations that will also want to be computerised.

Community Centres

Most of the participants pointed out the importance of the government in playing a leading role in reforming and improving ICT. As the cost of computers and Internet connection is too high for the majority of citizens, community centres could be a big step forward. The few established community centres have proved to be a success. For example, Sengerema Rural Access Point is a telecentre initiated by the Tanzania Commission for Science and Technology (COSTECH) with support from the International Development Research Centre (IDRC) to provide Internet access to a remote area called Sengerema in Tanzania. The telecentre is housed in a local community centre and staffed by volunteers from a local information technology women's group. The centre offers an Internet café, computer classes, typesetting, desktop publishing, and other services such as photocopying (Tan, 2007). Similar projects could be initiated to remarkably reduce the communication inequality between rural and urban communities.

Schools

Most of the government (public) secondary schools do not teach students computer studies. Few private and expensive secondary schools teach computer studies (Sedoyeka and Hunaiti, 2008). The students graduating from both secondary schools are combined at the higher education level. At this point, there is a clear difference between those who learned ICT and those who did not. There could be a chain reaction relating to social and cultural capital. Those who are now computer literate and use the Internet will induce those close to them, mostly family members, to join the Internet society. Reforming these institutions by introducing computer classes to at least all secondary schools will remarkably improve the country's ICT literacy level. This will also create an understanding and a greater demand for Internet access, and more people will join the Internet community.

Government Departments and Private Organisations

These organisations could afford the transformation into the modern offices that apply ICT in their operations. Participants pointed out that these institutions could set an example which could be followed by other small organisations, especially those in rural areas. The government could also engage fully in spearheading the activities to bridge the divide. This could even be in the form of public awareness campaigns to promote ICT, and especially Internet use.

5. CONCLUSION

Bridging the communication access divide between the developed and the developing countries is as challenging as bridging the divide amongst the communities. This paper has presented the challenges faced by the ongoing initiatives to bridge the digital divide in Tanzania. It has presented the primary findings from the study conducted in the country looking into the causes as well as the obstacles in bridging the digital divide in the society.

The study has found that there is a digital inequality amongst local communities, economical dimensions being the main reason. Whilst Tanzania is considered poor and digitally disadvantaged compared to developed countries, the study found that the digital inequality also exists because of the financial differences between urban and rural communities. This led also to the technical perspective, where some communities do not have the means to access the Internet because of their geographical location. This has some implications on availability of services. Financial issues also impact the technical means a community will have access to Internet. Individuals cannot afford the purchase of hardware like computers, or the installation of Internet services. This has led to many turning to Internet cafés in urban areas, whilst those in rural areas are completely unconnected.

The willingness of people to adapt the use of the Internet is one of the challenges. At an individual level, there is still no desire to embrace ICT and opportunities that come with it. Although culture could be used in a positive way, some still have worries. Stories about the implications of accepting western ways of life are making some individuals sceptical about technology, especially the Internet. Social capital was found to be a positive factor as it has contributed in bringing new members to the Internet community. Social links are, and can be, used to introduce the Internet to the members of the society. All the discussed issues will have to be supported by government departments and all other institutions responsible for bringing about the ICT change. With generally low GDP, community centres can provide opportunities for people to get Internet access and basic computer trainings. Institutional reform, which includes the change of attitude, priorities and proper plans, is expected to be the backbone of bridging the digital divide.

Economic factors also pose a main challenge. The technologies used at the moment pose financial barriers to many due to their high cost requirements. Communities will have to take an active role in finding ways of accessing the Internet locally rather than waiting for network operators or the government to do it for them. To achieve this, a new approach utilising cheaper but robust wireless technologies like WiMAX will have to be considered. Another approach that can be incorporated with WiMAX is *community mesh networks* using Wireless Fidelity (WiFi). The combination of mesh networks and community centres will reach many in rural communities and will revolutionise the efforts to bridge the digital divide.

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