

Mobile Technologies impact on economical development in sub-Saharan Africa

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Abstract

Mobile technology today is increasingly being used to help improve under developed and developing areas such as sub Saharan Africa. With the statistics showing the number of adults in Africa owning mobile devices steadily increasing, mobile technology has been a popular area of interest to use to help improve areas such as healthcare and education throughout African cities and rural areas. The purpose of this study was to examine the different ways mobile technology was being used to help the residents of sub-Saharan Africa in the sectors of health care and education, and examine the possible ethical effects these technologies could be having. It was concluded from the research that the mobile technologies being used in these areas whilst simple was incredibly effective and was successful in helping to better the quality of health in education in sub-Saharan Africa. However, it was found that many of the projects and systems developed using mobile technology would focus mainly on urban areas. Research showed that while reports state the huge increase in the number of those using mobile devices in Africa, along with the large estimated increase in the coming years, the difference between rural African countries and countries which contain urban cities is substantial. The study concludes that while the mobile technology can be implemented to help better the standard of health and education, it is mainly focused on urban areas and contributing to a poverty imbalance between urban and rural Africa.

Keywords – Mobile, Africa, Education, Poverty, Health

Introduction

In today's world mobile technology has been used to help improve and enhance almost every sector, in this paper the author researches and discusses how it has helped benefit developing areas such as sub-Saharan Africa, the paper outlines the constraints of mobile technology in sub-Saharan Africa. This paper focuses mainly on how the use of mobile technology has improved the health and education standards in different areas. It outlines how mobile devices are being used to educate those all over sub-Saharan Africa on how to protect against diseases such as polio. This paper also details how mobile devices are being utilized to help provide better healthcare to those in African cities, through topping up smart cards with mobile devices for the distribution of clean water as well as the delivery of vouchers which can be exchanged for healthcare equipment. This report also discussed how mobile devices are being used to track and monitor the outbreak of malaria in sub-Saharan Africa and is applied to a system to help ensure health care facilities in areas with affected residents have the capacity to deal with those who have contracted the disease. Finally, this paper discusses the ethical effects of using the mobile devices and how they are affecting the residents of sub-Saharan Africa.

Evaluation

Mobile Technology is a sweeping term covering many different areas of technology. Many of the uses for this technology in developed countries include helping with general day to day operations for the user such as online banking, shopping, or social media applications. Mobile technology is a sector which is growing rapidly, and also merging with other sectors to help make use of the technologies full potential. One of the areas where mobile technology has been proven to be successful, is when using simple technology and mobile devices to help developing countries such as Africa (Aker & Mbiti, 2010). Many different organizations and companies are using mobile technology to accomplish huge feats for rural African villages. A leading success story has been the M-Pesa service launched in 2007 by Vodafone for Safaricom and Vodacom. This has generated mobile money revenues of more than \$300 million in 2004. This makes it the most successful mobile transfer service at this time. It has now expanded to Afghanistan, South Africa, India and Eastern Europe. It seems to have found its niche market. In Kenya alone, mobile money transactions totalled \$22+ billion

in 2013. Other African countries such as Sudan, Somalia, Tanzania, and South Africa are also huge revenue generators for operators as well (BBC Africa, 2015).

Mobile Tech in Africa

In today's world when discussing developing countries, the most commonly mentioned country is Africa. Africa is known worldwide for its widespread poverty, levels of education, unsanitary living conditions, gang violence and high mortality, and birth rates. Many companies and organizations are now turning to mobile technology to help combat these issues facing those living in Africa. With the increase in advancements in technology, many organizations and companies are researching and looking into how some technologies could be adapted to help reach areas which are usually not easily accessible. A simple yet effective method at developing communication with these areas is through mobile devices. In recent years the ownership of mobile phones in Africa have increased rapidly, with the percentage of adults who own a phone rising from 64% in 2002 to now match the US with 89% in 2014 (Global, 2015). An infographic depicting this information can be seen in the appendices chapter as image 1.0. As shown in reports conducted by Pew Global (2015), the most popular activity for mobile phone users in Africa is sending text messages. The report shows that 80% adult cell phone owners use their phone mostly to send text messages as see in infographic image 2.0 in the appendices chapter below. SMS is arguably the most popular activity in this area due to the fact that many in this area only have ownership of a cell phone rather than smartphone, with a study conducted on Nigerian residents showing that although 89% of the population there owned a mobile phone only 27% owned a smartphone (Pew Global, 2015).

Constraints Affecting Mobile Devices in Africa

Africa is known for its lack of proper infrastructure, and industrialization. Technology isn't something that is commonly associated with Africa. The main contributing factor for this being that mostly all technology needs to be powered in some way. A study by The World Bank (2013), showing that 76% of sub-Saharan Africa is without access to electricity, the possibility of being able to use technology within these areas decreases drastically. Another area of technology which is obstructing the growth of use of technology in Africa is connectivity. A study by iPass,(2014) shows that if growth in connectivity hotspot numbers continue to grow at the same rate as previous years

then by 2018 there will be a WiFi beacon for every 20 people on earth, however only one beacon for every 400 Africans.

Education

The use of mobile technology has been hugely influential in the improvement of education throughout Africa. The need for helping improve education throughout sub-Saharan Africa has been a main priority for many organizations, one of which was Oxfam. Oxfam are a charity organization which help in delivering medical aid, supplies and help to a number of different countries including Africa (Oxfam, 2016). One particular project which Oxfam began was to help improve sub-Saharan resident's knowledge on different diseases which were quite common in the areas however easily preventable. Oxfam developed an SMS delivery system, which would send out four texts daily with educational information on the different diseases and how to prevent against them. This was incredibly simple as the only technology needed for the residents was a simple mobile phone which could send and receive SMS.

Health

Mobile technology is also being used to help better the health services in areas of sub-Saharan Africa. Organizations and companies such as UNICEF are using simple mobile technology to help teach about how to prevent from contracting diseases, help improve distribution of medical supplies and equipment to people who would otherwise not have access to the materials. They are also helping to monitor and ensure medical facilities contain the stock levels needed to combat against diseases. Two of the main diseases technology had been used to battle the spread of was polio and malaria.

Polio

Alongside the project discussed earlier to help better educate areas of Africa about the polio and how it can be contracted, a project was also launched that would help provide the equipment and sanitary supplies needed to help prevent the spread of the disease to rural and hard to reach areas. The project would also work through SMS where the users would receive a SMS with a mVoucher. As stated by Textello (2016), the mVoucher or mobile voucher is a unique code, each code is created using the customer's contact number, resulting in each customer and code being linked, this then reduces the problem of multiple claims, and users' mVouchers being stolen. The user would then present their code to a registered trader, where they would then in return

receive the specified package containing the items and supplies needed (Oxfam, 2015).

Malaria

To help combat against the threat of malaria in different areas of Africa another project also using SMS was created. This project was however to help survey the outbreak of the disease, and help get real time accurate updates on the impact of the disease. A system to combat malaria such as this was needed as malaria is still a large threat, particularly to children as indicated by the World Health Organization (2015), detailing that a child dies every two minutes in sub-Saharan due to malaria. Rather than simply just supplying information on the disease and vouchers for equipment to prevent from contracting the disease like done with the polio SMS system, the new system would “improve access to essential malaria medicine in areas of developing countries” (Novartis, 2014). The new SMS system created was called “SMS for life”. SMS for life uses common technology to help achieve its goals of eliminating medical facilities from depleting stock levels completely, increase access to essential medicines needed for those infected with the disease and to help reduce the amount of deaths caused by malaria.

SMS for life is a web based system which makes use of a SMS management tool, this then links with a web based application created for reporting. The system uses the SMS management tool to store the number of a health worker from each of the medical facilities registered in the area, SMS for life then uses a short code number that allows the health facility employee to receive an SMS with a data request, and send an additional SMS with the requested data counts completely free. The data sent from the health worker is then manipulated by the online reporting system, which makes it available for viewing online by a higher body, usually the District Health Management Team. The higher body view this information on the SMS for life website by password, this allows a secure method of monitoring the malaria surveillance in each medical facility in the area (Githinji, et al., 2014).

Water ATM's

In some areas in Africa, local governments have teamed with Grundfos, a Danish water engineering company to install “water ATM's”. The water ATM's work by have having a water dispenser installed with users having an account with the dispenser.

Each user then receives a smart card, these smart cards and accounts are topped up through mobile phones. The water dispensers can then be activated by the smart card. The user simply scans or swipes the smart card to be dispensed clean, safe water (Wesangula, 2016).

This project has brought water to many different areas of rural Africa and has now began to be installed in more urban areas such as Nairobi (BBCAfrica, 2015). As stated by Mourdoukoutas (2015), there are still some issues with the systems however Rasoul Mikkelsen, Grundfos director for global partnerships believes that “the project will have a huge positive impact on health. It is an affordable system with sustainable, good quality water,”.

As well as the projects discussed above there have also been systems developed using SMS to help monitor Zambia for measles outbreaks, allow HIV sufferers health workers to send information on patient status as well as inform their patients details of their anti-retroviral therapy (Aker & Mbiti, 2010).

Ethical Effects

It is clear to see that the results of the Polio projects mentioned above have been extremely successful. An evaluation report by Oxfam (2015) stated that the project had a reach of 104,358 residents receiving the text which in turn was estimated with a reach of 1 million people, this was a completion rate of 86%. These people are now much more educated on how to better protect themselves against Polio, giving not just those who received the informative SMS messages but also those who were in communication with them, a better standard of living and a greater opportunity at life. Also with the pairing of the mVouchers for sanitary supplies and equipment to prevent contraction, with the educational messages it gives an incentive, as it gave the participants of the scheme something physical alongside the messages, something that they can then use the information received to put into practice (Oxfam, 2015).

However, there were some issues surrounding the project. The mVoucher system feedback report shows that the amount of participants that received the voucher compared to the amount of vouchers collected varies greatly with 71.4% of those who received a voucher declining to redeem it (Oxfam, 2015). Oxfam distributed a household survey to each of those who participated in the project, the survey asked the participants if they had collected their supplies with the voucher and if not then

why? The main reason given for not claiming the supplies was “Distance to distribution Centre”, this highlights how these projects seem to be specifically targeted at more urban areas rather than the outer lying rural areas of sub-Saharan Africa which is usually in greater need of the aid. This can also be seen in the number of distributors in each district, when the project began it was outlined that each district was to have 3 traders and 15 distributors, however this did not happen in every district, because of the lack in distributors the resulting distribution was below expected capacity, with fewer distribution points (Oxfam, 2015).

Issues can also be seen with the water ATM's which have been implemented in certain cities throughout Africa. Although the ATM's have achieved their goal of delivering safe clean water to different parts of the city, they too can be seen to be focused on the urban areas. As discussed in an article by Mourdoukoutas (2015), it states that Mr. Gichuki, the managing director of the Nairobi Water and Sewerage Company, said that “the Nairobi Water and Sewerage Company has so far identified 611 more points to install the dispensers and aims to eventually install one every 100 meters throughout the city”. Meaning the residents from more rural secluded areas are left having to travel further for clean water when those who live in the cities have multiple choices for where to receive their water from, as well as having to wait longer before the installation of a water ATM in a nearer location. This again shows the imbalance between the urban and rural parts of sub-Saharan Africa.

The effects of the increased use of mobile technology can be seen in many areas, and with numbers showing that Africa has had the fastest growing region in the years 2009 to 2014, and as stated in a report by GSMA intelligence (2014), is predicted to continue to grow at a rate of 7% annually until 2020. These figures show the level of growth expected for Africa however when looking at figures relating to each individual country a drastic imbalance can be seen. As shown in the report by GSMA intelligence (2014), the breakdown of the number of subscribers to mobile phone providers show the harsh difference between the more urban countries and the more rural countries. For example, the percentage of subscribers in Mali is 70%, compared to the considerably smaller percentage of 22% in Ethiopia. This large margin shows the growing issue of the difference between these two areas, an issue which needs to be examined. As stated in a report by Aker & Mbiti (2010), more examination of the possible impacts that could occur is need, the report suggested that “careful evaluations of mobile

phone development projects are required for better understanding of the economic and social outcomes”.

Conclusion

From researching and examining how mobile technology has helped improve sub-Saharan Africa, in the different areas of health and education, it is clear that the technology and the projects it was used in has greatly benefited the African residents. The educational system created to aid those at risk of polio helped residents learn cleaning procedures and how to use the sanitary items provided with the mVouchers also distributed through mobile devices also. The use of mobile devices has also helped service those suffering from malaria, as it ensures that those needing treatment's local health facility will always be within capacity, thanks to the “SMS for Life” system. Finally, the statistics outlining the difference from the rural and urban areas of sub-Sahara, show how the effect differs from region to region. To conclude the paper, it is evident from the information presented that mobile technology has greatly helped improve different areas of life such as education and health. However conversely the effects of the increased use of mobile devices in Africa has contributed to a poverty imbalance and perpetuating health inequalities between the urban and rural areas of sub-Saharan Africa, and its possible impacts is an area that needs to be greatly researched before any implementation of larger projects can begin.

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KEY TERMS AND DEFINITIONS

Advance Fee Scam (Nigeria 419) is an advance fee fraud which involves a payment in advance with the promise of wealth, wills, gifts, employment or prizes. The scammer contacts their intended target via mail, phone, fax or email. Originally known as the Spanish Prisoner Letter it has been carried out since at least the 16th century via ordinary postal mail. Section 419 of the Nigerian Penal Code prohibits this type of activity and it has often referred to as '419 frauds' or 'Nigeria 419'.

Developing Countries are often referred to as underdeveloped countries and they refer to countries where there is a less developed industrial base and they have a low Human Development Index (HDI). Developing countries differentiate from developed countries in that the people have a lower life expectancy, lower standard of education and the people of developing countries have a lower income and thus less money.

Ethical Standards are principles which when followed will promote values such as trust, good behaviour, fairness and/or kindness. One consistent set of standards that all companies follow does not exist but rather each company has the right to develop a set of standards which are meaningful to that particular organization.

Information and Communication Technology (ICT) is an umbrella term which includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications. The term ICT however has no set definition as the concepts methods and applications involved in ICT are constantly changing almost on a daily basis.

Mobile Point of Care (MPOC) involves the use of multitasking devices which support clinician use cases, improve productivity, streamline communication and bridge the gap between inpatient and outpatient care This fast growing area provides an abundance of apps for mobile devices and will change the way healthcare is delivered providing the opportunity for remote monitoring, measuring drug response, tools for drug development and diagnostic assistance for point-of-care and management of chronic or infectious disease.

Mobile Technology is a technology which is used for the purpose of cellular communication. The standard mobile device has moved from being a simple two- way pager to being a mobile phone. Mobile technology as the name implies refers to a technology which is portable. Examples of mobile IT devices include: laptops, netbook computers, tablets, smart phones, global positioning system (GPS) devices

Personal Data refers to data relating to a living individual who is or can be identified from the data or using the data in conjunction with other information which is in or likely to come into the possession of the data controller.

Sub-Saharan Africa geographically refers to all the areas of the continent of Africa which lie south of the Sahara Desert. Some of the countries which fall into this category include countries such as Kenya, Ethiopia, Ghana, Nigeria and South Africa.

Short Message Service (SMS) is a simple text messaging service component found in phones, the Web, or in mobile communication systems. It adopts a series of standardized communications protocols which enables either fixed line or mobile phone devices to exchange short text messages. More commonly referred to using the term "SMS" it is used for both user activity and all types of short text messaging in many parts of the world.

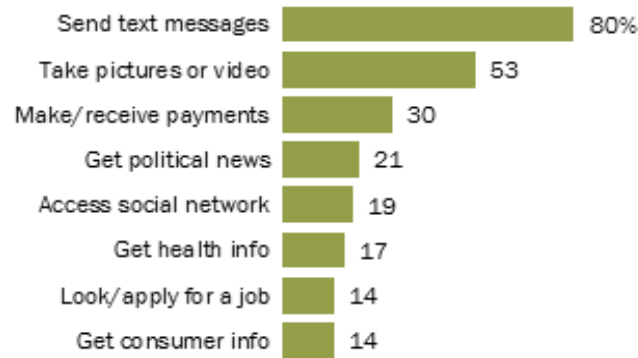
Monitoring Applications involve the use of a technology to enable the monitoring of patients while outside of conventional clinical settings (e.g. in the home), which may increase the access to care and decreases the cost of delivering healthcare.

Appendices

Image 1.0

Texting Most Common Use of Cell Phones in Africa

Median adult cell phone owners who used a cell phone in the past 12 months to ...



Note: Median percentages across seven African countries.

Source: Spring 2014 Global Attitudes survey. Q74a-h.

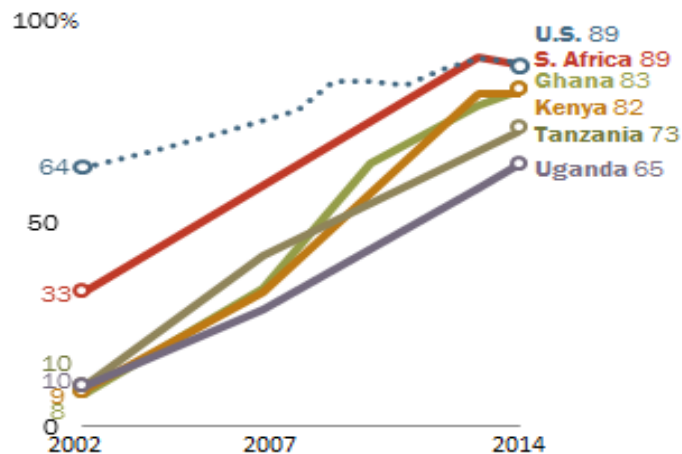
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Image 1. Percentage of what adults use their mobile devices for in sub-Saharan Africa as stated by Pew Global (2015).

Image 2.0

Cell Phone Ownership Surges in Africa

Adults who own a cell phone



Note: U.S. data from Pew Research Center surveys.

Source: Spring 2014 Global Attitudes survey. Q68.

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Image 2.0 infographic depicting the number of adults who own a mobile device globally as stated by Pew Global (2015).