EFFECTS OF GDP PER CAPITA ON MOBILE TELECOMMUNICATION PENETRATION IN SUB-SAHARAN AFRICA

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The influence of telecommunication in economic and social development is great. Some researchers established positive relationship between telecommunication development and economic development across the nations of the world as it reduced the gap between the rich and the poor. Before the advent of the mobile telecommunication, electronic communication was restricted to government cycles and well-established enterprises especially in Africa. This study investigates the influence of GDP per capita on mobile penetration in 42 Sub-Saharan Africa countries. 2016 data of GDP per capita, penetration rate and number of subscribers for the countries were used. The statistical tool employed is a panel regression analysis adopting an ordinary least square method of estimation; the data was analyzed with the aid of EVIEW version 9. The statistical models and correlation analysis indicates the relationship between GDP per capita and mobile penetration rates, the model generated revealed that penetration rate and the number of subscribers contributes to GDP per capita and that the two variables can be used to predict it. The models generated can also be used for future projections. The result of the study is in line with previous studies which support positive relationship between penetration rates and economic development. The importance of telecommunication to national developments are enumerated, while operators are expected to improve quality of service and customer satisfaction, the government must make effort to promote macroeconomic stability, the most important thing being sustenance of good governance. Other things that can improve the economy and the level of GDP per capita must also be vigorously pursued. The governments of these countries are therefore advised to pursue efforts that can improve mobile penetration as it's capable of improving their economies.

Keywords: GDP per capita, telecommunication, penetration, Sub-Sahara, Africa

Development of the telecommunication can be described as one of the greatest technological innovations in the 21st century that has the greatest impact on all aspects of lives. Before the advent of the mobile telecommunication, electronic communication was restricted to government cycles and well-established enterprises especially in Africa. Telecommunication until 2000s in Africa operates as monopoly and is recognized as such by analysts and economists [12, p. 7].

Globalizations and the introduction of mobile telecommunication revolutionized the industry. From the late 1990s African countries began to give licenses to multinational mobile telecommunication operators. These companies brought in skills and cutting-edge technologies that state-owned monopoly could not effectively compete with, this lead to privatization of state owned telecommunication companies across Africa countries. In the end liberalization of the telecommunication company brought in efficiency, new jobs, and improvement in commerce actives and in standard of living.

The migration of the state monopoly to a competitive telecommunications industry may be the major factor for the rapid development of the sector. However, liberalization comes with cost as operators are profit oriented which inform the locations and the directions of the expansion of their businesses, beside this even in places where the services are available, the economic power of individual citizens may have effect on their ability to access the services as regards their ability to buy the electronic devices or to pay for subscriptions or tariffs as the case may be.

Telecommunication penetration which is reflected in digital divide unlike regional digital divide considers the difference in access/usage of information in countries around the world on a sovereign scale rather than limited to specific regions. Therefore, the important indicators are different. Currently global digital divide focuses on the difference in access between countries around the world, as different countries have different information and communication technology infrastructure. On a regional basis, regional digital divide focuses on degree of access in some regions and on the difference in the level of patronage in other regions. For example, in developed countries, where mobile penetration rate is close to 100%, it is a question of how much Information and Communication Technology (ICT) infrastructure is used and what type. In the developed countries, it would largely be a question of what type of smart phone is

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used, what speed of internet the smart phone uses, and so on.

It would be redundant to analyse how many citizens in the US or UK have the possibility to use smart phones. In Africa it would be a totally different ball game, where many people may not even see the need to have a smart phone, by comparing its relevance to that of basic physiological needs. A farmer in a small village in Nigeria will see the relevance of storing more raw food supplies than purchasing a small mobile toy called a smart phone. Even those that see the need to have access to information may not have the resources to get them. It is no secret that a vast number of Africans live on less than 1 US dollar a day [9, p. 51], and the cheapest of mobile phones cost from 50 US dollars and above.

This research investigates the relationship between GDP per capita and telecommunication penetration in Sub-Saharan Africa.

LITERATURE REVIEW

There is literature that suggest factors that could affect telecommunications. Competition in the telecommunication industry has an impact on telecommunication penetration, this is observed to be positive in Africa. Research which used data from 30 African and Latin American countries between 1987-1997 confirms this. The author went further to give the reason for this positive impact as increase in the number of fixed line penetration and decrease in the price of local calls. The indication that low call price could attract patronage by users shows the relevance of this study [14, p. 17].

A research shows that new entry in the telecommunication market is positively correlated with mobile penetration level and expansion, the author also touched on the influence of regulation adjudging that independent regulation is positively correlated with penetration especially in a privatized mobile telecommunication market [11, p. 7]. This is accurate considering the fact that new entry leads to competition. The perspective here is how independent regulation of the sector can be encouraged. This is completely absent in Africa but continuous researches that can show the justification can get the attention of policy makers.

On the effectiveness of regulation and competition in mobile telecommunication penetration a study considered 29 Asian countries for the examination of diffusion of mobile and the impact of regulation and competition. It is seen that both regulation and competition play a great role in the diffusion of mobile service. The research also shows that per capita income and the size of fixed network affects diffusion positively. Belayneh et al. (2010) in their analysis of the effect of competition on mobile penetration also considered the role of the intensity of competition with Sub-Saharan Africa as focus between 2000 and 2006. The result is also consistence with existing studies on the topic as it indicated that the promotion of effective competition plays a significant role in mobile penetration in Sub-African countries [6, p. 1].

In an effort to establish a relationship between population density and mobile phone penetration a study shows that mobile phones reduce costs of business transactions and enhances market efficiency. This conclusion shows that as enterprises receives higher turnovers by the influence of mobile telecommunication, the country Gross Domestic Product (GDP) increases which has a multiplying effect on GDP per capita and the financial capacity of households and individuals to gain more access to telecommunication services [1, p. 229]. Mobile phone innovation as expressed in Internet penetration, scientific output and quality of education decrease constraints of entrepreneurship [3, p. 2].

On the impact of mobile phone and economic growth in Sub-Saharan Africa countries a researcher established the fact that new forms of telecommunication can bring both macroeconomic benefits to national economies as well as benefits to individuals both in the developed and the developing countries. He went further to show that lower-income groups can have more business opportunities, and improve productivity through the use of the mobile phone, he described the role of mobile phones in developing economies to the crucial role of fixed telephone lines in developed countries in the 1970s and 1980s [10, p. 269]. This research shows a close interdependent relationship between the development of the telecommunication market and human capital development

Mobile penetration and the usage of the Internet have also been found to be associated with the reduction of corruption in Africa. A study which utilized Granger causality (a statistical concept of causality whose mathematical formulation is based on linear regression modeling of stochastic processes) tests with focus on Sub-Saharan Africa shows that there is unidirectional causality from mobile phone penetration to corruption, and from internet adoption to corruption [11, p. 271]. As regards what influences telecommunication penetrations in rural areas, researchers investigated the correlation of cellular phone access and network performance in rural areas of Malawi, the result shows that the timing of network access is determined both by demand and cost factors, with

demand showing more relevance for dropped call rate. The authors partly attribute rural development to the emergence of mobile phones [8, pp. 2-16].

The downward fall of the prices of mobile phones and subscription fees, mobile phone is expected to complete its transformation from a symbol attributed to the elite class to a substance of necessity not only to elites both to all adults regardless of income level. There remains the challenge of the provision of complementary public goods and the formulation of policies that can propagate the benefits in the use of mobile phones across Africa [1, p. 19].

RESEARCH METHODOLOGY

The data used in the analysis are telecommunication data from 42 countries in Sub-Saharan Africa, the telecommunication data are sourced from GSMA (a trade body that represents the interests of mobile network operators worldwide), while the GDP per capita record is from the World Bank.

The variables for each of the 42 countries are: 2016 GDP per capita, unique subscribers in millions, and the penetrations rates. A unique subscriber is a unique user who is subscribed to mobile services at the end of the period, excluding Machine to Machine (M2M) [5, p. 7]. Mobile penetration expressed as percentage refers to mobile subscriptions over total population. In this study, we intend to measure the impact of GDP per capita on mobile penetration rates in 42 Sub-Saharan countries in 2016. The statistical tool employed is a panel regression analysis adopting an ordinary least square method of estimation. The data was analyzed with the aid of EVIEW version 9 (a statistical program used mainly for time-series oriented econometric analysis). The statistical models and correlation analysis indicate the relationship between GDP per capita and penetration rates. The models can also be used for projections.

DESCRIPTIVE ANALYSIS OF THE RESULT

Figure 1 shows the pattern of distribution of GDP per capita of the sampled countries in 2016. The graphs show that the level of GDP per capita has sharp variation across countries in Sub-Sharan Africa. Assessing countries captured by the graph, countries like Eritrea, Gambia and Ghana have very low figures, Gambia, Angola, Zambia and Namibia have very high figures. An observation of this indication from a regional view shows that the countries with low figures are in Central, Eastern and Western sub-regions while those with high figures are in the Southern sub-regions with Gambia from the Western region. As expected the countries with high figures are relatively rich countries with high revenue from natural resources.

Figure 2 shows the level of penetration rates cross these countries in 2016. It also will be observed that there are sharp differences in penetration rates across the countries but not as much as what is observed with GDP per capita. The differences in penetration among the sampled countries are much closer than their GDP per capita. With the exception of Eritrea - 9%, South Sudan - 16%, Central African Republic - 22% and Madagascar - 23%, all the captured countries tend to operate within a close range of 25% to 70%. South Africa has the highest penetration rate of 69%. The average penetration for the captured region is 43%.

Figure 3 shows the combination of both GDP per capita and penetration rate. The pattern of the graph is somewhat similar which graphically shows a positive correlation between GDP per capita and penetration rate, but the sharp drops noticed with Eritrea and South Sudan shows that across cross

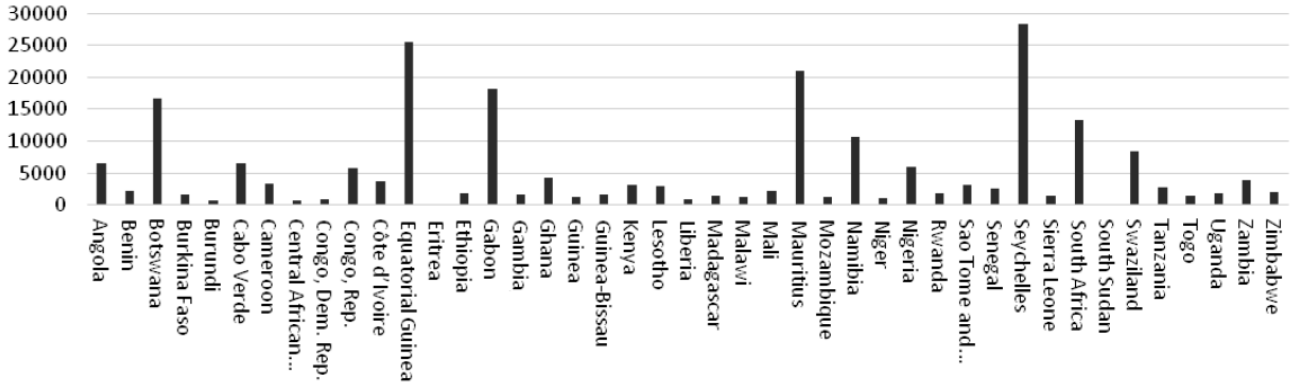

Figure 1. 2016 GDP per capita of sampled countries in Sub-Saharan Africa.
Compiled by the author on: The World Bank.

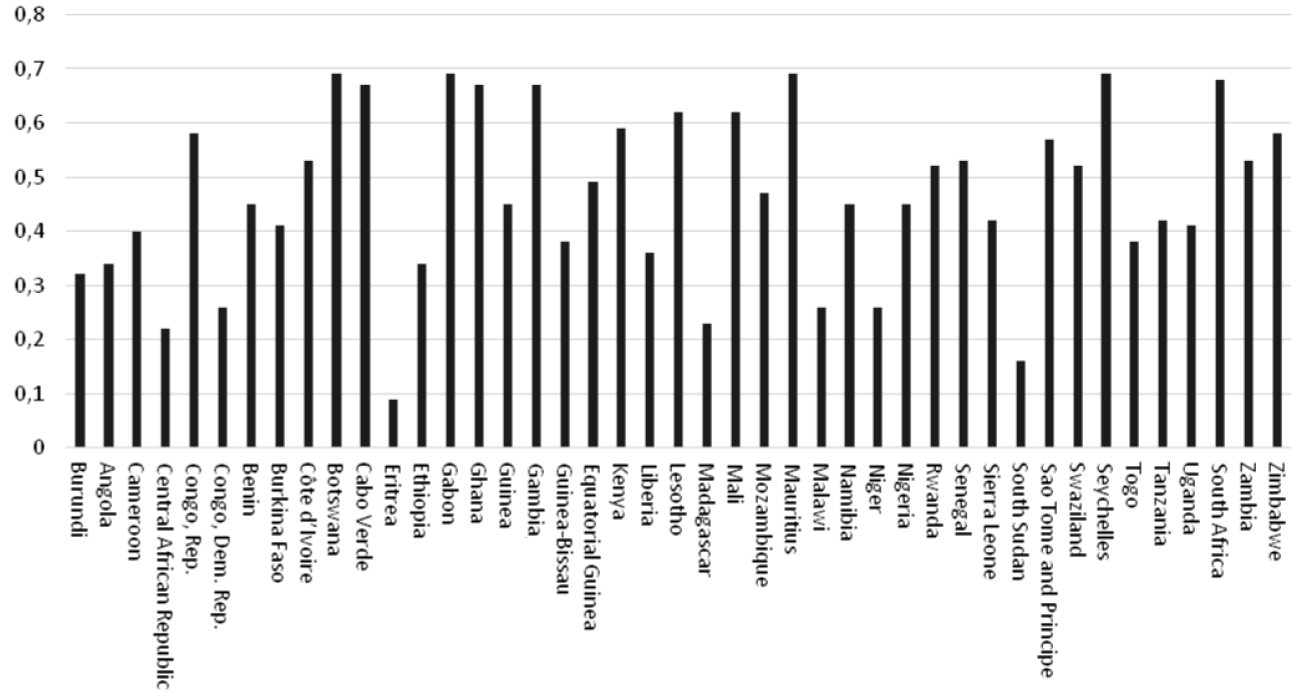

Figure 2. Penetration rates of sampled Countries in Sub-Saharan Africa.
Compiled by the author on: GSMA.

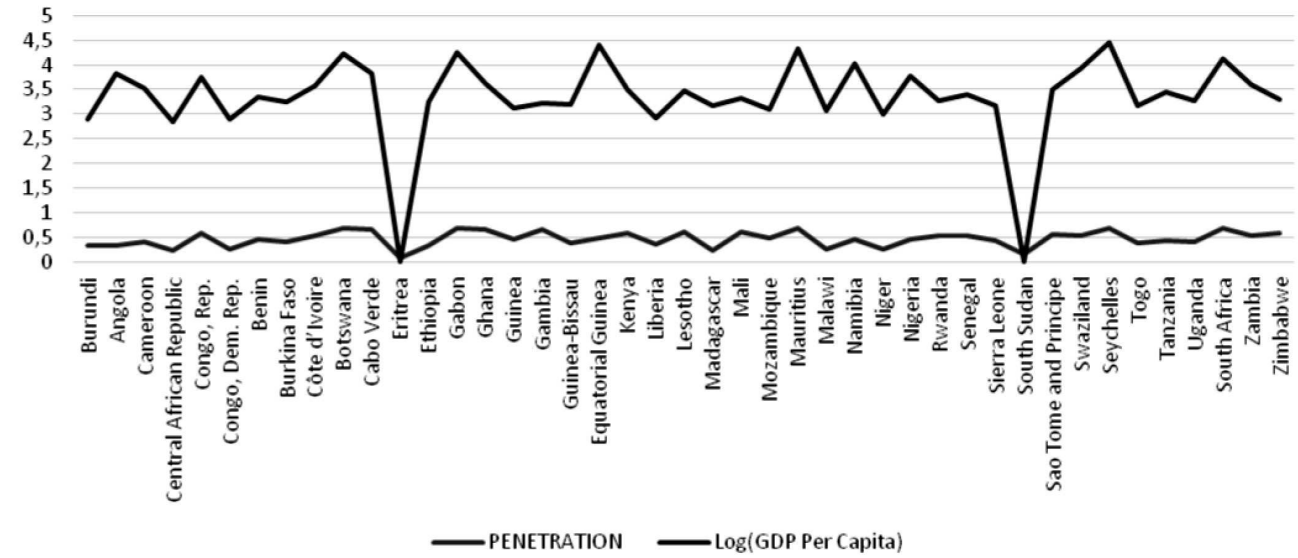

Figure 3. Both GDP per capita and Penetration Rate.
Compiled by the author on: The World Bank and GSMA.

country comparison. Besides the impact of GDP per capita on mobile penetration that is generally common to Sub-Saharan countries there are other peculiar factors that applies to Eritrea and Sudan. It can be concluded that there are some other factors besides GDP per capita which have a great influence on mobile penetration in these two countries that may be less severe in terms of impact on other countries in the region.

CONCLUSION

From the literature review, one of the deductions that can be made is that economic power can be expressed in GDP per capita and mobile penetration are bi-directional that is both can influence each other positively. The research confirmed this interference in Sub-Saharan Africa. When users are better economically, they are able to access

telecommunication services. On the other hand, the services enable users to be more productive in their economic activities. On a macro level, the expansion of telecommunication services expands market boundaries and reduces cost of doing business. Besides this, telecommunication business serves generate income to the national GDP both in the downstream and upstream sectors. This research confirmed positive and strong relationship between GDP per capita and penetration rate. The research also revealed that GDP per capita can be increased by the level of development of mobile penetration and increase the number of subscribers. The call is for the governments of the countries make policies that can promote mobile penetration. It's the duty of operators to encourage unique subscribers even though it's not a strong factor.

The mobile penetration in the region is expected to increase from 2012 record of 52% to 79% in 2020, and the sub-region is expected to be the fastest growing region in terms of mobile phone usage globally in the next five years*. This research confirmed positive and strong relationship between GDP per capita and penetration rate. To achieve the goal of 79% penetration rate average in the sub region or a better result, effort must be put in place to create the necessary conditions.

The importance of telecommunication to national developments is known to all. While operators are expected to improve quality of service and customer satisfaction, the government must make effort to promote macroeconomic stability, the most important thing being sustenance of good governance. Other things that can improve the economy and the level of GDP per capita must also be vigorously pursued.

* Sub-Saharan Africa to Witness Fastest Growth in Mobile Usage Rates Globally. CISION - www.prnewswire.com

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