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Analysis of telecommunication service expansion, employment and poverty in Nigeria

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Abstract

This paper investigated the empirical relationship between telecommunication service expansion, employment and poverty in Nigeria. The study utilized time series data which were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin, Nigeria Communication Commission (NCC) and World Bank's World Development Indicators (WDI) of 2010. The vector autoregressive modeling technique was used in determining the relationship among telecommunication service expansion, employment and poverty between the periods of 1986 and 2010. Our results showed that telecommunication service expansion explained about (9%) of the forecast error of employment in the first year rising to about (21%) in the fifth year. Similarly telecommunication services explained (4%) of the forecast error variance of poverty in the first year and rose to about (29%) in the fifth year. The study concluded that telecommunication service expansion due liberalization has little impact on employment and has marginally promoted welfare. It is recommended that Nigeria should place more emphasis on growing infrastructural facilities and also strive to maintain an operating environment that is conducive to attracting investment in this sector.

Keywords: Telecommunication Services; Employment; Poverty; Economic Growth

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1. Introduction

The importance of telecommunication infrastructure in driving globalization and economic development cannot be over emphasized. Liberalization of telecommunication sector in countries of the world has been a cogent factor to this development. The development of National ICT infrastructure through private investment has encouraged the policy of institutional reforms. Hence, liberalization of telecommunication sector is an important segment of such economic reforms in Nigeria. At the same time, the wave of privatization of state owned telecommunication operators has resulted in increased competition among the operators and lower prices of telecommunication products. The influx of Global System for Mobile Communication (GSM) Operators and the facilities they provide has enhanced easy and effective communication among Nigerian populace thereby stimulating the process of trade and transactions between Nigerians and their foreign counterparts.

According to Manuaka (2008) and Okereocha (2008) "over 1,000,000 Nigerians have been directly and indirectly employed by the operators. Moreover, supportive enterprises and service organizations like banking, haulage, consultancies, insurance etc. have themselves blossomed". Also, Okereocha (2008) emphasized that "mobile phone has empowered the poor by opening up veritable windows of wealth generation for them to get out of the scourge of poverty". Okereocha (2008) also stressed further that telecommunication sector has enhanced massive inflow of investments and the doggedness of the industry regulator.

Despite the level of achievement recorded in telecommunication sector for over a decade, poverty level coupled with high rate of unemployment is still on the increase. ILO (1982) stated that "before global economic depression of 1980s, the problems that confronted the economy were wars, cattle raids, famine, diseases and poverty". Since then, the growth rate of unemployment has taken an unbearable and disturbing dimensions in Nigeria with numerous able bodied persons who are searching for jobs at any rates yet unable to secure one (Onah, 2001). The most striking issue about unemployment in Nigeria is that it is very high among young school leavers and graduates particularly from tertiary institutions (Adebayo, 2000).

According to The Nigerian Human Development Report, UNDP (2009), " 54.4% of the population lives below the national poverty line" and that "unemployment rate in Nigeria rose from about 12 out of 100 working age people in 1999 to 18 in 2005 with the rate of youth unemployment rising in urban area than rural area". In addition, NBS (2012) reported that "age groups 15-24 and 25-44 had higher unemployment rates of 37.7 and 22.4 percents respectively". Also, "rural unemployment stood at 25.6 percent compared to urban unemployment of 17.1 percent". This is a pointer to poverty, for instance, NBS (2012) also estimated that "there was slight decline of poverty of 2.4 percent between 2003/2004 and 2009/2010". Hence, the concern on the impact of telecommunication service expansion in Nigeria. The objective of this paper therefore, is to analyze the relationship between telecommunication service expansion, employment and poverty in Nigeria.

2. Literature review and theoretical framework

The relevance, economic implications and policy implication of telecommunication services have been more pronounced in the last decade .One of the foremost attempts to examine analysis of telecommunication services was that of Hardy (1980) who analyzed the relationship between telephone service and economic development. Despite the fact that Hardy's models were regarded as elementary, his effort is noteworthy identifying the mechanism of how telephone growth aided economic development. Moving the discussion ahead, Röller and Waverman (2001) specified a micro-model of supply and demand for telecommunications investment. Their, micro-model together with a macro-production function and ensured that the model incorporated the feedback process between activity in telecommunications and the aggregate economy. They found that for OECD countries telecommunications infrastructure growth indicated a positive effect on economic growth. Moreever, Waverman et al. (2005) extended the model of Röller and Waverman (2001) to Africa countries. They found that the model was not robust to changes in sample size and changes in model specification. Hence, they utilized an endogenous growth model. Their results showed that mobile phones have impacted economic growth positively. Furthermore, they indicated that mobile phones are relevant substitute for landlines. Also, Shideler et al. (2007) found that broadband is positively related to employment in Kentucky, using disaggregated data. However, their models were no as robust in relation to good measures of fit.

Crandall et al. (2007) analyzed the impact of broadband at the state level. The study showed that industry groups were more affected than others. They also indicated that manufacturing, finance, education and health care all had larger employment gains, but, they find no statistically significant effect on state gross domestic product. Similarly, Sridhar and Sridhar (2003) study showed that telecommunication has potential on benefit urban areas, employers, employees and the society by reducing the need to travel and by reducing office distractions.

Other noticeable efforts among others include Jerome and Ariyo (2004) study on the impact of implementation of privatization and liberalization in telecommunications and private investment in infrastructure on poverty reduction concluded that infrastructure reforms and privatization in Africa were carried out without considering the needs of the poor and meeting the policy preconditions that were necessary for their efficiency. The implication of their study is that infrastructure privatization has negatively affected the poor in Africa. The authors suggested that the goals of infrastructure reforms will be realized if reforms are implemented within the context of appropriate market and regulatory frameworks. In addition, Akinbobola and Saibu (2004) investigated the nexus between income inequality, unemployment and poverty in Nigeria using a vector autoregressive (VAR) approach. The authors used four-variable VAR model and found that reduction in unemployment rate enhances human development thereby reducing poverty. In the same vein, the noticeable growth in public expenditure lowers unemployment and improves the human development index. Their study recommended that infrastructure-based policies may initially reduce unemployment and at the end enhance the living standards of Nigerians.

The review of empirical literature presented here has indicated that little or no research, to our knowledge, has been done to explore this issue in Nigeria. Given the dearth of empirical studies on this issue in Nigeria, the present study becomes justifiable in shedding light on the question of telecommunication service expansion as a tool has been effective in employment generation and poverty reduction in Nigeria.

3. Methodology

The nexus between telecommunication service expansion, employment and poverty, was examined within the context of a four-variable vector autoregressive (VAR). The study adapted the model of Akinbobola and Saibu (2004). The model was specified and estimated using annual data for 1986-2010. A vector autoregressive process of order β, VAR (p), for a system of n- variables can be written as:

$$Z_t = A + B(L)Z_t + e_t \qquad (1)$$

where Z_t is a (n × 1) vector of system variables, A is a (n × 1) vector of constants, B(L) is a (n ×n) matrix of polynomials in the lag operator L, and e_t is a (n × 1) vector of serially uncorrelated white noise residuals.

Sims (1980) VAR being an unrestricted reduced form approach and uses a common lag length for each variable in each equation. Four variables were included in the model: telecommunication service expansion (SEMP), Economic Growth (EG), Employment (Demp) and poverty index (POV). The data for all of the variables were obtained from the Nigeria Communication Commission (NCC), Central Bank of Nigeria Statistical Bulletin. First and foremost, time series properties of the variables were examined using Augmented Dickey-Fuller tests. This was done in order check for the first-order unit roots before VAR was estimated. Carrying out the unit roots tests imply that the first differences of the logs of the variables i.e Semp, GDP, Demp, and POV should be used in specifying and estimating the model.

3.1. Model

The model represented by a four-component vector is, thus, defined as:

$$V = [SEMP, GDP, EMP, POV] \qquad (2)$$

where V is the vector containing the four variables, SEMP is telecommunication service expansion, GDP is the real GDP, DEMP is the level of employment, and POV is poverty index.

Equation (1) is an identity that was estimated using the VAR regression technique. The impulse response functions (IRFs) and the variance decompositions (VDCs) were based on the moving-average representations of the VAR model. Analysis of the model showed short-run dynamic relationships among these variables.

3.2. Definition and measurement of variables

The study makes use of economic growth, employment, poverty, penetration rate, employment per telecom subscribers and the measurement of each of the variables are discussed below.

i. *Telecommunication Service Expansion (SEMP)*: One of the indicators is penetration rate i.e. total subscriber per 100 per 100 inhabitants. This was used as measured of expansion in telecommunication services in the study. Main line penetration (teledensity) is the most common indicator of telecommunication service expansion. A main line "is a telephone line connecting the subscriber's terminal equipment to the public switched network and which has a dedicated port

in the telephone exchange equipment" (ITU, 1998). This variable was sourced from Nigeria Communication Commission (NCC).

ii. *Economic Growth (GDP)*: Measures the economic activities within a country regardless of their ownership. This variable is measured by real gross domestic product following Wallsten (2001).

iii. *Poverty (POV)*: Poverty is a state of deprivation, a state in which the standard of living of people falls below some minimum acceptable standard. Within poverty research, disposable income and consumption expenditure are most commonly used measure of a person's standard of living (Greenwell et al. 2001). This study adopted Okojie (2002) who opined that 'real consumption expenditure per capita as a measure of poverty is superior to income measures. Hence, this study employed expenditure per capita. It was sourced from World Development Indicator (WDI)

iv. *Employment (DEMP)*: According to World Development Indicator Report (2010), employment refers to those above a specified age (often 15-64) who worked for monetary gain a specified number of hours per day during the reference period of the survey, or sought to do so (WDI, 2010). Due to the problem of data availability in Nigeria, labour participation rate was used as proxy for employment and it was sourced from (WDI).

4. Data analysis and interpretation of result

To investigate the effect of telecommunication service expansion on economic growth, employment and poverty in Nigeria, the Vector Regressive (VAR) model is estimated. Under this situation a four variable VAR model of order 1, which expresses the dynamic relationship between these variables were analyzed using the Impulse Response Functions (IRFs) as analytical tool. Since variable SEMP is stationary in level while RGDP, EMP and POV are of unit root these last three variables are transformed to their first difference form in the VAR system.

4.1. Impulse response analysis

These IRFs measure the dynamic responses of the variables to innovation in employment (EMP). For each of the variables, the horizontal axis of the IRF shows the number of years that have passed after the impulse has been given, while the vertical axis measures the response of relevant variable.

It is important to state here that telecommunication impact on an economy can be decomposed into direct and indirect channels. Though the direct impact of telecommunication is very marginal, however, it has attracted foreign direct investment (FDI). The inflow of foreign capital in the country has created opportunities at different levels. With the establishment of the setup of these Foreign Service providers, create highly paid jobs opportunities and demand for technical labour increase. The entrants of mobile phones and wireless companies have established a competitive market environment and introduced advanced technology.

On the other hand, the indirect impacts includes establishment of call and customer service centers, cellular phone franchises dealers e.t.c. Other indirect impacts of telecommunication services includes expansion in business activities through improved telecommunication services, firms now connected to each

other very easily and the international market is at the finger tips of businessmen through internet (Mahmood et al. 2008).

Figure 1 shows the impulse response functions using the VAR ordering SEMP, DEMP, DRGDP and DPOV. This ordering is used in the VAR system on the assumption that the performance of the telecommunication service is expected to firstly affect employment following by growth in real gross domestic product and ultimately leads to poverty reduction.

Figure 1(a), shows that a one standard deviation shock to variable SEMP, which captures expansion in telecommunication services, leads to a decline in the same variable starting from the first year of economic liberalization to the sixth year and rises after. Since Figure 1(a) is not important for the analysis of the effect of telecommunication service expansion on economic growth, employment and poverty in Nigeria, we focused our attention of Figure 1 (b), (c) and (d).

With respect to the effect of telecommunication service expansion on economic growth, there is the need to understand the response of the latter to innovation in the sector under consideration. Figure (1b) shows that in response to innovation in the telecommunication service expansion to economic growth (measures by changes in real gross domestic product) initially becomes negative after which a positive effect occurred after the 6th year of economic liberation. This result implies that telecom service expansion as a result of liberalization did not immediately have a positive impact on the economy. One main reason that could be attributed to the positive impact after 6th year could be attributed to the initial huge cost and lower cost of investment into the sector in succeeding years.

To examine the effect of telecommunication service expansion(SEMP) on employment (DEMP), Figure(1c) indicates that in response to this service expansion, employment initially increase within the first four years and declines after. The fall in employment rate, as reflected in the result after the 4th year may be attributed to the substitution of capital for labour in this sector. At inception, the telecommunication sector, in an attempt to invest massively in the country needs high level of manpower. However, with the growth of this sector and massive investment in the telecommunication gadgets capital may be substituted for labour.

As regards the effect of telecommunication service expansion on poverty, Figure (1d) shows that the response of consumption expenditure per capita is negative up till the fourth year due to innovation to telecommunication service expansion. However, poverty drops slightly after the fourth year and thereafter remains relatively unchanged throughout the periods. This implies that poverty rate which slightly increased with respect to the performance of the telecommunication sector and has little or no significant effect from the 5th years of economic liberalization. The implication of this result is that telecommunication service expansion as a result of economic liberalization contributes marginally to poverty reduction. This trend in poverty in the country could be attributed to the fact that the component of poverty in an economy is multi-dimensional and depends on contributions of other sectors of the economy (FGN, 2011). According to UNDP (2009) “the major seasons for the negative correlation between economic growth and poverty rates as disconnect between economic growth and employment, little impact of growth and employment on the poor people, lack of improvement on total factor productivity, lack of inter sectoral linkages and growth brought

about by high technology". One other possible reason is the low per capita income in the country within those years (CBN, 2010)

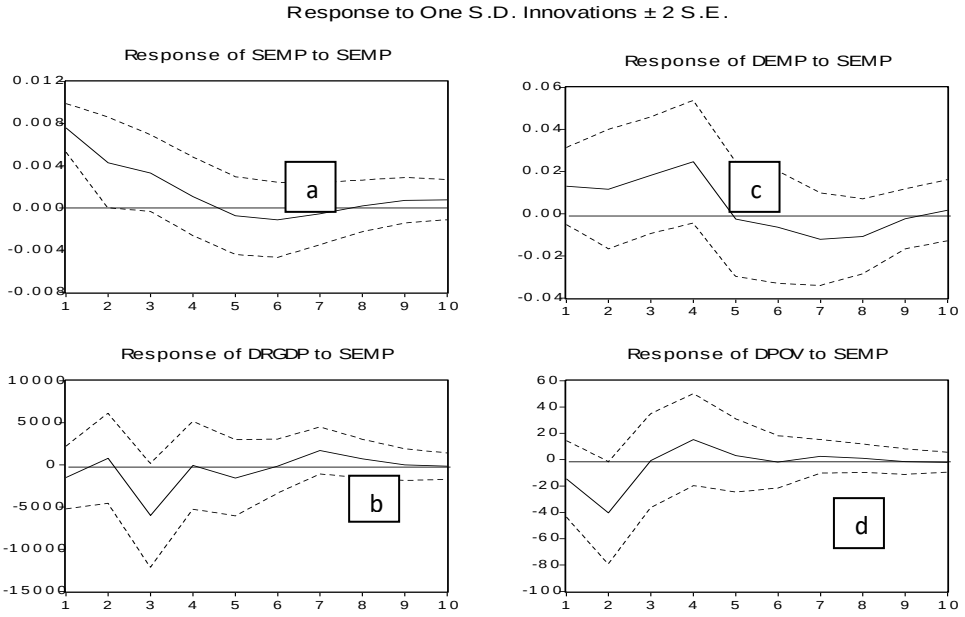

Figure 1. Impulse Response (VAR Ordering = SEMP DEMP DRGDP DPOV)

4.2. Variance decomposition

The results of the impulse response analysis indicated that innovation in telecommunication service expansion initially has a negative impact on economic growth but leads to positive impact after the 6th year of economic liberalization. Innovation in the telecommunication service expansion and has a positive effect on employment rate within the first four years and declines afterwards, while contribution to poverty reduction is marginal. To shed more light on the above result, this study also carries out variance decomposition. The forecast error variance decomposition (FEVD) The FEVD is a way of disentangling the effect of various shocks and to consider the contribution of each type of shock to the forecast error variance. The FEVD also provides information about whether telecommunication sector is important for economic growth, employment generation and poverty reduction.

In analyzing the FEVD, results were reported for forecast horizons 1, 3, 5, 7 and 9 years. Table 1 shows the FEVD which gives an idea of the share of fluctuations in various variables that is caused by innovation in telecommunication service expansion.

4.2.1. Variance Decomposition of Employment (DEMP)

The variance decomposition estimates suggests that innovation to telecom service expansion as evidenced in Table 1, explains about 91.028 percent of shocks in the employment in the 1st quarter declining in effects to

about 68.78 percent in the 3rd quarter 56.21 throughout the periods. The employment impact on poverty fluctuates marginally during the first, third, fifth periods respectively. The result corroborates Fasoranti (2010) who found that the deregulation of telecommunications has led to increased employment opportunities in Nigeria. With the expansion in the number of private mobile telephone operators, many youths who would have been openly unemployed have resorted to sale of recharge cards and operation of telephone Kiosks.

Table 1. Variance Decomposition of DEMP

Period	S.E	SEMP	DEMP	DRGDP	DPOV
1	0.044	8.972	91.028	0.000	0.000
3	0.072	12.368	68.775	12.094	6.763
5	0.078	20.523	59.209	10.271	9.997
7	0.080	20.507	57.178	12.070	10.245
9	0.081	19.950	56.210	13.716	10.124

4.2.2. Variance Decomposition of Economic Growth (DRGDP)

With respect to economic growth which is captured by the real GDP, the variance decomposition in Table 2 shows that economic growth explains 94.43% of changes in itself during the first year, declines to 69.44% in the third period and declines marginally through 62.64% in ninth period. However, economic growth contributes 2.63% to employment (DEMP) during the first period. Thereafter, it contributes an average of 5% throughout the periods under consideration. This result indicates that the telecommunication service expansion is very important since the contribution of this sector to variance of economic growth and employment variables is significant.

Table 2. Variance Decomposition of DRGDP

Period	S.E	SEMP	DEMP	DRGDP	DPOV
1	8779.250	2.940	2.634	94.426	0.000
3	12299.750	25.590	4.756	69.437	0.217
5	12746.010	25.296	5.306	65.428	3.970
7	13008.390	26.008	6.377	62.973	4.641
9	13045.500	26.000	6.432	62.649	4.750

This result supported Osotimehin et al. (2010) as well as Tella et al. (2007) whose studies explained the contribution of telecommunication infrastructure to economic growth in Nigeria since the period of telecom reform. Telecommunication sector has remained one of the major drivers of growth in the Nigerian economy. Growth in this sector has been phenomenal in recent years. Investment inflows into the Nigerian Telecommunications sector since 2006 have continued to increase astronomically forcing the main players in the subsector to expand their capacities (NBS, 2010).

4.2.3. Variance Decomposition of poverty (DPOV)

Table 2 shows that poverty explains 72.09% in the first period. However, in the third period, it declines to 55.08% through 52.91% throughout the periods. It is important to stress that though telecommunications might not have influence poverty substantially, most especially when we consider the direct channel, however, the impact of telecommunication service expansion on employment and economic growth has implications for poverty reduction. This result explains the marginal contribution of telecommunication liberalization to poverty. This result could be buttressed by Ajiboye et al. (2007) who concluded that the advent of mobile telecommunication has impacted Nigeria rural economy in terms of job creation, time management, and reduction in cost of travelling and so on. In terms of economic growth (DRGDP), poverty contributes 22.17% in the first year; it falls to 17.20% in the third year and then becomes relatively unchanged throughout the periods.

Table 3. Variance Decomposition of DPOV

Period	S.E	SEMP	DEMP	DRGDP	DPOV
1	68.667	4.482	1.250	22.172	72.096
3	83.135	26.726	0.983	17.207	55.085
5	85.167	28.823	1.518	16.644	53.015
7	85.384	28.808	1.531	16.718	52.943
9	85.450	28.813	1.557	16.719	52.911

From the FEVD result, one can conclude that though telecommunication service expansion as a result of economic liberalization has influenced Nigerian economy in terms of economic growth and employment, the improved performance of this sector has not contributed substantially, but marginally to poverty reduction. The study has revealed that the telecommunication sector has promoted employment in the country but its effect on economic growth and poverty reduction is not impressive. One can conclude that the abysmal result on the effect of telecommunication service expansion on growth may be attributed to the poor performance of other sectors such manufacturing and agriculture.

5. Conclusion

This paper utilized time series data to analyze empirically the effect of telecommunication service expansion on employment, and poverty in Nigeria. The assumption for the empirical work was that telecommunication service expansion contribution to welfare in Nigeria is positive and this was tested by looking at the relationship between telecommunication variables as a measure of employment, economic growth and poverty. The results of this work only provided evidence to support the earlier work that telecommunication reforms have positive effects on employment and economic growth. Though most studies had focused exclusively on developed countries and the few in developing countries were on cross-country studies. The conclusion drawn from these wealthy countries deviated from Nigeria case particularly in terms of poverty reduction.

The analysis of the effect of telecommunication service expansion on economic growth, employment and poverty, the study found that though economic growth and employment was significantly related to telecommunication service expansion, it has marginally impacted welfare in Nigeria. The Implication of this result is that telecommunication service expansion has helped countries of the world to leapfrog several stages of development, certain constraints such a infrastructural decay and inadequate operating environment have limited the potentials of telecommunication sector on welfare improvement in Nigeria. This explains the growth rate of contribution of telecommunication to Gross Domestic Product and mployment in informal sector of telecommunication market. The study recommended that more emphasis should be placed on growing infrastructural facilities and that Nigeria should strive to maintain an operating environment that is conducive to attracting more investment in this sector.

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