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Impact of Information and Communication Technology (ICT) on Employment Generation in Rural Areas in Kogi State

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Abstract

The rising rate of unemployment in Nigeria in general and Kogi State in particular, calls for modern day innovations that Information and Communication Technology (ICT) offers. In this study, the impact of access to, ownership and utilization of ICT on employment generation in rural areas in Kogi State was investigated. The study made use of the Shapiro-Stiglitz model of employment. Primary data were collected through household survey using structured questionnaire. The structured questionnaire was validated in a departmental seminar where the proposal and draft of the instrument were presented. Multi-stage sampling method was adopted to select 10 households each from 120 rural communities that were earlier randomly selected from the 21 Local Government Areas (LGAs) of the State. This makes a total sample of 1,200 households used in the survey. Three models of regression were estimated in the study using binary choice (LOGIT) technique. The findings of the study were that households' utilization of ICT has had positive and significant impact on employment generation in Kogi State at 5 percent significance level. However, households' access and ownership of ICT did not have statistically significant impact on employment generation in rural areas of Kogi State. The study concluded that the utilization of ICT has positively impacted the people in terms of employment generation in the rural areas of Kogi State. The study recommended that Kogi State government, Non-Governmental Organizations and individual philanthropists should establish more ICT training centres and Community Internet Service Centres (CISC) in rural areas. Also, rural dwellers in Kogi State should make themselves available for ICT training.

Keywords: Information, Communication, Employment, Rural Areas

JEL Classification: E24, O18, O33

1. Introduction

Inadequate employment is one of the developmental difficulties facing the Nigerian economy. With the outbreak of COVID – 19 and its attendant negative impact on the Nigerian economy, the unemployment problem in Nigeria has gone from bad to worse. According to the National Bureau of Statistics, the rate of unemployment in Nigeria increased from 27.1 percent to 33.3 percent in the fourth quarter of 2020 (NBS, 2021) [15]. This rising trend in the rate of unemployment is evident in the rural and urban areas in Nigeria.

Rural areas in Kogi State are facing neglect and general underdevelopment. Infrastructural facilities are either not available or in a deplorable state. The level of poverty in the rural communities is high due to low level of economic activities by both the private and the public sector (Kogi State Government, 2012) [10]. Linked to this is the high level of unemployment and underemployment. For instance, the rate of unemployment in the rural areas was 25.6 percent compared to 17.1 percent for the urban areas in 2011. Rural income inequality was 0.4334 in 2010 (NBS, 2012). The deplorable living standards of rural dwellers also accounted for the high rate of rural – urban migration (Kogi State Government, 2012) [10].

The Kogi State government has over the years embarked on some developmental programmes such as the World Bank Supported Agricultural Development Project (ADP), the Rural Water Supply Scheme, the Rural Electrification Scheme, the Low-Cost Housing Scheme, the Universal Primary Education Scheme and the State Transport Scheme, but little or no results were achieved given a number of factors such as insufficient funds and corruption.

Information and Communication Technologies (ICTs) are changing the world at an unprecedented rate. The information age has opened up the entire world and has turned it into a global village. The lives of people, how they live, the type of jobs they do, the way they communicate, and the way they travel are being affected almost day-to-day by the introduction of new

technological and scientific inventions. The rapid evolution and accessibility to electronic devices like mobile phones, laptops, tablets and the rapid expansion of the telecommunications industry in Nigeria have greatly influenced and facilitated easy access to ICT and awareness of its potential benefits (Kogi State Government, 2012) [10].

The main objective of the study is to assess the impact of access to, ownership and utilization of ICT on employment generation in rural communities in Kogi State. The study covers 120 rural communities selected across all the Local Government Areas in Kogi State. Following the introduction; section two is the conceptual review on ICT, theory of employment and theoretical nexus between ICT and employments, empirical discourse between ICT and employment; section three is the methodology; discussion of results is presented in section four while section five contains the conclusion and recommendations.

2. Conceptual clarifications

2.1 Information and Communication Technology (ICT)

ICTs refer to technologies that can be used to interlink information technology devices such as personal computers with communication technologies such as telephones and their telecommunication networks. Michiels and Van Crowder (2001) [14] defined ICTs as a range of electronic technologies which when converged in new configurations are flexible, adaptable, enabling and capable of transforming organizations and redefining social relations. The range of technologies is increasing all the time and there is a convergence between the new technologies and conventional media. According to Rodriguez and Wilson (2000) [20], ICT is a set of activities which facilitate and enhance the processing, transmission and dissemination of information by electronic means.

Cesaretti and Misso (2012) [2] stated that information and knowledge represent notions now in vogue in the debate among economists. They noted that the increasingly important role attributed to information depend not only on structural changes that it produces but also from its location in an evolutionary process that is characterized by the transition to an economy based on services (outsourcing) and the extension of markets and production combinations at the global level (globalization) and by the continuous increase in the general level of the stock of information and knowledge.

2.2 Theoretical review

Shapiro-Stiglitz model of Employment

Shapiro and Stiglitz (1984) [22] model is a specific application of efficiency wages in which workers have an incentive to shirk (not work hard). Firms, obviously, would like to assure that workers instead exert high effort and thus achieve high productivity. If the firm can monitor worker performance at no cost, then it can simply insist on its desired level of effort as a condition of employment and fire workers who shirk. The level of performance required and the wage would be set jointly at levels that would assure that the firm could attract workers. However, the more interesting and realistic case is one in which firms cannot directly observe individual workers' effort. Instead, there is a given probability (less than one) that a shirking worker will be caught and fired. Thus, workers must decide whether to shirk or to work hard by balancing the increased utility of shirking against the probability of being caught and fired.

ICT and Employment

Economists are of the view that during the last two decades, new technological paradigms based on ICT, especially the use of Internet in economics, could bring about a positive change in the field of creating employment opportunities and promoting labour markets (Barnes, 2007) [1]. Vivarelli (2007) [24] found that ICT affected employment through increase in the supply of skilled labour, decrease in production cost, development of competitive market, developing business atmosphere, motivation of self-entrepreneurship, improvement and creativity.

Garcia-Murillo (2017) [5] in his assessment of the impact of ICTs on employment in Latin America concluded that like developed countries, the region is beginning to experience negative effects of ICTs on employment. He observed that, at least in the short term, the use of ICTs will cause contraction in employment. According to Freeman and Soete (1994) [4], Edquist, Hommen and McKelvey (2001) [3], and Vivarelli and Pianta (2000) [25], the use of ICTs in production has positive impact on employment. On the other hand, researchers such as Koellinger (2006) [9] asserted that the effect of ICT on employment on one hand, can be positive by making innovation result in employment and growth and on the other hand, can be negative due to the replacement of labour force (especially unskilled workers) by ICT systems.

Roger (2002) [21] posited that two areas of employment opportunity arise from the deployment of ICTs. First, unemployed people can use ICTs to discover job opportunities, and second, they can become employed within new jobs that are created through the deployment of ICTs. Poor people in rural communities lack opportunities for employment because they often do not have access to information about available vacancies. One use of ICTs is to provide on-line services for job placement through electronic labour exchanges in public employment service or other placement agencies.

2.3 Empirical review

Tomas and Diaz (2002) [23] in their study of the effect of ICT related technological innovation on the quality and quantity of employment in Spain for the period of 1980-1990 found out that the use of ICT led to increase in employment in 1990 compared to 1980. Matteucci and Sterlachini (2003) [12], observed a positive relationship between investment in ICT and of employment at the end of the 1990s. Also, they compared the employment performance programmes in USA, EU and Italy together using a comprehensive equation of 173 industries in order to estimate and explain employment growth model based on the impact of ICT. They concluded that, there was a close relationship between employment and ICT investment in USA.

Kaushalesh (2004) [8] in a study on the growth rate of employment and creating electronic business jobs in large scale industries of Netherland during 1995-2003 found out that the adoption of new technologies does not necessarily indicate abolishing the existing jobs. On the contrary, by adopting ICT and some relevant technologies in the market, the required number of employments for skilled labour was indirectly increased.

Harrison, Jordi, Jacques and Bettina (2008) [7], in their study on the effect of ICT on employment rate in France, Germany, Spain and England firms during the years 1998-2000, found out that, ICT did not only create a direct and

positive change in the employment of labour, but it also created an indirect positive change, following compensatory effects of lowering the prices of the commodities produced. Lachenmaier and Rottmann (2007) [11] examined the effect of ICT related technology on employment. They observed a positive effect of technology in a firm level analysis in German. They posited that innovation in production process led to the production of new items in the market and consequently increased the level of employment. Similarly, Merikull (2008) [13] in his study on the effect of innovation on employment of firms at industry level in Estonia for the period of 1994- 2005, found out that ICT has positive effect on employment rate in both firm and industry levels.

O'Mahony, Robinson and Vecchi (2008) [17] in their investigation of the effect of ICT on skilled labour force demand in U.S.A, England and France, found out that both employment rate and skilled labour force wages increased by entering ICT in service and production field of activities during the period of study. Also, there was a significant and meaningful difference among the countries with respect to the relationship between ICT and employment rate. The results revealed that U.S.A gained more from ICT with respect to the employment rate than other investigated countries.

3. Methodology

This study utilised the survey design, which was conducted through the administration of structured questionnaire to the people in selected rural areas in Kogi State. The survey design was adopted because it made it easy for people to participate and remain anonymous. The study also used quantitative and qualitative data which were obtained through the use of a structured questionnaire.

3.1 Instrument for data collection

Copies of a structured questionnaire were used for data collection in this study. The questionnaire sought information about households' characteristics, employment status and households' access to, ownership and utilization of ICT.

3.2 Method of analysis

Three (3) econometrics models were estimated in the study in order to assess the impact access to ICT, Ownership of ICT and Utilization of ICT have had on employment generation in rural areas in Kogi State. The models were estimated with the use of Binary Choice technique using computer software (E-views version 10). The estimated models were subsequently analyzed on the basis of the sign and significance of the coefficients of the variables of interest.

3.3 Model specification

Employment Model:

This model seeks to examine the impact of ICT on employment generation in the rural areas in Kogi State. To accomplish this, the study drew from the model of Rodokanakis (2012) [19] with some modifications. The model is:

$$E_i = \alpha + \delta_i X_i + U_i \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3.4)$$

Where E_i (employment status) is the logit (In of the odds) of being unemployed, X_i is a vector of household characteristics, δ_i (parameter estimates) of the odd ratios of the independent variables X_i, α is the constant and U_i is random error term.

For the purpose of this study the model was modified thus:

$$E_i = \alpha + \delta_i X_i + \phi_i T_i + U_i \ldots\ldots\ldots\ldots\ldots\ldots \quad (3.5)$$

Where,

E_i = employment status (the logit (In of the odds) of being unemployed)

X_j = vector of household characteristics such as household size (HS), head of household's level of education (HE), age of household head (AH), marital status of household head (MS), gender of household head (GH), housing of household (HH) and electricity available in household (EH).

T_j = vector of ICT variables such as household access to radio (HAR), household ownership of radio (HOR), household utilization of radio (HUR), household access to television (HAT), household ownership of television (HOT), household utilization of television (HUT), household access to GSM phone (HAG), household ownership of GSM phone (HOG), household utilization of GSM phone (HUG), household access to personal computer (HAP), household ownership of personal computer (HOP), household utilization of personal computer (HUP), household access to Internet (HAI), household ownership of Internet MODEM (HOI), household utilization of Internet (HUI).

β_j = co-efficient vector of household characteristics

λ_j = co-efficient vector of ICT variables

h_j = random error term

The a-priori expectations were that: $\beta_j, \lambda_j > 0$.

X_j = vector of household characteristics such as household size (HS), head of household's level of education (HE), age of household head (AH), marital status of household head (MS), gender of household head (GH), housing of household (HH) and electricity available in household (EH).

T_j = vector of ICT variables such as household access to radio (HAR), household ownership of radio (HOR), household utilization of radio (HUR), household access to television (HAT), household ownership of television (HOT), household utilization of television (HUT), household access to GSM phone (HAG), household ownership of GSM phone (HOG), household utilization of GSM phone (HUG), household access to personal computer (HAP), household ownership of personal computer (HOP), household utilization of personal computer (HUP), household access to Internet (HAI), household ownership of Internet MODEM (HOI), household utilization of Internet (HUI).

β_j = co-efficient vector of household characteristics

λ_j = co-efficient vector of ICT variables

h_j = random error term

The a-priori expectations were that: $\beta_j, \lambda_j > 0$.

α = constant term

δ_i = co-efficient vector of household characteristics

ϕ_i = co-efficient vector of ICT variables

U_i = random error term

The a-priori expectations were that: $\delta_i, \phi_i > 0$.

Impact of Access, Ownership and Utilization of ICT on Employment Generation in Rural Areas of Kogi State

Table 1: Impact of Access, Ownership and Utilization ICT on Employment Generation in Rural Areas of Kogi State

ICT LOGIT Model Estimation						
Dependent Variable: Employment Status				**No. of Observations: 1,120**		
Independent Variables	**Access**		**Ownership**		**Utilization**	
	Coefficient	**Probability**	**Coefficient**	**Probability**	**Coefficient**	**Probability**
Constant	0.2144	0.7184	0.4093	0.5047	0.6400	0.2982
Household Size	0.0664	0.1510	0.0407	0.3970	0.0503	0.2667
Household's Head Level of Education	0.1131***	0.0000	0.1305***	0.0000	0.1165***	0.0000
Age of Household Head	-0.0091	0.3557	-0.0086	0.3973	-0.0203**	0.0486
Marital Status of Household Head	-0.4229*	0.0854	-0.1770	0.4828	-0.0790	0.7349
Gender of Household Head	0.4370**	0.0167	0.4360**	0.0177	0.4746**	0.0105
Housing of Household Head	0.1432	0.3700	0.2518	0.1308	0.2420	0.1296
Electricity Available in the Household	-0.1513	0.4949	-0.2283	0.3131	-0.1125	0.6016
Household ICT Knowledge	0.8280***	0.0001	0.9319***	0.0000	0.9457***	0.0000
Household Access to Radio	0.8428***	0.0000	-	-	-	-
Household Access to Television	-0.3038	0.1659	-	-	-	-
Household Access to GSM Phone	0.4854*	0.0765	-	-	-	-
Household Access to Personal Computer	0.2556	0.3071	-	-	-	-
Household Access to the Internet	0.7279***	0.0050	-	-	-	-
Household Ownership of Radio	-	-	0.2909***	0.0000	-	-
Household Ownership of Television	-	-	-0.1524	0.4764	-	-
Household Ownership of GSM Phone	-	-	0.0009	0.9973	-	-
Household Ownership of Personal Computer	-	-	0.3278	0.2524	-	-
Household Ownership of the Internet MODEM	-	-	0.1288***	0.0001	-	-
Household Utilization of Radio	-	-	-	-	0.6843***	0.0016
Household Utilization of Television	-	-	-	-	-0.0867	0.6894
Household Utilization of GSM Phone	-	-	-	-	0.1664	0.6040
Household Utilization of Personal Computer	-	-	-	-	0.6040***	0.0055
Household Utilization of the Internet MODEM	-	-	-	-	0.6578***	0.0030

(***) Significant at 1%, (**) Significant at 5% and (*) Significant at 10%

Table 1 overleaf, shows the estimated LOGIT models of the impact of ICT on employment proxied by employment status of respondent in rural areas of Kogi State. The access to ICT model shows that, holding the vector of household characteristics constant, the coefficients and the associated probabilities of the vector of ICT variables used in the study indicate that with households' access to radio, GSM phone, personal computer, the Internet and ICT knowledge; the probability of a household to become employed increases. These aforementioned ICT variables all have the expected signs. With households' access to the television however, the probability of becoming employed decreases since households' access to the television has a negative sign. This negative sign may be as a result of the relatively high cost of accessing the television coupled with the epileptic power supply in rural areas in Kogi State.

In terms of statistical significance, the positive impact of households' access to radio, the Internet and ICT knowledge are significant at 1 percent; while that of access to GSM phone is significant at 10 percent. The positive impact of personal computer and the negative impact of access to television are not statistically significant. These results imply that households' access to radio, GSM phone, the Internet and their ICT knowledge will increase their chances of becoming employed. Also, household access to the television will decrease their chances of becoming employed. The positive impact of access to radio, the Internet and ICT knowledge seem to be more apparent.

On the basis of the magnitude of the coefficients of the ICT variables, households' access to radio appears to have had higher positive impact on the probability of becoming employed in the rural areas of Kogi State since it has the highest coefficients (0.8428).

Also shown on Table 1 overleaf is the Ownership model. The model shows that holding the vector of household characteristics constant, the coefficients and the associated probabilities of the vector of ICT variables used in the study indicate that with households' ownership of radio, GSM phone, personal computer, the Internet and ICT knowledge; the probability of a household to become employed increases. These aforementioned ICT variables all have the expected signs. With households' ownership of television however, the probability of becoming employed decreases since households' access to the television has a negative sign. This negative sign may be as a result of the relatively high cost of owning a television set and the inability of rural dwellers to receive messages about employment opportunities through their television set.

In terms of statistical significance, the positive impact of ownership of radio, Internet MODEM and ICT knowledge

on employment in rural areas in Kogi State are significant at 1 percent; while the positive impact of household ownership of GSM phone, personal computer and the negative impact of ownership of television are not statistically significant. These results imply that households' ownership of radio, GSM phone, personal computer, Internet MODEM and their ICT knowledge increases their chances of becoming employed. Household ownership of television on the other hand will decrease their chances of becoming employed.

On the basis of the magnitude of the coefficients of the ICT variables, households' ownership of radio appears to have had more positive impact on the probability of becoming employed in the rural areas of Kogi State since it has the highest coefficients (0.2909).

Table 1 also shows the Utilization of ICT Model. The model shows the impact of ICT utilization on employment in rural areas in Kogi State. Holding the vector of household characteristics constant, the coefficients and the associated probabilities of the vector of ICT variables used in the study indicate that with households' use of radio, GSM phone, personal computer, the Internet and ICT knowledge; the probability of a household to become employed increases. These aforementioned ICT variables all have the expected signs. With households' use of television however, the probability of becoming employed decreases since households' use of television has a negative sign. This negative sign may be as a result of the opportunity cost of watching television instead of searching for gainful employment. Also, since both the private and public enterprises rarely advertise vacancies on the television, it becomes very difficult for the unemployed to get a job through the television.

These results imply that households' active usage of radio, GSM phone, personal computer, the Internet and their ICT knowledge increases their chances of becoming employed. And excessive usage of the television will decrease their chances of becoming employed.

On the basis of the magnitude of the coefficients of the ICT variables, households' utilization of radio appears to have had higher positive impact on the probability of becoming employed in the rural areas of Kogi State since it has the highest coefficient (0.6843).

5. Conclusion and recommendations

Access to radio, GSM phone and the Internet; ownership of radio and Internet MODEM; and utilization of radio, personal computer and the Internet; have had a positive and significant impact on employment generation in Kogi State with p-values (< 0.0765). Government and non-governmental organizations should incorporate the establishment of ICT training centres across rural areas in Kogi State in their poverty alleviation programmes, since ICT literacy is important in determining ICT access and usage. These centres would provide the much-needed ICT knowledge to the people in rural areas thereby empowering them to fully utilise the opportunities ICT provides. Establishment of Community Internet Service Centres (CISC) across rural areas in Kogi State to provide easy access to the Internet for the people in rural areas. The cost of such services should be subsidized by the government or development partners.

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