LABOUR PRODUCTIVITY IN AGRICULTURAL SECTOR OF SUB-SAHARA AFRICA (2010 – 2017): A DATA ENVELOPMENT AND PANEL REGRESSION APPROACH

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ABSTRACT

Purpose: This study focused on investigating labour productivity in the agricultural sector of sub-Sahara Africa countries between the periods of 2010 – 2017.

Design/Methodology/Approach: The study adopted descriptive design. The sample size for this research include thirty-seven sub-Sahara African nations. Measuring SSA nation's agricultural productivity in this study was based on input and output factors relating to the labour resource utilization between the periods of 2010 - 2017. Data Envelopment Analysis and panel regression analysis were carried out to examine labour productivity within the set periods.

Findings: The findings from the study suggests that labour productivity in the agricultural sector of Sub-Sahara Africa countries can be improved from its presently low state of productivity. The statistical analysis showed that between the periods of 2010 – 2013, only about 34.9 percent of countries in the region were technically efficient in the utilization of labour resources for productive use. More disturbing was that, from 2014 – 2017, labour productivity dropped to 11.6 percent. Meanwhile, employment of labour in the agricultural sector revealed as low as 1.58 percentage to crop production index in the region. Notably, there is the potential of labour employment to derive as high as 80 percent yield to the Gross Domestic Product of economies in the SSA region.

Practical Implications: Considering the strategic role of labour to the agricultural sector of SSA countries, there must be a stakeholders approach to stimulating the interest of the populace of these countries and getting them actively involved in the agricultural sector. This imply that government, investors, support agencies from developed economies and populace of the SSA nations must support the drive towards agricultural productivity of the SSA nations.

Originality/Value: This study established a research agenda that involved a paradigm shift from the more rampant literature on foreign investments, agricultural research, rural livelihood and well-being, among others to focusing on issues that pertain to labour productivity for sustainable agricultural yields in Sub-Sahara Africa countries. Also, the methodology adopted in the study, such as application of Data Envelopment Analysis and regression analysis to panel data, shows a departure from single units of analysis adopted by existing studies.

***Keywords*:** Labour Productivity, Agricultural Productivity, Poverty Reduction, Sub-Sahara Africa, Data Envelopment Analysis

JEL Classification: M1, M2

1. INTRODUCTION

The increasing rate of poverty and the emergence of food scarcity as a global threat to human survival and quality of life has made the theme of labour productivity a strategic area of focus, especially in developing nations. Labour productivity has been described as a possible economic and social contributor to wellbeing, especially through the involvement of populace in agricultural employment (World Bank, 2012; Nolte & Ostermeier, 2017); coupled with poverty reduction ((Deininger & Xia, 2016; Herrmann, 2017). In sub-Sahara African countries, the critical role of labour productivity cannot be undermined, especially in these times of deep need for increased food production, so as to meet the rising population demand among countries in the region (Conceição, Levine, Lipton, & Warren-Rodríguez, 2016; Kc & Lutz, 2017; Mason-D'Croz, et al 2019). Despite this, existing literature lacks currency in empirical analysis to measure labour productivity in the agricultural sector, especially from a cross-country perspective across the sub-Sahara region. Understanding labour productivity from a cross country perspective can largely guide policy design and cross border economic activities for enhanced regional growth and economic development (Dzanku, 2019).

Moreover, the scientific investigations and understanding of labour productivity in the agricultural sector of sub-Sahara African countries, based on a perspective that enables them to gain insights about benchmarking performance has been an existing methodological gap in the existing literature. Arising from this, two major research questions have been identified by this present study, which will be addressed. First, studies into agricultural transformation in sub-Sahara Africa have focused more attention on issues that pertain to foreign investments, agricultural research, rural livelihood and well-being, among others; thus, alienating discourse on actual labour (manpower) and employment productivity for sustainable agricultural yields in the south of the Sahara (SSA) (Letiche, 2010; Christiaensen, Demery & Kuhl, 2011; Baumgartner, Braun, Abebaw & Muller, 2015; Gautam & Andersen, 2016; Pardey, Andrade, Hurley, Rao & Liebenberg, 2016; Ozturk, 2017).

Second, few found studies on labour productivity issues in the SSA agricultural sector are either conceptual studies or they were carried out in single countries (for example, Frisvold & Ingram 1995; Osabuohien, 2014; Christiaensen, 2017), hence limiting the chances of drawing empirical implications and benchmarking statistical results among these countries for improved productivity. Whereas, adopting a wide spread of countries would improve policy making that reflects a drive for regional prosperity and leveraging on collective strength (Hsiao, 2007). Consequently, this study is focused on addressing these two research agenda by adopting data envelopment analysis and regression analysis upon a pool of panel data. The study is organized as follows. The next section will discuss relevant literature on the development of agriculture in Africa, evaluating the performance of agricultural sectors in the SSA region and discussing agricultural productivity or otherwise in this region. The Third section will highlight the methodology to be adopted for this study, including defining the Data Envelopment Analysis (DEA) approach that will guide the study. In the Fourth section, the empirical analysis and results will be presented to show the agricultural sector productivity results and benchmark activities of nations in the SSA region. This will be followed by sections that will discuss the outcomes from the analysis, deduce theoretical and practical implications that will guide policymakers and researchers, and then the final conclusions will be drawn.

2. LITERATURE REVIEW

2.1. State of Agricultural Sector in SSA

Agriculture plays a strategic role in employment and sustaining livelihood in SSA (Irz et al, 2001; De Janvry & Sadoulet, 2009; Cervantes-Godoy & Dewbre, 2010). The comments from World Bank Reports (2019) also suggest that agriculture was among the sectors that contributed to enhancing the economic outlook of SSA region in 2018. Notwithstanding, Chandio et al, (2016), suggest the government enactment of an innovative agricultural practice that can improve yield and enhance the contribution from the sector to the gross the domestic product (GDP). Similarly, Iganiga and Unemhilin (2011) highlighted government's commitment to adequate budgetary allocation to execute of capital projects in the agricultural sector as a panacea for the sector's contribution to national GDP. These researchers emphasise on adequate support by the government and other institutions, for the agricultural sector across sub- Saharan Africa, especially in areas such as provision of soft and accessible credit facilities for farmers and other practitioners in the agricultural value chain (Fan, Hazell, & Thorat, 2000; Fan & Chan-Kang, 2005). They also remark on the need for the government in sub Saharan Africa to finance and encourage agriculture related research that could facilitate further development and position the sector for better contribution to GDP across in sub Saharan Africa (Yakubu and Akanegbu, 2015; Sertoglu et al, 2017).

Mason-DeCroz et al, (2019) suggest increased and continuous investment in the agricultural sector, as a resilient medium to affectively address the impending danger of food shortage and poverty across the entire continent of Africa. Similarly, David, Di Guessepe and Zezza (2017), note that most African households are predominantly involved in Agricultural practice and earn their living from Agricultural sector, but they caution against the adverse influence of urbanisation on agriculture. Sheahan and Barrett (2017), noted that the attention of relevant stakeholders in the agricultural value chain must be drawn to address this challenges of enhancing a sustainable agricultural development practice across sub- Saharan Africa.

2.2. Factors influencing Labour Productivity in Agricultural development in sub-Saharan Africa

Labour productivity in the agricultural sector can be viewed based on input factors that are utilized by human resources for improved agricultural outputs. Consequently, the following factors are discussed as prominent influencers of labour productivity in the agricultural development of SSA countries.

Access to Electricity

Kuygusuz (2011), relishes power supply in the rural location as a key factor required for agricultural development and productivity. Therefore, the strive to achieve a sustainable agricultural development in SSA requires consultation with the stakeholders who can facilitate a process of enhancing the provision of the needed logistics, such as power energy. According to Ufua, Papdopoulos & Midgley (2018), effective consultation and involvement of the affected stakeholders can address the challenge conflicts that could hinder the design and implementation of programme on the subject of agricultural development in the SSA region. Whilst they note that stakeholders' consultation could be time consuming, they argue that solution/s advanced from the process could provide the needed platform/s for cooperation and commitment to the provision of basic facilities such as power supply, required to facilitate

agricultural development process in sub-Saharan African (Ikelebe, 2005; Shackleton, Le Maitre, & Richardson, 2015; Warner, 2016; Ibidunni et al, 2017; Osabhuohien, Efobi, Hermann & Gitau, 2019; Ufua and Adebayo, 2019; Ufua, Olokundun, Ogbari, & Atolagbe, 2019).

Land under Cereal

Understanding more effective methods for cultivating available fertile land can expose African agriculturalists and stakeholders to emerging models and more competence, and thus could yield greater productivities (Ibeanu, 2000; Okonjo-Iweala & Osafo-Kwaako, 2007; Falola, Salau, Olokundun, Oyafunke-Omoniyi, Ibidunni, & Oludayo, 2018; Ntihiyurwa, et al, 2019). Land engaged for cereal production are strategic to SSA countries because cereal account for a large portion of food consumption in the region (Hadebe, Modi & Mabhaudhi, 2015). Most commongly consumed cereal crops include rice, maize, wheat, barley, oats, millet, mixed grains, sorghum and buckwheat.

Employment in Agriculture

Employment in the agricultural sector of SSA countries have been identified as a strategic factor for promoting productivity in the sector and engaging the human resource in the region for effective use (Losch, 2012; Amjath-Babu et al, 2016; Connolly- Boutin & Smith,2016). According to Fox and Thomas (2016), the dwindling employment in SSA can be traced to two major factors, namely the slow transition in demographics among the populace in the region and the sluggish development of a contemporary export-oriented and large scale agricultural market in the region. Therefore, it has been recommended that local authorities emphasise policies and programmes that support cultivation in the areas where agricultural labour productivity in promising (Binns & Lynch, 1999; Yakubu & Akanegbu, 2015; Henderson…& Herrero, 2016; Dorosh & Thurlow, 2018). Also, Chakeredza et al (2008) opined that the human labour required for employment in the modern SSA agricultural sector must be competent with the use of information technology infrastructure, possess soft skills that enhance yields in the sector and are able to relate with locals in both rural and urban setting of the sector (Benin, 2016; Sheahan & Barrett, 2017). Thurlow, Dorosh & Davis (2019) equally suggest that agricultural productivity requires policies that align employment in agriculture both on farms and along the entire value chain that cut across the rural and urban regions of the SSA to ensure sectoral sustainability. Consequently, this study deals with employment in agriculture as a veritable factor in the agricultural development goal of SSA countries.

Agricultural Land

Agricultural land in SSA is generally fed by the rain at up to ninety-six percent (Boateng et al, 2019). Notwithstanding, huge farming activities and the inadequate investments in sustaining quality of soil serve as major threats to productivity in the sector (Morris, 2007). Researchers (e.g., Headey & Jayne, 2014; Chimhowu, 2019), realise that the land use tradition in sub Saharan African has assumed a departure from the tradition of restriction to a more liberalised access, which has also facilitated productivity and overall Agricultural development across the region. Kareem (2018) recognises availability of arable lands as a key factor required for agricultural advancement in sub Saharan Africa. He equally craves for government support as importance factors enhancing investment in the agricultural sector. For instance, Muraoka et al, (2018), note that land use practices such as the land rental system in Kenya need re-orientation to enable further support to food security drive in Kenyan economy. This similar to Yu et al, (2019), who suggest government enactment of suitable policies to monitor land use in countries in order to have availability of arable land for agricultural cultivation, which is fundamental to addressing critical issues such as food security. Sahle and Yeshitela (2018) recommend integrated planning process based on relevant information to have effective land use and preservation of related natural resources. Such could enhance competency among agricultural practitioners as well as provide the leverage for positive effects such as employment generation and improved living standards (Cotula & Vermeulen, 2009; Moses, Olokundun, Akinbode, Agboola, & Inelo, 2016; Stephen, Ayodele, & Oluremi, 2017; Thirtle, *et al*.2003; Akudugu, 2016; Ibidunni & Ogunike, 2017; Lawry, Samii, Hall, Leopold, Hornby, & Mtero, 2017; Moses, Olokundun, & Mosunmola, 2014).

2.3. Agricultural Labour Productivity Using Data Envelopment Analysis

Data envelopment analysis is the most popular method of measuring efficiency of production/service units (Siti & Umi, 2017). Investigations into technical efficiency of labour, have been examined in previous studies (for example, Deprins, Simar & Tulkens, 2006; Nazarko, J. & Chodakowska, 2017). Labour productivity for enhanced agricultural production is hall marked upon a collection of factors that are related to and can influence increased agricultural outputs for economic buoyancy (Stanojević, Krstić & Đekić, 2015). In the literature, labour productivity is captured through human resources (that is, number of employees), capital expenditure and employees at the management cadre (Susilo, 2013); amount of used capital per worker, size of farms, level of crop intensification and circulating capital, social capital, infrastructure and research & development (Polyzos, S. & Arabatzis, 2006); employment in agriculture and land area (Djido & Shiferaw, 2018). Generally, the approaches followed in previous DEA studies, examines labour productivity from a view point that takes account of factors that are relevant to the use of labour as a productive resource in the agriculture sector, and could relate with macro-economic variables such as Gross Domestic Product (GDP) and production index (Stanojević, Krstić & Đekić, 2015). Consequently, this study's DEA approach adopts the multi-factor analysis input and output perspectives of measuring labour productivity across SSA countries. The input factors include: agricultural

land disposable to agricultural labour force, agricultural labour employment, labour accessibility of electricity and land for cereal cultivation on the level of crop production. The output factors used include: crop production index and contribution to GDP.

3. METHODOLOGY

The research study is descriptive in nature. The use of descriptive research design is validated by the fact that populations for the study is already established, theories are not newly explored or determined and the research study simply attempts to describe the relationships among the variables included in the research (Jong & van der Voordt, 2002). The sample size for this research include thirty-seven Sub-Sahara African nations. Agricultural sector are selected as the basic unit of analysis for this study because of their strategic role in contributing significantly to the GDP of Sub-Sahara African nations and their potentials of accounting for a large percentage of employment within the region (OECD-FAO, 2016). Consequently, investigating on measures that can improve agricultural resource productivity and relevant policies that can achieve this objective in the SSA nations will yet reposition the region for better economic performance. Hence, measuring SSA nation's agricultural productivity in this study was based on input and output factors relating to the resource utilization within a five-year period of 2010 - 2017. Specifically, the input and output factors that were determined for this study were as guided by existing studies, such as Barton and Cooper (1948) and Nsiah and Fayissa (2017). The inputs factors used include: agricultural land disposable to agricultural labour force, agricultural labour employment, and labour accessibility of electricity and land for cereal cultivation on the level of crop production. On the other hand, the output factors used include: crop production index and contribution to GDP. The selection of these factors were also influenced by the availability of data from the SSA countries within the period of 2010 – 2017. The data were gathered from The World Bank, World Development Indicators (2017). The study adopted Data Envelopment Analysis (DEA) and Regression analysis as statistical measures. DEA was used to analyse the efficiencies of labour related factors in the agricultural sector of the SSA countries. This was with a view of identifying (i)technically efficient nations that could serve as benchmarks for other less technically efficient nations (ii) how SSA nations, through trend analysis, are performing in terms of agricultural productivity and what further actions could be taken to improve the sector. The regression model however, shed light on the specific labour related factors that are contributing to agricultural performance (in terms of outputs) among the SSA countries. It showed the long run variation effects of each of the explanatory variables on crop production index and GDP. This approach is quite different from an incremental approach of a two-stage DEA. However, it is very significant to have such view of the agricultural sector of SSA considering the need to provide viable contributions in the area of recent policies that can enhance agricultural labour productivity in the region (Johnson & Kuosmanen, 2012).

3.1. Data Envelopment Analysis Model Specifications

In the dual form, the DEA model is of the form:

Objective function Max $\theta_0 \lambda_o$

Subject to:

$$\sum_{n=1}^{n} y_{nj} \lambda_n \geq y_{oj} \qquad \text{(Output Constraint)}$$

$$(j=1,2,\ldots m.)$$

$$\theta_0 X_{oj} \geq \sum_{n-1}^{n} X_{ni}\lambda_n \qquad \text{(Input Consttraint)} \quad (i=1,2,...N)$$

$$\sum_{n=1}^{n} \lambda_n \leq 1 \qquad \text{(Scale Constraint)}$$

$$\lambda_n \geq 0 \qquad \text{(Non-negativity Constraints)} \quad (n=1,2...N)$$

The Scale Constraint is adjusted according to the assumption required for the study. A VRS frontier (Banker, et al, 1984; the BCC Model) is obtained by substituting the Scale Constraint of the linear programme $\sum_{j=1}^{n} \lambda_j = 1$

3.2. Regression Model Specifications

The general form of the panel data analysis model is specified as:

$Y_{it} = f(X_1, X_2, X_3 \ldots, X_n)$

$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + e_{it}$ .....(1)

Where:

Y_{it} = dependent variable (firm performance measures)

β_0= constant

β = is the coefficient of the explanatory variables

F_{it} = explanatory variables

e_{it} = error term (assumed to have zero mean and independent across time period)

Perf(CPI, CGDP) = f (ALD, EMAG, LUC, AET)……..……(2)

The regression model for the empirical analysis is given below:

$CPI_{it} = ß_0 + ß_1 ALD_{it} + ß_2 EMAG_{it} + ß_3 LUC_{it} + ß_4 AET_{it} + e_{it}$ .....(3)

$CGDP_{it} = \alpha_0 + \alpha_1 ALD_{it} + \alpha_2 EMAG_{it} + \alpha_3 LUC_{it} + \alpha_4 AET_{it} + e_{it}$ .....(4)

3.3 Measurement of Variables

Dependent variable, Measured as:

***CPIit*:** Crop Production Index for Country i in time t.

***CGDPit*:** Contribution to GDP for Country i in time t.

Independent Variables, Measured as:

ALDit: Agricultural Land (in hectares) for Country i in time t.

EMAGit: Employment in Agriculture for Country i in time t.

LUCit: Land Under Ceareal for Country i in time t.

***AETit*:** Access to Electricity for Country i in time t.

4. ANALYSIS AND RESULTS

The results presented in this study reflects statistical outputs from the DEA and Panel regression analysis.

4.1. DEA Results

Data envelopment analysis has the capacity to determine benchmark scores for all relevant Decision Making Units (DMUs) engaged in a study. In order to guide how resources should be utilized in by the agricultural sector of each DMU, the DEA frontier model provides a benchmark which displays certain other DMU's which others can pattern their operations after, in other to enhance operational performance and resource productivity. According to the DEA model, scale inefficient agriculture producing countries in SSA, also referred to as decision making units, can benchmark their operations against that of more operationally efficient countries by simply observing the benchmark tables provided. The DEA results (see appendix) contains the efficiency scores of agricultural productivity of SSA countries, benchmarks analysis of these SSA countries and the number of other SSA countries that they can benchmark against.

Data envelopment analysis as a tool for productivity performance management, both of firms and nations, helps policy makers to take decisions the right set of resource combinations that can achieve higher yields for their institutions. As depicted in the DEA tables (see appendix), technical efficiency scores and benchmark scores of labour productivity in Sub-Sahara Africa countries are as presented. A total of 37 decision making units were included in the study. Countries like Senegal, Zambia and Zimbabwe were deleted from the final list of countries included in the analysis because of lack of available data for the period which this study covered. Among the countries used for this study, the above labour productivity table shows that only 15 countries (representing 34.9 percent) were technically efficient in their utilization of agricultural labour resources, within the period of 2010 - 2013. Meanwhile, between the periods of 2014 – 2017, there was a drastic fall in the number of countries that were technically efficient with agricultural labour resources. Within this period, only 5 countries (representing 11.6 percent) were technical efficient. This statistical results indicates that SSA countries have largely been very inefficient, especially in more recent years, concerning the utilization of labour resources to achieve robust productivity in their agricultural sector.

4.2. Regression Results

This present study explored the contributory effect of agricultural land disposable to agricultural labour force, agricultural labour employment, and labour accessibility of electricity and land for cereal cultivation on the level of crop production among the Sub-Saharan African countries.

Table 1. Agricultural Labour Employment and Productivity

CPI	**Coefficient**	**Std. Error**	**Z-statistic**	**Probability**
CPI				
LI	0.035	0.129	0.270	0.785
ALD	4.696	1.570	2.990	0.003

EMAG	-1.581	0.509	-3.110	0.002
LUC	16.874	5.449	3.100	0.002
AET	1.242	0.325	3.820	0.000
Constant	-287.861	111.350	-2.450	0.014

Sargan test of over identification restrictions: Chi^2 (9) =38.92274; Prob. > Chi^2=0.0000
Wald Chi^2 (5) = 69.73; Probability >chi^2 =0.0000

Source; Researcher's computation with STATA

The result of the empirical evidences in Table 1 shows the estimated model result for agricultural labour employment and crop production among Sub-Saharan countries. Evidently the Wald chi^2 statistic (69.73: Probability value<0.01) indicates the model overall statistical significance at 1 percent significance level. The Sargan over identification restriction test (Chi^2 (9) =38.92274; Prob. > Chi^2=0.0000) rejects the null hypothesis of valid over identification restrictions. This implies that the model is exactly identified. The result of the model indicates that crop production index has no significant lag effect on its current value. Notably all the exogenous variables revealed a more than proportionate effect on crop production as an outcome variable of agricultural labour employment.

More evidence from the result indicates a significant positive relations between agricultural land cultivated by agricultural labour force and crop production. Apparently, a percentage increase in agricultural land usage by agricultural labour increased crop production by 4.70 percent holding other factors at constant. This shows that increases in agricultural land utilization by agricultural labour would significantly enhance crop production among the Sub-Saharan countries. Thus accessibility of more land for agricultural activities plays an important role in determination of the level of crop production especially among the Sub-Saharan African economies.

However, the level of agricultural labour employment appears not to be supportive enough for a high level of crop production among the Sub-Saharan countries. As a matter of fact, the result of the parameter estimate of employment in agriculture reveals a retarded impact of 1.58 percent within the period considered in this study. This could be further explained by the low skilled characteristics of agricultural labour predominant among these economies who mostly are peasant rural farmers. The result further suggests the need for concerted effort in the development and empowerment of agricultural labour force by the respective governments' of these African countries.

It is obvious from this study result that land under cereals exhibits a significant direct relationship with the volume of crop produced among the Sub-Saharan economies. A deeper analysis of the result provides evidence in support of the fact that increases in land under cereals (16.87) accounted for the highest contributory effect on crop production. This implies that the more access to land for cereals cultivation by agricultural labour the higher volume of crop production particularly among the Sub-Saharan countries. Hence, in magnitude and direction the level of agricultural labour engagement in land utilization for cereal production accounted for the most positive determinant of crop production among these African economies.

Interestingly, access to electricity by agricultural labour shows a significant positive effect on crop production. Specifically, a percentage increase in accessibility of electricity by agricultural labour increases crop production by 1.24 percentage, all things being equal. This suggests that the more agricultural labour force have access to electricity in the execution of their agricultural activities, the higher the level of crop produced within these countries.

This study further tried to empirically ascertain the nature of the relationship between agricultural land utilization by agricultural labour, labour employment in agriculture, and land cultivation under cereals, agricultural labour accessibility of electricity and percentage of the contribution of crop production among the Sub-Saharan African economies.

Table 2. Agricultural Labour Employment and Crop contribution to GDP

CPGDP	**Coefficient**	**Std. Error**	**Z-statistic**	**Probability**
CPGDP				
LI	-0.079	0.068	-1.160	0.245
ALD	1.153	1.188	0.970	0.332
EMAG	0.799	0.357	2.240	0.025
LUC	3.530	4.412	0.800	0.424
AET	0.494	0.231	2.14	0.033
Constant	-143.422	88.141	-1.630	0.104

Sargan test of over identification restrictions: Chi^2 (9) =20.91557; Prob. > Chi^2=0.0130
Wald Chi^2 (5) = 11.15; Probability >chi^2 =0.0484

Source; Researcher's computation with STATA

The global statistical (Wald Chi^2 (5) =11.150; Probability value<0.05) attests to the estimated model significance at 5 percent level of significance. The over identification restriction test Sargan statistic (Chi^2 (9) =20.91557; Prob. > Chi^2=0.0130) implies the rejection of the null hypothesis of valid over identification restrictions, indicating that the model is exactly identified.

Notably, there appears no significant effect of previous years' crop proportion of gross domestic product (GDP) on its current value among these countries. Further evidence from the result shows that agricultural land accessed by agricultural labour force and the land under cereal portray a positive relationship with crop GDP but not significant as expected. This suggests the need to make more lands available for agricultural and particularly for cereal cultivation since this portends a positive prospect for improving the contribution of agricultural crop to the country's economic growth.

Precisely, increases in agricultural labour employment indicates a corresponding increase in the crop contribution to economic growth among the sub-Saharan African economies. A percentage rise in labour employment indicates a 0.80 percent increase in crop proportion of GDP among these countries. This implies that increase in agricultural labour employment could serve a significant factor that can be used to facilitate economic growth of Sub-Saharan economies. Hence these SSA economies have potentials of improving their economic performance through efficient and effective utilisation of labour employment in their agricultural sector of the respective economies.

Detailed analysis of the result shows that access to electricity by the agricultural labour force was positively and significantly related to crop contribution to economic growth of these economies. This implies that increases in utilization of electricity in the production and processing of agricultural commodities by agricultural labour force with consequently account for improvement in the growth of Sub-Saharan African economies. Particularly, a percentage

increase in electricity accessibility and utilization by agricultural labour accounts for 0.50 percent contribution of crop to the country's economic growth.

5. DISCUSSION

This study adopted the combine advantage of Data Envelopment Analysis and Panel regression analysis to examine agricultural labour productivity among SSA countries, based on data collected from the World Bank between the periods of 2010 – 2017. The results from the dual analysis, points to the fact that agricultural labour must be given priority by the governments of nations in the sub-Sahara Africa region. The Data Envelopment Analysis showed that between the periods of 2010 – 2013, only about 34.9 percent of countries in the region were technically efficient in the utilization of agricultural labour resources for productive use. More disturbing was that, from 2014 – 2017, labour productivity drooped to 11.6 percent. Therefore, evidences are that there is continuously a huge downward shift in labour resource engagement for agricultural productivity in the SSA region. Results from the regression analysis, did not present any significantly different view. In this regards, contribution of labour employment in the agricultural sector revealed as low as 1.58 percentage decline in crop production index in the region. Meanwhile, there is the potential of labour employment to derive as high as 80 percent crop yield to the Gross Domestic Product of economies in the SSA region.

The results from these various analysis, largely explain the reasons for the growing level of poverty and shortage in food supply in Sub-Sahara Africa countries. Generally, agricultural labour is considered to be pivotal to the success of any production unit, both at the micro and macro level of analysis (Nolte & Ostermeier, 2017; Ibidunni *et al*, 2018). It therefore, holds that for agricultural production to yield more significant outcomes, based on this present study, government in the SSA region must pay attention to efficient and effective utilisation of labour employment in the agricultural sector of the respective economies.

Perhaps, a major challenge faced by this economy, is the unwillingness of youths and female populace to get involved with agricultural activities (Palacios-Lopez *et al*, 2017; Dzanku, 2019). Their unwillingness might also be associated with the fact that government have only shown little concern toward the development of the agricultural sector, especially through unfunded agricultural activities, insufficient provisions of fertilizers to help agricultural yields and less emphasise on the role of agricultural as a major production unit of the economy (Izuchukwu, 2011; Ibidunni *et al*, 2017; Abiodun *et al*, 2018; Ibidunni *et al*, 2019). Consequently, the results from the analyses shows the need for a concerted effort in the development and empowerment of agricultural labour force by the respective governments' of these African countries. More so, government holds the responsibility of building a perception, on the minds of youths, to conceive agricultural activities as high lucrative a dignified career paths that could ensure economic freedom both to the nation and individuals.

Also, the result from regression analysis demonstrated the need for government and policy makers to emphasise policy issues relating to agricultural land, employment in agriculture, land under cereal and access to electricity as critical to enhancing GDP and crop production index. This finding is consistent with existing studies such as Union (2006); Kuygusuz (2011); Headey & Jayne (2014); McCullough (2015); Chandio et al, (2016); Diao, McMillan and Wangwe (2017); Chimhowu (2019). The approach taken in this research reflects the fact that labour and related resources which are engaged by agricultural workers must be duly attended to for countries in the SSA region to experience improved agricultural productivity.

On a final note, developing labour productivity in the agricultural sector of SSA economies must take on a stakeholders approach (Fan, Hazell, & Thorat, 2000; Fan & Chan-Kang, 2005; Shackleton, Le Maitre, & Richardson, 2015; Warner, 2016; Ibidunni et al, 2017; Osabhuohien, Efobi, Hermann & Gitau, 2019). This imply that government, investors, support agencies from developed economies and populace of the SSA nations should be ready and willing to take their toll of responsibilities that ensure advancement of the sector.

6. IMPLICATION

This study focused on investigating labour productivity in the agricultural sector of Sub-Sahara Africa countries between the periods of 2010 – 2017. Data Envelopment Analysis and regression analysis were carried out to examine labour productivity within the set periods. Based on the statistical finding, the following practical and theoretical implications were drawn.

6.1. Practical Implication

Considering the strategic role of labour to the agricultural sector of SSA countries, there must be a stakeholders approach to stimulating the interest of the populace of these countries and getting them actively involved in the agricultural sector. This imply that government, investors, support agencies from developed economies and populace of the SSA nations must support the drive towards agricultural productivity of the SSA nations. More fundamental is the fact that Governments of the SSA countries must establish policies and ensure adequate support mechanisms that make the agricultural sector more attractive and decent. In this sense, funding of the agricultural sector must be prioritized; agricultural activity must be encouraged not only in rural areas, with subsistent efforts, but it must become large scale. More so, labour productivity will greatly increase where agricultural is perceived across youth and gender categories as a promising economic activity.

6.2. Theoretical/Research Implication

This study established a research agenda that involved a paradigm shift from the more rampant literature on foreign investments, agricultural research, rural livelihood and well-being, among others to focusing on issues that pertain to labour productivity for sustainable agricultural yields in Sub-Sahara Africa countries. Also, the methodology adopted in the study, such as application of Data Envelopment Analysis and regression analysis to panel data, shows a departure from single units of analysis adopted by existing studies. This approach adopted in the present study has further enhanced the chances of drawing empirical implications and benchmarking statistical results among these countries for improved productivity.

7. CONCLUSION AND RECOMMENDATION

The study concludes that labour productivity in the agricultural sector of Sub-Sahara Africa countries can be greatly improved, given the right government policies and implementing support plans for employees in the agricultural sector. Consequently, it is recommended that there must be a stakeholders approach to stimulating the interest of the populace of these countries and getting them actively involved in the agricultural sector. Also, governments in the SSA countries must prioritize funding of the agricultural sector; agricultural activity must be encouraged not only in rural areas, with subsistent efforts, but it must become large scale. Evidently, agricultural labour suggests the most significant positive effect on crop contribution

to gross domestic product among the sub-Saharan economies. Hence, there is need for the Government of these African countries to explore the inherent potentials from agricultural employment in achieving a sustainable economic growth. Apparently, in terms of productivity, evidence from the study shows a diminishing effect of agricultural employment on the performance of the agricultural sector. It is pertinent that concerted effort be put in place for adequate development of agricultural Labour particularly in Sub-Saharan African region. This will not only improve the productivity of the sector but will enhance the sector's capacity for large scale production and foreign trade in agriculture for the African countries.

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APPENDIX

Table 1a: Technical Efficiency Scores and Benchmark of SSA Country's Labour Productivity in Agricultural Sector (2010-2013)

		2010		2011		2012		2013	
NO	**DMU**	**Score**	**Benchmark**	**Score**	**Benchmark**	**Score**	**Benchmark**	**Score**	**Benchmark**
1	Angola	0.820718	Guinea(0.136881); Lesotho(0.135508); Mauritania(0.134324); Namibia(0.556083)	0.710166	Guinea(0.181087); Lesotho(0.031337); Namibia(0.760584)	0.932944	Guinea(0.236101); Namibia(0.730549); Zimbabwe(0.033350)	1	Angola(1.000000)
2	Burundi	1	Burundi(1.000000)	1	Burundi(1.000000)	1	Burundi(1.000000)	1	Burundi(1.000000)
3	Benin	0.839845	Burundi(0.737377); Erithrea(0.262623)	1	Benin(1.000000)	1	Benin(1.000000)	1	Benin(1.000000)
4	Burkina Faso	1	Burkina Faso(1.000000)	1	Burkina Faso(1.000000)	1	Burkina Faso(1.000000)	1	Burkina Faso(1.000000)
5	Botswana	0.88844	Erithrea(0.125494); Lesotho(0.514972); Mozambique(0.024041)	0.864583	Lesotho(0.255820); Namibia(0.407978)	0.899699	Lesotho(0.256658); Namibia(0.155064); Togo(0.588278)	0.840653	Lesotho(0.314143); Namibia(0.350752)
6	Central African Republic	0.687497	Erithrea(0.553606); Lesotho(0.000137); Mozambique(0.031674); Mauritania(0.231358); Namibia(0.183224)	0.741075	Ethiopia(0.305664); Malawi(0.007069); Namibia(0.520282); Nigeria(0.084609)	0.777527	Congo, Dem. Rep.(0.131849); Guinea(0.038067); Namibia(0.529265); Nigeria(0.110623); Togo(0.190196)	0.710776	Congo, Dem. Rep.(0.050152); Namibia(0.504895) ; Nigeria(0.021905)
7	Cote d'Ivoire	0.93027	Congo, Dem. Rep.(0.743371); Zimbabwe(0.253082)	0.84212	Congo, Dem. Rep.(0.768506); Zimbabwe(0.227972)	0.78177	Congo, Dem. Rep.(0.769696); Zimbabwe(0.230304)	0.757316	Congo, Dem. Rep.(0.822284); Zimbabwe(0.177716)
8	Cameroon	0.575074	Mauritania(1.000000)	0.654801	Lesotho(0.561590); Namibia(0.289153)	0.625155	Mauritania(0.904714); Togo(0.095286)	0.582233	Lesotho(0.113454); Mauritania(0.835835)
9	Congo, Dem. Rep.	1	Congo, Dem. Rep.(1.000000)	1	Congo, Dem. Rep.(1.000000)	1	Congo, Dem. Rep.(1.000000)	1	Congo, Dem. Rep.(1.000000)

10	Congo, Rep.	1	Congo, Rep.(1.000000)	1	Congo, Rep.(1.000000)	1	Congo, Rep.(1.000000)	0.891123	Congo, Dem. Rep.(0.993627); Malawi(0.006311);
11	Djibouti	0.905369	Burkina Faso(0.294573); Guinea-Bissau(0.023491); Mauritania(0.513994); Namibia(0.167942)	0.966253	Burkina Faso(0.075516); Mauritania(0.714425); Namibia(0.210059)	1	Djibouti(1.000000)	1	Djibouti(1.000000)
12	Erithrea	1	Erithrea(1.000000)	1	Erithrea(1.000000)	1	Erithrea(1.000000)	1	Erithrea(1.000000)
13	Ethiopia	0.85099	Erithrea(0.765166); Mauritania(0.135996); Namibia(0.098838)	1	Ethiopia(1.000000)	1	Ethiopia(1.000000)	1	Ethiopia(1.000000)
14	Gabon	0.741973	Erithrea(0.166461); Lesotho(0.674850); Mozambique(0.016531)	0.748504	Lesotho(0.376857); Namibia(0.482480)	0.741773	Lesotho(0.370030); Namibia(0.383606); Togo(0.246365)	0.714666	Lesotho(0.416975); Namibia(0.443117)
15	Ghana	1	Ghana(1.000000)	1	Ghana(1.000000)	1	Ghana(1.000000)	1	Ghana(1.000000)
16	Guinea	1	Guinea(1.000000)	1	Guinea(1.000000)	1	Guinea(1.000000)	1	Guinea(1.000000)
17	Gambia, The	1	Gambia, The(1.000000)	1	Gambia, The(1.000000)	1	Gambia, The(1.000000)	1	Gambia, The(1.000000)
18	Guinea-Bissau	1	Guinea-Bissau(1.000000)	1	Guinea-Bissau(1.000000)	1	Guinea-Bissau(1.000000)	1	Guinea-Bissau(1.000000)
19	Equatorial Guinea	0.718162	Erithrea(0.173789); Guinea(0.147669); Mozambique(0.563961)	0.81	Namibia(0.131031)	0.795736	Congo, Dem. Rep.(0.600416); Namibia(0.079400); Togo(0.320184)	0.772453	Guinea(0.031820)
20	Kenya	0.808615	Bangladesh(0.062703); Erithrea(0.058017); Lesotho(0.008673); Malawi(0.722045); Namibia(0.148562)	0.810676	Guinea-Bissau(0.234514); Lesotho(0.123576); Mauritania(0.093048); Malawi(0.545814); Namibia(0.003048)	0.825151	Ethiopia(0.004508); Ghana(0.011694); Guinea-Bissau(0.127449); Mauritania(0.010133); Malawi(0.682816); Namibia(0.163400)	0.724271	Bangladesh(0.189373); Guinea-Bissau(0.146662); Lesotho(0.061507); Mauritania(0.090493); Namibia(0.013981)

21	Liberia	0.791254	Erithrea(0.328623); Mauritania(0.276627); Namibia(0.394750)	0.858294	Namibia(0.737530)	0.886067	Mauritania(0.197296); Namibia(0.678912); Togo(0.123793)	0.844612	Mauritania(0.368849); Namibia(0.631151)
22	Lesotho	1	Lesotho(1.000000)	1	Lesotho(1.000000)	1	Lesotho(1.000000)	1	Lesotho(1.000000)
23	Madagascar	1	Madagascar(1.000000)	1	Madagascar(1.000000)	1	Madagascar(1.000000)	1	Madagascar(1.000000)
24	Mali	0.690495	Erithrea(0.377082); Guinea(0.293762)	0.740149	Guinea(0.141637); Namibia(0.010140); Nigeria(0.248623)	0.842802	Guinea(0.200957); Namibia(0.095592); Nigeria(0.397222); Togo(0.306229)	0.645045	Guinea(0.175307); Namibia(0.170633); Nigeria(0.290532)
25	Mozambique	1	Mozambique(1.000000)	0.678181	Namibia(0.559397)	0.794858	Congo, Dem. Rep.(0.223731); Namibia(0.580633); Togo(0.195636)	0.693638	Namibia(0.683413)
26	Mauritania	1	Mauritania(1.000000)	1	Mauritania(1.000000)	1	Mauritania(1.000000)	1	Mauritania(1.000000)
27	Mauritius	0.85672	Erithrea(0.446760); Guinea-Bissau(0.311302); Nigeria(0.241938)	0.771606	Guinea-Bissau(0.148957); Namibia(0.382552); Nigeria(0.468491)	0.770938	Namibia(0.536128); Nigeria(0.445994); Togo(0.017878)	0.690593	Namibia(0.610197); Nigeria(0.371739)
28	Malawi	1	Malawi(1.000000)	1	Malawi(1.000000)	1	Malawi(1.000000)	1	Malawi(1.000000)
29	Namibia	1	Namibia(1.000000)	1	Namibia(1.000000)	1	Namibia(1.000000)	1	Namibia(1.000000)
30	Niger	0.635676	Erithrea(0.205614); Lesotho(0.324960); Mauritania(0.469426)	0.501539	Lesotho(0.314648); Malawi(0.557772)	0.638056	Lesotho(0.211949); Malawi(0.500772); Togo(0.287279)	0.582217	Lesotho(0.389169)
31	Nigeria	1	Nigeria(1.000000)	1	Nigeria(1.000000)	1	Nigeria(1.000000)	1	Nigeria(1.000000)
32	Sierra Leone	0.677569	Erithrea(0.207515); Mauritania(0.465119)	0.651257	Namibia(0.462355)	0.70788	Mauritania(0.031422); Namibia(0.331941); Togo(0.636637)	0.651228	Mauritania(0.222206); Namibia(0.357942)
33	Somalia	0.677515	Erithrea(0.207156); Mauritania(0.464950)	0.651201	Namibia(0.462039)	0.707834	Mauritania(0.031545); Namibia(0.331439); Togo(0.637016)	0.65116	Mauritania(0.222353); Namibia(0.357496)

34	Togo	0.962949	Erithrea(0.011247); Guinea(0.020612); Lesotho(0.403974); Mauritania(0.060827)	0.976758	Lesotho(0.170225); Malawi(0.022787); Namibia(0.262115)	1	Togo(1.000000)	0.843037	Lesotho(0.076155); Namibia(0.399702)
35	Tanzania	0.578809	Bangladesh(0.127942); Erithrea(0.151163); Guinea-Bissau(0.062943); Mauritania(0.119003); Namibia(0.538949)	0.54306	Congo, Dem. Rep.(0.001654); Guinea-Bissau(0.072124); Malawi(0.177373); Namibia(0.748849)	0.515396	Burkina Faso(0.081789); Djibouti(0.000029); Namibia(0.918182)	0.531017	Namibia(1.000000)
36	Uganda	0.585049	Erithrea(0.173425); Lesotho(0.561830); Mauritania(0.103425)	0.550998	Lesotho(0.156815); Malawi(0.120588); Namibia(0.530961)	0.607811	Lesotho(0.139955); Malawi(0.176763); Namibia(0.407164); Togo(0.276117)	0.539865	Lesotho(0.286076); Namibia(0.408488)
37	South Africa	0.605983	Erithrea(0.532928); Mauritania(0.140351); Namibia(0.326721)	0.697532	Namibia(0.408733)	0.695436	Namibia(0.632927)	0.733596	Namibia(0.762919)

Table 1b: Technical Efficiency Scores and Benchmark of SSA Country's Labour Productivity in Agricultural Sector (2014-2017)

		2014		2015		2016		2017	
NO	**DMU**	**Score**	**Benchmark**	**Score**	**Benchmark**	**Score**	**Benchmark**	**Score**	**Benchmark**
1	Angola	1	Angola(1.000000)	1	Angola(1.000000)	1	Angola(1.000000)	0.901312	Zambia(0.252406)
2	Burundi	1	Burundi(1.000000)	1	Burundi(1.000000)	1	Burundi(1.000000)	0	
3	Benin	1	Benin(1.000000)	0.989863	Burundi(0.898745); Congo, Dem. Rep.(0.099160); Gambia, The(0.002095)	1	Benin(1.000000)	0.908153	Gambia, The(0.143528); Zambia(0.856472)
4	Burkina Faso	1	Burkina Faso(1.000000)	1	Burkina Faso(1.000000)	1	Burkina Faso(1.000000)	0.657339	Namibia(1.000000)

5	Botswana	0.899482	Namibia(0.512478)	0.93813	Namibia(0.369399)	0.903909	Mauritania(0.199282); Namibia(0.662378)	0.253379	Namibia(1.000000)
6	Central African Republic	0.749802	Namibia(0.466740)	0.782954	Namibia(0.230489)	0.713262	Angola(0.032143); Congo, Dem. Rep.(0.273267); Madagascar(0.000276) ; Namibia(0.479115)	0.408738	Namibia(0.461549)
7	Cote d'Ivoire	0.709423	Congo, Dem. Rep.(0.848426); Zimbabwe(0.151574)	0.687684	Congo, Dem. Rep.(0.874823); Zimbabwe(0.125177)	0.688981	Congo, Dem. Rep.(0.901468); Zimbabwe(0.098532)	0	
8	Cameroon	0.609764	Bangladesh(0.190590); Mauritania(0.809410)	0.517944	Lesotho(0.031179); Mauritania(0.968821)	0.465316	Mauritania(0.950478); Namibia(0.049522)	0.329922	Namibia(1.000000)
9	Congo, Dem. Rep.	1	Congo, Dem. Rep.(1.000000)	1	Congo, Dem. Rep.(1.000000)	1	Congo, Dem. Rep.(1.000000)	0.090954	Erithrea(0.556106); Namibia(0.243192); Zambia(0.200701)
10	Congo, Rep.	0.911586	Congo, Dem. Rep.(0.993626); Malawi(0.006318)	0.984503	Burundi(0.000190); Congo, Dem. Rep.(0.993424); Malawi(0.006386)	1	Congo, Rep.(1.000000)	0.058575	Erithrea(0.364579); Gambia, The(0.488067); Namibia(0.147354)
11	Djibouti	1	Djibouti(1.000000)	0.976339	Ghana(0.035312); Mauritania(0.608088); Namibia(0.136499); Nigeria(0.014725)	0.851402	Erithrea(0.001924); Ethiopia(0.018030); Mauritania(0.733647); Namibia(0.203642); Nigeria(0.042757)	0.565911	Namibia(1.000000)
12	Erithrea	1	Erithrea(1.000000)	1	Erithrea(1.000000)	1	Erithrea(1.000000)	1	Erithrea(1.000000)
13	Ethiopia	1	Ethiopia(1.000000)	1	Ethiopia(1.000000)	1	Ethiopia(1.000000)	0.389919	Namibia(0.124214)
14	Gabon	0.726143	Namibia(0.814887	0.747164	Namibia(0.795328)	0.663182	Mauritania(0.145280); Namibia(0.854720)	0.268713	Namibia(1.000000)
15	Ghana	1	Ghana(1.000000)	1	Ghana(1.000000)	1	Ghana(1.000000)	0.761308	Namibia(0.005716)
16	Guinea	1	Guinea(1.000000)	1	Guinea(1.000000)	1	Guinea(1.000000)	0	

17	Gambia, The	1	Gambia, The(1.000000)	1	Gambia, The(1.000000)	1	Gambia, The(1.000000)	1	Gambia, The(1.000000)
18	Guinea-Bissau	1	Guinea-Bissau(1.000000)	1	Guinea-Bissau(1.000000)	1	Guinea-Bissau(1.000000)	0.750346	Namibia(0.225564)
19	Equatorial Guinea	0.757967	Nigeria(0.011017)	0.797138	Angola(0.513639); Mozambique(0.460786)	0.760439	Angola(0.588466); Namibia(0.354523)	0	
20	Kenya	0.739267	Burundi(0.052134); Burkina Faso(0.061139); Bangladesh(0.214056); Namibia(0.071279)	0.694712	Burundi(0.058245); Burkina Faso(0.063822); Bangladesh(0.204628); Namibia(0.073741)	0.683426	Bangladesh(0.132274); Congo, Dem. Rep.(0.195608); Guinea-Bissau(0.196714); Mauritania(0.435612); Namibia(0.039792)	0	
21	Liberia	0.847822	Mauritania(0.493882); Namibia(0.499657)	0.924727	Angola(0.210627); Mauritania(0.526701); Namibia(0.262671)	0.929759	Mauritania(0.230915); Namibia(0.553868)	0.66292	Namibia(0.870466)
22	Lesotho	1	Lesotho(1.000000)	1	Lesotho(1.000000)	1	Lesotho(1.000000)	0.432814	Namibia(1.000000)
23	Madagascar	1	Madagascar(1.000000)	1	Madagascar(1.000000)	1	Madagascar(1.000000)	0.87379	Gambia, The(0.072422); Senegal(0.018974); Zambia(0.908604)
24	Mali	0.749376	Angola(0.124779); Nigeria(0.346007)	0.845537	Angola(0.175541); Guinea(0.198971); Nigeria(0.314650)	0.915034	Angola(0.429762); Nigeria(0.467950)	0.313355	Zambia(0.464890)
25	Mozambique	0.738124	Namibia(0.714279)	1	Mozambique(1.000000)	0.831567	Angola(0.195640); Namibia(0.735443)	0.283786	Namibia(0.686145)
26	Mauritania	1	Mauritania(1.000000)	1	Mauritania(1.000000)	1	Mauritania(1.000000)	0.657628	Namibia(1.000000)
27	Mauritius	0.752716	Angola(0.705462); Namibia(0.085560)	0.785433	Angola(0.764574); Mauritania(0.086831)	0.735614	Angola(0.711828); Namibia(0.135241)	0.522481	Zambia(0.033735)
28	Malawi	1	Malawi(1.000000)	1	Malawi(1.000000)	1	Malawi(1.000000)	0.362149	Namibia(1.000000)
29	Namibia	1	Namibia(1.000000)	1	Namibia(1.000000)	1	Namibia(1.000000)	1	Namibia(1.000000)

30	Niger	0.52729	Namibia(0.329941)	0.517312	Namibia(0.317848)	0.428631	Congo, Dem. Rep.(0.028052); Mauritania(0.465906); Namibia(0.506042)	0	
31	Nigeria	1	Nigeria(1.000000)	1	Nigeria(1.000000)	1	Nigeria(1.000000)	0.377405	Zambia(0.853188)
32	Sierra Leone	0.725324	Mauritania(0.252919); Namibia(0.245418)	0.288128	Namibia(0.842586)	0.290222	Namibia(0.852769)	0.28159	Namibia(0.859519)
33	Somalia	0.725289	Mauritania(0.253045); Namibia(0.245027)	0.287904	Namibia(0.842586)	0.289995	Namibia(0.852769)	0.28159	Namibia(0.859519)
34	Togo	0.991901	Namibia(0.390024)	0.932451	Angola(0.073426); Mozambique(0.038107)	0.86286	Angola(0.166573); Mauritania(0.156994); Namibia(0.293190)	0.132162	Namibia(0.679770)
35	Tanzania	0.496028	Mauritania(0.082334); Namibia(0.917666)	0.525519	Bangladesh(0.129732); Congo, Dem. Rep.(0.081047); Namibia(0.619186)	0.449624	Burkina Faso(0.096421); Guinea-Bissau(0.108437); Mauritania(0.060789); Namibia(0.734353)	0.412909	Namibia(1.000000)
36	Uganda	0.560995	Namibia(0.636569)	0.497717	Ethiopia(0.023218); Namibia(0.594463)	0.462856	Mauritania(0.263428); Namibia(0.736572)	0.173448	Namibia(1.000000)
37	South Africa	0.645057	Namibia(0.754166)	0.605382	Namibia(0.624615)	0.601179	Namibia(0.624908)	0.56138	Namibia(0.681748)