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Governance, Internet Usage and Sustainable Development Goal of Hunger Reduction in South Africa and Nigeria

Collins Ngwakwe[1]

Abstract: Internet technology usage is a veritable support to public governance albeit somewhat understudied. **Objective**: The objective of the paper is to evaluate whether a combination of public governance and internet usage assists in achieving sustainable development goal (SDG) of hunger reduction. **Prior Work**: the paper is inclined on past theories, which suggest that governance combined with internet technology is vital in achieving SDG of hunger reduction. **Approach**: Data were collected from the World Bank Development Indicators and from the World Wide Governance Indicators. Data were analysed using the fixed effect panel regression. **Results**: Results show that effective governance alone is insignificantly related to achievement of SDG goal 2, but after the inclusion of internet usage into the model, public governance proves to be significantly related to SDG 2 (hunger reduction). **Implication**: African governments should subsidize internet access for the poor and should prioritize governance effectiveness to reduce hunger and achieve Sustainable Development Goal 2. Further research should evaluate the relationship between government subsidization of internet data for the poor and hunger reduction. **Value**: this paper provides first approach, which suggests that introducing internet usage into the governance variable enhances governance effectiveness toward achieving sustainable development goal of hunger reduction.

Keywords: Governance; digitalisation; internet usage; sustainable development; hunger; poverty; economic development

1. Introduction

Africa is seen as the epicentre of global poverty and hunger with the highest malnourished population in the world; albeit numerous aids from the West, Africa

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[1] Professor, PhD, University of Limpopo, Turfloop Graduate School of Leadership, Faculty of Management and Law, Address: University Rd, Mankweng, 0727, South Africa, Corresponding author: collins.ngwakwe@ul.ac.za.

remains the only continent bedevilled by hunger (SOS, 2020). Since the goal 2 of Sustainable Development goals is targeted at hunger reduction by 2030, it is therefore pertinent to keep searching for the solution to hunger reduction in Africa – perhaps through new solutions such as governance and internet technology (George, 2019). Despite the many years spent in alleviating hunger and malnutrition during the millennium development era that ended in 2015, African countries host the largest number of population facing hunger and malnutrition (SOS, 2020). Even the largest economies in Africa namely South Africa and Nigeria have not been able to extinguish hunger and malnutrition albeit their largest economic wealth in Africa (Otekunrin et al, 2019; Chakona & Shackleton, 2019). The two countries still have wide level of inequality, poverty and hungry population in the middle of affluent population. Hence this paper focusses on the two largest economies in Africa (South Africa and Nigeria).

The fulcrum of the sustainable development crusade and advocacy is a healthy human survival through a compassionate co-consideration of all humans and of all other nature's objects that support humans (flora and fauna including the atmosphere, land and seas that provide habitat support). Previously, the quest for economic development by business and governments was more on the economic achievement of businesses and nations. But this practice of economic development has been proven to be asymmetric as it harbours survival of the fittest where might reigns supreme to the detriment of the economically weak and downtrodden citizens. This angle of development has thus witnessed growth in inequality, poverty and hunger in many countries of the world. This therefore has prompted a new orientation of economic development toward a sustainable dimension (Stojanović, Ateljević & Stević, 2016). Despite all the breakthroughs in science and technology, the avenues to achieve sustainable development has remained daunting for leaders and policy makers, hence research on how best to achieve sustainable economic development is ongoing and very desirable. Toward this end, considerations about governance as a tool for sustainable economic development has emerged in recent times and is currently undergoing various aspects of research and policy considerations to elicit results and how best governance can be channelled toward sustainable economic development. Furthermore, some researchers have argued that governance may not be treated in isolation of the emerging digital technology and that the latter is equally playing and/or should play a role in facilitating progressive sustainable economic development. Despite this growing research and policy concern, there is a paucity of research done that jointly analyses governance and digital usage – particularly internet usage on sustainable development gaol 2 (hunger

and malnutrition). Therefore, this paper contributes to the literature by focussing attention on how a combination of governance and internet usage may impact on the Sustainable Development Goal 2 (SDG-2), which is hunger and malnutrition. This is a currently vital niche of research given that no business and government may be successful if some percentage of its population is left behind to wallow in hunger and malnutrition as this constitutes an unhealthy and unproductive workforce.

2. Problem of the Paper

Some mixed results exist in the literature regarding role of governance and internet usage on sustainable development. Some previous researchers have found no strong relationship between governance and sustainable evelopment (Stojanović, Ateljević & Stević, 2016); but other researchers believe there is a relationship between governance and sustainable economic development (Hansson, Arfvidsson & Simon, 2019). Similarly, other group of researchers provide evidence about the role of internet usage on sustainable development via job creation and poverty reduction (Vincent & Evans, 2019). Whilst this debate is ongoing in the literature, there is a dearth of research about the relationship between governance, internet usage and hunger reduction in sub-Saharan Africa. This paper therefore contributes by focussing this research in sub-Saharan Africa by using data from the two biggest economies (South Africa and Nigeria). The paper contributes new insight for research and policy makers in Africa on how the internet and governance may be repositioned to serve as a catalyst to poverty reduction in sub-Saharan Africa.

2.1. Objective of Paper

Hence the objective of this paper is to examine the relationship between governance, internet usage and hunger reduction in South Africa and Nigeria. Therefore the paper answers the research question on whether there is and the extent of relationship between governance, internet usage and hunger reduction.

3. Literature Review

This section presents a discussion of related literature review on the two key variables and sustainable development. The first section of the literature discusses governance and sustainable development. Thereafter, the second section of the literature discusses digital technology and sustainable development.

3.1. Governance and Sustainable Development

Research in the twenty first century is inundated with ideas that elevate governance as a pillar of sustainable development and this has been very contentious amongst scholars who have found diverse relationships between governance and development (Abdelbary & Benhin, 2019; Lange, Bornemann & Burger, 2019). Recently Leal *et al* (2016) evaluates the role of governance in achieving society's innovation toward sustainability. They conducted an analysis of the Baltic countries' adherence to World Governance Indicators and found that realisation of sustainable governance will depend on the ability of governance to enhance transparency and participation of citizens. This is in compliance with the OECD (2006) recommendation that participation assists in holding the agents accountable, which thus enhances trust in leaders and helps to reduce narrow network interests. The study also found that a sustainable governance would remove legal barriers and bureaucracies that bridge the establishment of self-governing civic societies as advocates of sustainable development. This finding supports Lupova-Henry and Dotti (2019) finding that a sustainable governance would facilitate a network of concerned organisations who may generate a pragmatic bottom-top solutions for achieving reduction of barriers to sustainable development.

In their study on the sustainability impacts of modes of governance, Lange, Bornemann and Burger (2019) applied a comparative analysis to evaluate the sustainability implication of a range of modes of governance such as self-governance, interactive governance, public-private governance, decentralized governance, central governance and hierarchical governance. They focussed their study on these five types of governance mode in the Swiss energy policy; their findings fail to support some research claim that new modes of governance surpass the traditional governance modes in promoting sustainable development. Instead the success of new modes of governance in achieving sustainable development would best be realised if these new modes of governance are made to work in a combined fashion with existing traditional modes of governance. This finding means that calls

for new modes of governance for sustainable development may not necessarily be the catalyst for achieving sustainable development, rather a reorientation of existing modes toward accountability, inclusiveness and transparency might hold the key to governance ability for sustainable development (Ramzy et al. 2019).

In their recent study, Ramzy et al (2019) studied the interrelationship between governance and sustainable development. Using a sample of one hundred respondents, which comprised academic and administrative staff and the Heliopolis University for Sustainable Development, their results found a strong relationship between governance variables and sustainable development goals. They highlighted that little research, which measures the interrelationship between governance and sustainable development exists, hence the need for more research in this important area of sustainable development. This current research extents the research trajectory of Ramzy et al (2019) by integrating digital usage as additional variable to governance.

Transformation in governance has been seen by researchers as a veritable means of achieving sustainable development goals if such governance transformation possesses the quality of effectiveness and openness (Walsh et al., 2019). In their research on role of land and water related governance, Ünver and Mansur (2019) found that governance is positively related to poverty and hunger reduction. Adhikary and Sinha (2019) examine the inter-linkage between governance and poverty reduction; they applied a panel regression analysis on selected SAARC countries. Their findings show that governance effectiveness and regulatory quality of governance has strong positive significant effect on poverty reduction which includes reduction in hunger. Dankumo et al (2019) examined the relationship between corrupt governance and poverty reduction in Nigeria; they applied the ARDL bound test and found a long-run association between public expenditure, corruption and poverty; they also found that corrupt governance in the area of social public expenditure is adversely related to poverty in Nigeria. This means that lack of transparency in the management of public expenditure targeted to the social development of poor population is handled in a corrupt manner, which deepens the level of poverty in Nigeria. This thus accentuates the necessity for enhanced governance at the federal and state levels if poverty and hunger is to be rooted out.

3.2. Digital Technology and Sustainable Development

A plethora of research supports the idea that digital technology – particularly the internet has a good potential to support sustainable development, particularly regarding hunger reduction. Banerjee (2018) outlines the positive aspects of the internet toward hunger reduction, this includes amongst others, effective harvest storage and supply chain network, improvement in food purchasing habits and food shelf-life including easier distribution of surplus food to the needy population. Walsh et al (2020) argues that the UN Agenda 2030 sustainable development goal requires a blending of sustainable governance with enabling public policy that provides necessary finance for science and technology innovation within the reach of all levels of society in to orient transformation in social, economic and environmental systems. This argument suggests that internet technology must be all-inclusive for it to assist in reducing poverty and hunger amongst those at the bottom of the society pyramid.

The advent and fast booming of digitalisation megatrends in the likes of mobile internet, the big data and internet of things have speeded the creation of developmental opportunities across the nations with greater velocity than before (WEF, 2020). This is because digitalisation has proven to have multiple capacity to drive decent new work, new economic growth and peoples' wellbeing; this growth impact cuts across all social and economic sectors (Bernstein, 2019). Digitisation has also been praised for enhancing the expansion of peoples' freedom to express their rights and voice out their concerns in governance – this has also been proven to greatly assisting in boosting human rights and attracting further assistance to poverty and hunger alleviation (WEF, 2020; Bernstein, 2019; Hassani et al. 2019). Analysis of the effect of digitalisation on employment has also been noted in a research conducted by Yang and Wang (2018), which points to enhanced labour supply in the digital sector with resulting positive alleviation on poverty and hunger. In their review of the opportunities from Industry 4.0 Warhurst and Hunt (2019) found that digital technology may not necessarily shape the future of jobs but that it will rather provide wide options for people to choose. In their research, Ejemeyovwi et al. (2019) evaluated the impact of internet technology usage on human development in ECOWAS countries; they applied a panel data fixed and random effect models and found that internet technology usage has a positive significant effect on human development. In another related research Mushtaq and Bruneau (2019) examined the effect information communication and technology on poverty and inequality; they applied a panel data regression on sixty-two countries; their findings show that when information technology is used as a financial inclusion instrument, it has the potential

to enhance economic growth, reduction in poverty and the alleviation of inequality – both poverty reduction and inequality reduction encapsulates hunger alleviation, which the second Sustainable Development Goal. Another study by Szabo et al (2019) examine the effect of internet usage on wellbeing of older adults; they applied a longitudinal survey with demographic controls on 1165 adults with ages between 60 and 77. Their findings show that internet usage positively influence wellbeing even amongst the adult population.

Researchers have argued that despite the diverse research allusions on the positive impact of digital technology, namely the internet and related technology, some sections of the society are left behind given their most pressing need for food, which often is left unsatisfied let alone affording the data needed to gain access to the internet. This is why Walsh et al (2020) advocates for a governance system that would provide an all-inclusive financial support for all citizens to gain access to and use the internet in order to take advantage of its hunger and poverty alleviation potential. Reliance on companies' behavioural change in making internet technology available for inclusive societies is unsustainable to sustainable development ideals (Treviranus, 2014). Global authorities such as FAO (2019) opine that internet has both positive and negative aspects regarding its effect on hunger and poverty. The positive is that the internet can enhance the creation of new products, activities and services that generate wealth and improved livelihood. Albeit this positive aspect, the internet can exacerbate existing alienation of and the marginalisation of impoverished communities with the possibility of worsening their debilitating socio-economic conditions. This points the fact that many communities are yet to reap the benefit of internet technology and as such may not grouped amongst the class whose internet usage can solve hunger problem. For this group, internet usage tend to worsen their hunger condition as this group may spend their food money on internet data and eventually go to bed hungry and malnourished (BBC, 2019). It is difficult to prove that internet can reduce hunger in poor, war-ravaged and Hungary countries in Africa where internet broadband data is beyond the reach of the hungry population. For instance, some countries in Africa such as DR Congo, Central African Republic (CAR), Guinea Bissau and others have the highest and unaffordable cost of internet data bundle beyond the reach of the hungry group. The hungry group in conflict prone areas of Africa such as the Congo and CAR cannot dream of internet bundle data, hence the internet cannot alleviate hunger under the existing unfavourable conditions. Another reason offered by BBC (2019) that limits the advantage of internet to some population is the internet gender gap in Africa;

men in Africa dominate internet usage by about 34% greater than about 23 percent of women (Statistica, 2019). This means that many women in Africa may not benefit from the hunger reducing advantage from the internet – which amplifies existing disadvantaged inequity position of women in Africa. Gendered digital divide against women said to be highest in Africa more than any other place in the world (APC, 2020). This digital gap in Africa may worsen the already existing record of Africa as having highest rate of hunger and extreme poverty after the Millennium Development period, which ended in 2015. The digital divide in Africa is a source of worry given that out of the estimated 2.2 billion people estimated to be added to the world by 2050, 1.3 billion will come from Africa; this thus requires an intensified effort by policy makers to make the internet available and affordable to the teaming population of Africa to realize the internet advantage to Sustainable Development goals 1 and 2 (poverty and hunger reduction) (FAO, 2019).

4. Method

Data for this paper were collected from the archives of the World Bank Development Indicators and from the World Bank World Wide Governance Indicators. These were collected over 17 years from two largest economies in Africa namely South Africa and Nigeria. The choice of South Africa and Nigeria inclines on the fact that albeit being the largest economies in Africa, these countries still have a large chunk of their population living in abject poverty, hunger and malnutrition whilst others are swimming in affluence. These two countries also portray an example of polarised inequality in the midst of wealthy individuals. The data were arranged and analysed using a panel regression approach, which gave a total of 34 observations. The fixed effect regression approach was used for the panel data analysis. Panel data regression approach has largely been used by previous researchers in related topics (Kwon & Kim, 2014; Makuta and O'Hare, 2015; Akhter & Daly, 2009).

The Regression Model:

$$\gamma = \beta_0 + \beta_1\chi_1 + \beta_3\chi_3 + \varepsilon \tag{1}$$

$$\gamma = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \varepsilon \tag{2}$$

Where:

γ = percentage of population facing hunger and malnutrition (Int-users)

β_0 = regression intercept

$\beta 1 - \beta 2$ = regression coefficients

$\chi 1$ = % of population using the internet (Int-users)

$\chi 2$ = level of governance effectiveness (GovInd)

The first model excludes internet usage but the second model includes internet usage to see the effect of the introduction of internet usage on governance effectiveness toward sustainable goal 2 of hunger reduction.

4.1. Results and Discussion

Table 1 presents the result of model 1, which is analysed without the inclusion of internet usage. The result show that at this level, governance is insignificantly related to SDG goal 2 of hunger reduction at a p-value of 0.06. Further analysis is conducted using model 2 in Table 2 wherein internet usage is included in the model so check if internet usage enhances the capacity of governance. Table 2 presents the panel data regression results conducted to determine the relationship between level of internet usage, governance effectiveness and level of population facing hunger and malnutrition (which is the Sustainable Development Goal 2). Data on the variables were tested for significant at an alpha (α) level of 0.05(5%). Results from the output in Table 2 indicate that although there is absence of significant relationship between internet usage and hunger reduction within the two countries whose data were tested. However, the introduction of internet usage in Table 2, improves the result for governance effectiveness, which indicates that governance is significantly and negatively related to hunger and malnutrition. This is indicated by a low P-value of 0.0001, which is far lower than the research alpha level of 5%. Also the regression coefficient for governance indicates a negative number (-1.85207), which shows that a percentage increase in governance effectiveness has the potential to reduce hunger by 1.85% in the two countries studied. The Durbin Watson statics was checked for possibility of autocorrelation – which is a test of independence in the residuals. Therefore, the Durbin Watson statistics result showed a value of 2 in Table 2, this indicates an absence of autocorrelation and that the residuals and independent of each other (Field, 2009). Furthermore, the rank correlation (rho) of 62% indicates a somewhat good correlation between the two independent variables and the dependent variable (hunger). Furthermore, the F-test with a P-value of 0.00001 indicates the overall significance regarding the combination of the two independent variables on the dependent variable. It can be seen that the p-value of 0.00001 is way

below the alpha level of 0.05. But despite the overall significance of the combined internet usage and governance an evaluation of individual independent variable significance does show that indeed it is the governance variable that is significantly having a reduction impact on hunger variable.

Furthermore, the data and results in Table 2 were tested further to validate the results through a normality and heteroscedasticity test on the variables (in Table 2). These tests were also done at an alpha level of 0.05, the results indicate a P-value of 0.284 and 0.082 for heteroscedasticity and normality tests respectively. Since these p-values are higher than the alpha level, the null hypotheses for the two tests were accepted, which suggests that the units have a common error variance and that error is normally distributed. Therefore, the results in Table 2 for heteroscedaticity and normality tests provides reliability to the results of this research (Halunga, Orme & Yamagata, 2017).

This research finding supports some previous research who found a relationship between governance and sustainable development (Leal et al, 2016; Lupova-Henry & Dotti, 2019); but this research finding is in contrast with some other research that found no strong relationship between governance and sustainable development (Stojanović, Ateljević & Stević, 2016). As regards internet usage; the lack of reduction effect of internet usage on hunger in this research confirms recent finding by BBC (2020), wherein they found that poor students go to bed with empty stomach after purchasing internet data bundle – thus making the students hungrier. It is not surprising therefore to see that in Table 2, the coefficient for internet users is positive, which is an indication that for some population group, internet usage might exacerbate hunger if the poor and hungry uses their feeding money to buy internet. This therefore suggests that the value of internet usage might be better realised if the government subsidizes or makes internet usage free for the poor. However, this angle of research is yet to be done. Furthermore, the strong relationship between governance and hunger is an indication about the need to strengthen governance effectiveness in Africa as this holds the potential to achieve hunger reduction.

Table 1. Panel Regression Result for Governance and Hunger Reduction in South Africa and Nigeria (Without Internet Usage Variable)

Model 1: Fixed-effects, using 34 observations
Included 2 cross-sectional units
Time-series length = 17
Dependent variable: PoPHMR

	Coefficient	Std. Error	t-ratio	p-value	
const	4.40019	0.220176	15.1503	<0.00211	***
GovInd	-0.42081	0.185219	-4.6112	<0.06001	

Table 2. Panel Regression Result for Governance, Internet Usage and Hunger Reduction in South Africa and Nigeria

Model 2: Fixed-effects, using 34 observations
Included 2 cross-sectional units
Time-series length = 17
Dependent variable: PoPHMR

	Coefficient	Std. Error	t-ratio	p-value	
const	5.50059	0.320166	17.1804	<0.00001	***
Int-Users	0.0106007	0.0133044	0.7968	0.43184	
GovInd	-1.85207	0.275218	-6.7295	<0.00001	***
R-squared		0.609722			
Adjusted R-squared		0.570694			
P-value(F)		0.00001			
rho		0.623236			
Durbin-Watson		2.817745			

Table 3. Test for Heteroskedasticity and Normality of Variables

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: $F(1, 30) = 0.244175$
with p-value = $P(F(1, 30) > 0.244175) = 0.624806$

Distribution free Wald test for heteroskedasticity -
Null hypothesis: the units have a common error variance
Asymptotic test statistic: Chi-square(2) = 2.51064
with p-value = 0.284984

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 5.87671
with p-value = 0.0829529

4.2. Implication

African governments should subsidize internet access for the poor and should prioritize governance effectiveness to reduce hunger and achieve Sustainable Development Goal 2. This paper opens an agenda for further research; therefore, future research should evaluate the relationship between government subsidization of internet data for the poor and hunger reduction. The paper provides a good academic study paper for administration classes.

4.3. Value (Contribution)

This paper provides first research approach, which suggests that introducing internet usage into the governance variable enhances governance effectiveness toward achieving sustainable development goal of hunger reduction. Accordingly, this paper's model improves earlier research that places the onus for sustainable development goal of hunger reduction only on governance. This paper thus contributes by demonstrating that introduction of internet usage can strengthening public governance to achieve sustainable development goal of hunger reduction.

5. Conclusion

This paper aimed to evaluate the relationship between internet usage, governance and hunger in two African largest economies – South Africa and Nigeria. Although diverse findings exists in previous literature, but none of the previous researchers have done a joint examination of this phenomenon using the two African countries. Also none of these previous research have combined internet usage and governance as two independent variables to examine their effect on hunger and malnutrition. This paper thus makes a unique contribution by bridging this gap in knowledge. Results from data analysis show that effective governance has the capacity to reduce hunger and malnutrition in the two African countries. But internet usage did not prove to have the potential to reduce hunger; this paper reasons that this is likely because the population that faces hunger whose data were used in this study would hardly see enough to eat let alone to buy internet data. The paper recommends that internet usage and of course the wider spectrum of digitalisation may prove to be helpful in hunger reduction if the government steps in to subsidize or make internet access and usage free for the poor and hungry population. The paper also

recommends that African governments should place priority on enhancing effective governance as this has strong capacity to reduce hunger. Further study is recommended to analyse the relationship between government subsidization of cost of internet data for the poor or free internet for the poor on hunger reduction. Such further study may include more African countries to the sample to enhance expanded generalisation of the findings.

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