The Nexus between Finance and Agricultural Productivity in Nigerian's agricultural sector

[1]Jesusetemi Oluwafemi, Pule Kholopane[2] and Ifetayo Oluwafemi[3]
[1,2]Department of Quality and Operations Management, University of Johannesburg, RSA
DFC Campus, South Africa.
[3]Postgraduate School of Engineering Management, University of Johannesburg, RSA
jesusetemiayeni@yahoo.com, pule.kholopane@gmail.com, ijoluwafemi@uj.ac.za

Esther T. Akinlabi
Department of Mechanical Engineering Science,
University of Johannesburg, RSA
APK Campus, 2006, South Africa.
etakinlabi@uj.ac.za

Abstract

A structural equation model (SEM) method was adopted in this study to investigate the nexus between how government or banking sector financial support to farmers has enhance growth in Nigeria agricultural sector. Farmer totaling 500 were surveyed using a well-structured questionnaire in Ekiti State, south western part of Nigeria. Out of the 500-questionnaire distributed, about 362 feedbacks received was captured using a statistical tool, SPSS and evaluated by means of Analysis of Moment Structures. From the findings, we discovered that both short and long-time loan has a significant effect on farmers productivities. The short-time loan is mainly used in acquiring the basics better-quality seed and pesticides, while the long-time loan is used in acquiring capital equipment for farm use. The use of improved farm implements through the availability of long time loan has assisted farmers in increasing their productivity and has made farming easier for them. The study has been able to prove that the use of long-term loan by farmer foster and helps them maximize their productivity than the use of shortterm loan, hence, these study backs polices focused at increasing financial supports to farmers in Nigeria.

Keyword: Agriculture 4.0, Agricultural Financing, Farming, Structural Equation Modeling, Nigeria

1. Introduction

The agricultural sector has been identified as an important sector which has aided the economy stability in Nigeria and other developing nations. South African experience a slight recession in 2018 but was able to come out of it due to their massive agricultural outputs sales[1]. In Nigeria, the agricultural sector interjects over 5% to Nigeria gross domestic product and roughly 9% percent to proper employment annually. Following the level of unemployment in the country, which is hovering around 23.10% as at January 2019[2], it is highly imperative to recognize where investment exertions needs to be directed. This brings about the question on how government and financial banks aid support economic development and ensures drastic reduction in Nigeria poverty rate. This assessment can be tackled by recognizing that majority of the Nigerian populace are extremely poor, and they live in the rural regions of the country, basically engages in smallholder survival farming for their livelihood. These categories of this individuals are small and slow-growing agricultural insignificant producers, with little staple crop produces, soil nutrient diminution as well as small extent of modern implements usage[3-7]. It is encouraging to know that there are some modern input machineries that now exist, like the use of modern sees which are well improved, use of fertilizer to increase the nutrients of the soil, land management and small-scale irrigation, which are all targeted towards increasing agriculture productiveness in rural areas.

There are several studies done to establish if growth in the agricultural sector has reduced poverty in Nigerian and African hereafter. There are sizable evidences indicating that the influence agricultural growth has on poverty reduction globally is inevitable, particularly extreme poverty[8-14]. Nevertheless, the exact channels through which government intervention funds exerted into agriculture sector which might foster and enhance the agricultural sector performance remain ineffectively understood, provoking some scholars to warn against giving precedence to agriculture compare to other segments[15, 16]. Also, an all-embracing cross-country pragmatic has been made to specifically state the circumstances and channels through which financial support, as a means of government finance, might support economic growth[17-20]. Part of the literature conducted on same question was also evaluated in African context[21-23]. It has been econometrically analyzed that one of the major challenges is to be able to singularize between the respective uses of different forms of financial support. According to Clemens in [24], he separated "early effect" financial support that assist segments such as agriculture and industry, roads as well as energy, any of which might be required to foster growth or development at the short to medium term. This is differentiated from other social segments events such as education, water and humanitarian assistance, health, whose growth impact might be visible in the future or probably not come. This debates becomes highly imperative even though common emphasis has be laid empirically worldwide indicates that only limited intuition regarding the genuine economic avenue through which financial support might aid growth, ensures highly level of reduction in the poverty rate, supports labor's operational transformation towards huge productivity in a country like Nigeria where most of the people are domiciled in the rural areas, and where most of their economic activity is centered on essential crop farming. Despite among "early effect" channels, financial support given to the agricultural sector might introduce several structural dynamics other than financial support targeted towards energy systems, industrial sectors or manufacturing sector. Banks plays a crucial role in the execution of monetary policy activities. A reasonable number of researchers has conducted survey on the relationship that exist amidst finance and economic growth in the actual economic situation.

It has been established that several farmers in Nigeria, especially the smallholder farmers are massively financially incapacitated, and therefore, they are not able to subtitle other means of financial support for banks credits. In lieu of this, this paper seeks to establish how bank loans or credit facilities to farmers has affected productiveness of farmer using a structural equation modelling, which is an excellent statistical instrument.

2. Literature Review

2.1 Credit as an Element of Productivity in the Agricultural sector

In the agricultural sector, the use of credit as an autonomous variable is inevitable, credit has been identified as the major factor that enhances high productivity in the agricultural sector. The use of modern technology in the agricultural sector to enhance productivity has made sector to be money consuming. Sial *et al* in [25] has postulated that the use of better quality seedlings , new farm implements such as tractors, fertilizers and pesticides that will be required for an adequate farming in anticipation for better productivity requires credits to purchase them.

We are in the era of digitalization, in which its application cut across all sectors. The agricultural sector is not left out in this digitalization process whereby, the evolution of industry 4.0 is been adopted by the agricultural sector, hence, the sector is now being considered as agriculture 4.0. This involves the use of precision technology in the agricultural sector, according to Zarco *et all* in [26], precision agriculture has been defined as farming management idea aimed at measuring and observing as well as responding to both intra and inter-field inconsistency in crops, or in aspect related to animal or other agricultural sector. The adoption of precision agriculture has contributed widely towards sustainability in the agricultural sector. The application of precision agriculture entails the use sensor technologies coupled with procedures to connect planned variable for monitoring farming practices such as fertilization process, pesticide and herbicide application, seeding, tillage, harvesting.

As part of the digitalization adoption in the agricultural sector, drone has been identified as agricultural instrument for monitoring and capturing the images of crops, which are later assessed with software programs capable of providing data regarding how crops evolving. This enables farmers to know the exact what part of the farm area requires prompt attention, it could be that a part of the farmland needs to be watered more intensively, especially during dry season where the use of the irrigation system is required or probably a portion of the farm land needs attention in respect to weeds removal. The figure 1 below shows the picture of a drone which is one of the technologies used for precision agriculture.
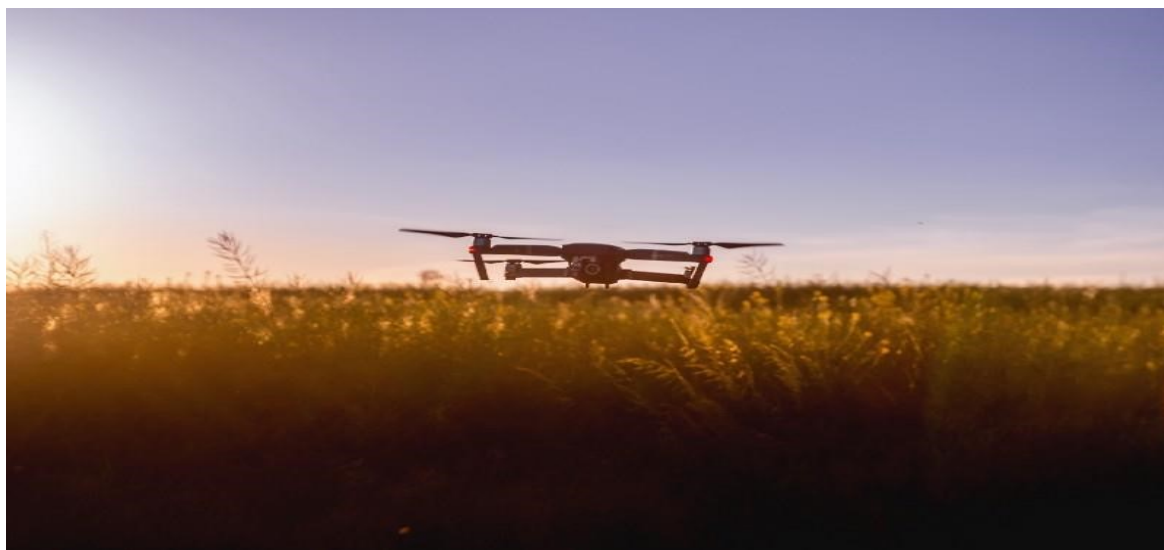
Figure 1: The use of drone for capturing and monitoring images and condition of crops and animals: Application of Agriculture 4.0

The main goal of precision agriculture, which is an application of agriculture 4.0 is majorly to enhance the productivity of crops and animals while ensuring a higher ecological sustainability.

The adoption of agriculture 4.0 for better farming system implies that a reasonable credit facility must be set aside to achieve it. The need of financial aid in enhancing agricultural productivity in Nigeria is highly inevitable. Most of the agricultural implements needs enough capital to acquire them, hence, the need for credit facility is highly needed. Sogo *et al* in [27], in his study, analyzed the premeditated role of financial aid played in fast-tracking agricultural productiveness in Nigeria, his findings illustrated that the major significant determining factor of development in agriculture productivity is accessibility to valuable credit. Though, it was deliberated that the triviality of most limitation estimations might be ascribed to deviation of bank loans to nonproductive projects like funeral ceremonies, naming ceremony, marriage and other social purposes. Notwithstanding this impediment, numerous empirical research agree that loan facility is a significant tool that aids farmers to acquire directions on how to use working capital, consumption goods and fixed capital[25].

2.2 Factors aside Finance affecting Agricultural Output.

Some non- financial features which directly or indirectly have impacts on agricultural productivity has been identified. These are rainfall, labor and land.

2.2.1 Rainfall

Unpredictable rainfall is a natural characteristic of semi-arid and sub-humid humid agroecosystems, restraining landscape productivity[28]**.** The farmers in Nigeria has been battling with market risk as well as environmental challenges such as weather. During drought, there are situations where crops fade away before maturity, and during the raining season, if there is excess rainfall which may leads to water logging or floods, the agricultural produce tends to yield poorly. Nigeria is situated in a high drought peril area of the globe[29]. In Nigeria, it has been established that the whole country experienced a high increase in temperature between the period of year 1971 to 2012[30], and also, there is a drastic decrease in the country rainfall amounting to 20% decrement between year 1901 to year 2000[31]. The level of increase in the severity and frequency of drought in different Africa countries is alarming, and this is due to climate change[32]. Several scholars have conducting research on droughts using different indices for their study in Nigeria over the past forty years[33-47].

2.2.2 Land

It is confirmed that Land is considered as one of the crucial element of production across segments, in which the agricultural sector is inclusive[48-50]. Factually, there has been some issues of preference in allocation of lands, in Nigeria, this scenario is not limited to Nigeria alone, similar case occurred in South Africa. It was reported that the black South African farmers were deprived some opportunities while the whites' farmers are given preference in terms of support via government subventions. This formed a very dualistic agricultural division, with black south African farmers farming on a small proportion of land [51, 52]with inadequate investment or institutional backing. In harmonizing farmer efforts, the government must invent policy that gives room for farmers to obtain land for cultivation in lieu of this, land use amendment law has been a current subject of discussion around the world [53]. According to Udoh in[54], restraining laws relating to land use requires amendment to make adequate land obtainable for commercial farming. For instance, the historic inequities in the Republic of South Africa necessitate a prompt intercession which will ensure some of the land are transferred to the earlier deprived farmers who farm on insignificant farm land because of their inability to obtain enough land.

2.2.2 Labour

Labour is seen generally in all sector as an essential variable in production function, both in the agricultural sector and other sectors. There are Various definitions of labour, it can be defined as the input exerted into any form of production process in concurrence to the number of hours worked. Before the introduction of the new emerging technology, it is assured that output of production rises relatively as the labour inputs increases.

3. Research model and hypotheses development

In figure 1 below, the theorized SEM model for agricultural productivity or output is illustrated. Within the contextual of structural modelling, the exogenous variables characterize those paradigms that exert an impact on other paradigms within the study and are not affected by other features in the quantitative model. Individuals paradigms acknowledged as endogenous are influenced by exogenous as well as other endogenous variables with the model. The model hypothesizes that the agricultural output denoted as AOutput is forecasted by land size, denoted as LS, also, labor denoted as LH, a short-term debt denoted as STD, as well long-term debt denoted as LTD. In this study, the single-headed arrows signify causal relationships among explanatory feature and the dependent features whereas double headed arrows signify covariances amid explanatory variables. Some studies have argued that land dimension is always a substantial determining factor of agricultural output[55], which brings us to the 1st hypothesis:

H1: No significant connection amid land dimension and agricultural productivity or output.

This implies that the number hours spent on the farm by the labourer impacts agricultural productivity, i.e., agriculturalists who devote more longer hours on his farmland, tends to have a high productivity.

H2: There is no significant relationship amid labour in times of hours spent on farmland and agricultural output.

Also, an empirical evidence in [56] speculated that the short-term credit, which is considered as the working capital and in turn used acquiring inputs, pesticides has a positive and substantial impact on agricultural productivity or output.

H3: The short-term loan given to farmers has no substantial impact on agricultural productivity.

Preceding researchers in the field of agricultural production has acknowledged rainfall as an essential contribution for agricultural production[57, 58].

H4: No substantiated connection amid rainfall as well as agricultural productivity.
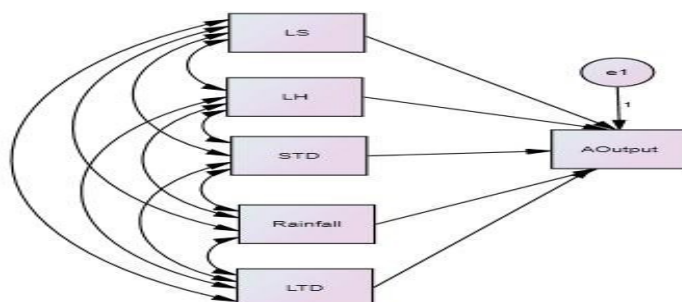
Fig. 2. Effect of credit facility on agricultural productivity or output

Several researchers have discovered the impact of long-term debt (LTD) on agricultural productivity or output. Darroch **(2001)** and Deininger et al. **(2007), both** survey the effect long-term credit has on agricultural productivity, using South African and India as a case study. They both found out that long-term debt incurred in facilitating individual ownership of land required for farming. H5: Long-term credit has no substantial impact on agricultural output.

4. Data and methodology

In carrying out this survey, the hypothesized agricultural productivity or output model was tested, the study made use of surveyed data acquired from the responses of the distributed structured questionnaires to farmers from Ekiti State, Southwestern part of Nigeria. About 500 well-structured questionnaire were distributed to smallholder agriculturalists. The research tools were exposed to dependable and legitimacy tests by means of "Cronbach alpha as well as confirmatory factor analysis procedures. Only 362 farmers responded which represent 72.4 percent. An analytical instrument, Statistical Package for Social Sciences (SPSS) Version 22.0 was used to analyse the data. The research tool fulfilled the standards for dependability with the value of 0.732 as the Cronbach alpha outcome. Structural equation modelling was employed for this study. Thus, this study hypothesized that the agricultural productivity is a subject of rainfall, land size, labor (LH) as well as both the short-term debt denoted as (STD), long-term debt as (LTD), which are all bank credits bank credits.

5. Results

The Table 1 below, displays the overall average effective observers summed to be n which equal to 363. The breakdown of the statistics shows that the farmers achieve agricultural productivity within the range of ₦1,250,000 and ₦ 1,500,000 on yearly basis (mean score = 3.12). The degree of performance recorded is buttressed by land dimension averaging 18-22 hectares. The short-term as well as long-term credits was within ₦ 875 000 to ₦2,750,000. Considering the labour periods per individual in a day devoted to activities in the farm daily, it is highly unbelievable that capitals exerted on the farm by farmers aren't enough to maximize its productivity, especially, considering the land dimensions of about 10 to 22 hectares of land.

Table1: Descriptive Data

	Mean Deviation	**Standard**	**N**
Agricultural Output as (AO)	1.59	1.034	362
Land	3.12	1.417	362
Labour	2.7	1.139	362
The Short-term credit	1.76	1.275	362
The Long-term credit	1.65	1.279	362
Rainfall	504.36	129.383	362

Also, table 2 below, shows the outcome of chi-square test carried out to ascertain the bivariate relationships amid the determining variables as well as agricultural output. Each of the determining factors were surveyed to have substantial links with agricultural output ($p < 0.05$). The Chi-square test outcomes portrayed in the table below didn't attest that the model fits the information being surveyed. We discovered its probability status to be substantial at ($p < 0.05$). In order to validate these outcomes as well as be mindful of the limitations of the outcome of Chi-square indicator expounded below, further vigorous examinations were employed by means of goodness, fit indices.

Table2: Chi-square analysis between the identified determining factor and Agriculture productivity

S/N	Relationship	Value	df	Chi-sq
1	Land size		37.252 30	0.008***
2	Short-term debt	60.921	35	0.000***

© IEOM Society International

3	Long-term debt	121.907	35	0.000***

Note: *; **; *** means implication at 1%, 5% and 10% correspondingly.

5.1 Best fit model for agricultural productivity.

5.11. Maximum likelihood estimates.

Regression model which formulate some portion of the Structural equation modelling model process established that there are connections amid some of the factors, which are coherent with the theory. Also, the means coefficients illustrated in the table below stand quite positive, highly substantial at 5% which implies ($p < 0.5$). Earlier studies have revealed that the whole credit is supportively and highly significantly connected to agricultural output, this study breakdowns credit into two components, which are short-term as well as longterm. We noticed that long-term loan has a better positive influence on agricultural productivity which is at .1899 than the short-term loan which is at .120. These results concur with Vikhe in [59] endorsements on longterm loan rules for Indian small-scale farmers. Also, 1 unit rise in land dimension is said to have led to 10% increment in agricultural productivity, thereby leaving other factors consistent . Land has a significant role to play in ensuring agricultural productivity

Table3. Regression weights

			Estimate	S.E	C. R	p
Agricultural Outpt (Q14)	<---	Short-term debt (Q21)	.120	.044	2.736	.006
Agricultural Output (Q14)	<---	Land size (Q7)	.100	.037	2.710	.007
Agricultural Output (Q14)	<---	Long-term debt (Q22)	.189	.043	4.376	***

Table 4 below, indicates simple relationships amid exogenous variables. It is observed that both short-term as well as the long-term have have a solid relationship on land dimensions ($p < .05$). Likewise, short-term loan as well as long-term loan have a robust relationship.

Table 4. The Covariances

			Estimate	S.E	C. R	p
Land sizes (Q7))	<-->	Short-term debt (Q211)	.452	.098	4.626	***
Land size (Q7)	<-->	Long-term credit (Q22)	.355	.097	3.665	***
Short-term credit (Q21)	<-->	Long-term credit (Q22)	.646	.092	7.015	***

Table 5: Squared multiple correlations (R^2)

Estimation

Agriculture Output (Q14)	.145

The outcomes of the hypothesized Model 1 indicated that labor as well as rainfall are irrelevant in describing agricultural productivity. The Land size (β =.015), short-term loan (β =.16) as well as the long-term debt (β =.25) which explain about 15.5% (R^2 =.145) of agricultural productivity model shown in figure 2. The table 5 above is explanatory. Analysing the Structural Equation Modelling approached adopted, we realized rainfall as well as labor are not reserved for modelling agricultural productivity using Structural Equation Modelling approach. The concluding model is exemplified in the Figure 2 below.

5.1.2. Model Fit for Structural Modelling Equation by means of goodness of fit indices.
The key drive for this paper is to ascertain the connection surrounding bank credit loan and agricultural output. Each one of the indices in Table 6 beneath attest to the fact he sample information is suitable for the model substantially. It was RMSEA that displayed a weak model fit, nevertheless, most of the indices substantiated that it's a virtuous model fit, the RMSEA index outcomes were not reckoned with at all. We deduced that the model fits the information being examined.
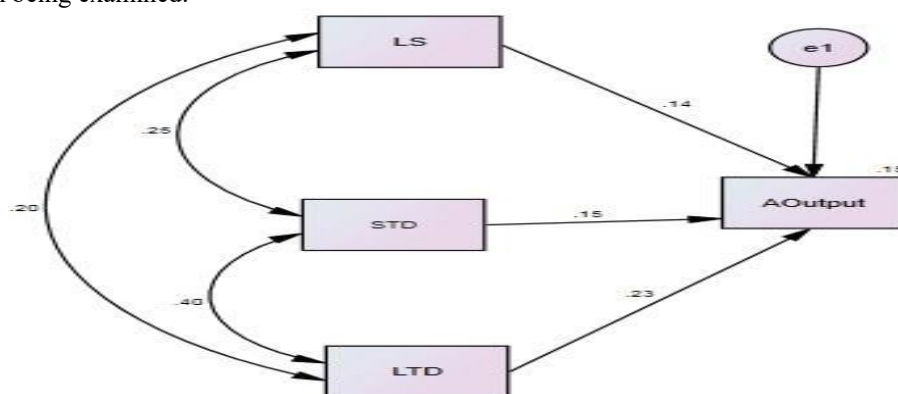

Fig. 2. The Impact of loan facility on Agricultural productivity Table 6. The SEM model fit indices

Index	Recommended Value	Output	Remark
CMIN	< 05	0.000	Very good
GFI	ot commonly suggested)	1.000	Very good
TLI	≤1(value near to 1 Shows It's a good fit)	0.000	Good
CFI	≤1(value near to 1 Shows Its a good fit)	1.000	Very good
PCFI	Complex to model size	0.000	Very good
RMSEA	≥0.07 to 0.8 with intimate Interval	0.255	Insignificant, therefore poor model fit.
NFI	near to 1 Shows It's a good fit): indices< 0.9 can be improved substantially	1.000	very good
PCLOSE	< 05	0.000	Very good

6. Discussion and Conclusion

This study employ a survey method in assessing the impact of land dimension, labour as well as both the shortterm loan and the long-term loan, rainfall in respect to agricultural productivity. The chi-square assessment outcomes to ascertain the bivariate connections amid the agricultural productivity and the determining factors was perceived to be substantial at ($p < 0.05$). Nevertheless, while harnessing SEM, we observed that land dimensions, short-term loans as well as long-term loans seems to expressively impact agricultural productivity.. This paper have established that small-scale farmers requires loan facility to increase their productivity. From the findings, we note that 1% rise in short-term loan amount to 0.15% rise in the agricultural productivity of the farmers leaving supplementary factors consistent. Also, 1% rise in long-term loan amount to 0.24% rise in its productivity. These outcomes of this study propose that small-scale farmers requires a long-term loan access. Long-term loan may be used to acquire capital farm equipment's essential to mechanise farming. These capital equipment's could be tractors, irrigation equipment. Also, short-term loan is essential in obtaining and meeting some important farm needs such as enhanced seedlings, fertiliser as well as pesticides, it could be use in settling farm workers' salaries.

The outcome of this study concur with Kohansel in [60], study, he examined the impact of loan availability of farmers on agricultural investment. The researcher employed logit model and noticed a strong connection between accessibility to loan, high productivity in the agricultural sector. Also, Gosa et all in [61], discovered in his study the significance of trade loan on keenness and productivity of the farmers in Romania. Also, in Jordan, Al-Rjoub in [62] investigated if changes in loan supply rate by the financial sector would have an impact on productivity, in line with several other studies discussed empirically. The outcomes indicated a positive relationships between bank loans and productivity enhancement.

Land has been pragmatically studied in this paper, findings showed a positive inputs to production as well as its impact proposes that any 1% rise in the land dimension amount to 0.123% rise in the farm productivity. This outcome is in line with Feder in [63], who established that the number of land is an essential determinant of productivity, in distribution of constrained and unhindered households in the agricultural sector in china. Labor is seen as insignificant factor as well as rainfall. Though, labor and rainfall coefficient were encouraging, which implies that they are key elements in the agricultural sector.

References

[1] Lameez Omarjee, "**5 reasons the SA economy is out of recession**," Fin24.com, South Africa, Dec 04 2018.

[2] Trading Economics, "**Nigeria unemployment rate**," Nigeria, january 2019.

[3] L. Chandy, H. Kato and H. Kharas, *The Last Mile in Ending Extreme Poverty.* Brookings Institution Press, 2015.

[4] J. W. McArthur, "Agriculture's role in ending extreme poverty," *The Last Mile in Ending Extreme Poverty,* pp. 175-218, 2015.

[5] T. Addison, S. Singhal and F. Tarp, *Aid to Africa: The Changing Context,* 2013.

[6] D. Mason-D'Croz, T. B. Sulser, K. Wiebe, M. W. Rosegrant, S. K. Lowder, A. Nin-Pratt, D. Willenbockel, S. Robinson, T. Zhu and N. Cenacchi, "Agricultural investments and hunger in Africa modeling potential contributions to SDG2–Zero Hunger," *World Dev.,* vol. 116, pp. 38-53, 2019.

[7] F. Tarp, *Aid Effectiveness (United Nations Development Group (UNDG)),* 2015.

[8] F. Bourguignon and C. Morrisson, "Inequality and development: the role of dualism," *J. Dev. Econ.,* vol. 57, *(2),* pp. 233-257, 1998.

[9]   D. Gollin, S. Parente and R. Rogerson, "The role of agriculture in development," *Am. Econ. Rev.,* vol. 92, *(2),* pp. 160-164, 2002.

[10] L. Christiaensen, L. Demery and J. Kuhl, *The Role of Agriculture in Poverty Reduction an Empirical Perspective.* The World Bank, 2006.

[11] L. Christiaensen and L. Demery, *Down to Earth: Agriculture and Poverty Reduction in Africa.* The World Bank, 2007.

[12] L. Christiaensen, L. Demery and J. Kuhl, "The (evolving) role of agriculture in poverty reduction—An empirical perspective," *J. Dev. Econ.,* vol. 96, *(2),* pp. 239-254, 2011.

[13] A. De Janvry and E. Sadoulet, "Agricultural growth and poverty reduction: Additional evidence," *The World Bank Research Observer,* vol. 25, *(1),* pp. 1-20, 2009.

[14] N. V. Loayza and C. Raddatz, "The composition of growth matters for poverty alleviation," *J. Dev. Econ.,* vol. 93, *(1),* pp. 137-151, 2010.

[15] P. Collier and S. Dercon, "African agriculture in 50 years: smallholders in a rapidly changing world?" *World Dev.,* vol. 63, pp. 92-101, 2014.

[16] S. Dercon and D. Gollin, "Agriculture in African development: theories and strategies," *Annu.Rev.Resour.Econ.,* vol. 6, *(1),* pp. 471-492, 2014.

[17] H. Hansen and F. Tarp, "Aid and growth regressions," *J. Dev. Econ.,* vol. 64, *(2),* pp. 547-570, 2001.

[18] E. Werker, F. Z. Ahmed and C. Cohen, "How is foreign aid spent? Evidence from a natural experiment," *American Economic Journal: Macroeconomics,* vol. 1, *(2),* pp. 225-244, 2009.

[19] S. Galiani, S. Knack, L. C. Xu and B. Zou, "The effect of aid on growth: evidence from a Quasiexperiment," *Journal of Economic Growth,* vol. 22, *(1),* pp. 1-33, 2017.

[20] C. Arndt, S. Jones and F. Tarp, "What is the aggregate economic rate of return to foreign aid?" *The World Bank Economic Review,* vol. 30, *(3),* pp. 446-474, 2016.

[21] P. Collier and J. W. Gunning, "Explaining African economic performance," *Journal of Economic Literature,* vol. 37, *(1),* pp. 64-111, 1999.

[22] K. Gomanee, S. Girma and O. Morrissey, "Aid and growth in Sub-Saharan Africa: accounting for transmission mechanisms," *Journal of International Development,* vol. 17, *(8),* pp. 1055-1075, 2005.

[23] J. D. Sachs, J. W. McArthur, G. Schmidt-Traub, M. Kruk, C. Bahadur, M. Faye and G. McCord, "Ending Africa's poverty trap," *Brookings Papers on Economic Activity,* vol. 2004, *(1),* pp. 117-216, 2004.

[24] M. A. Clemens, S. Radelet, R. R. Bhavnani and S. Bazzi, "Counting chickens when they hatch: Timing and the effects of aid on growth," *The Economic Journal,* vol. 122, *(561),* pp. 590-617, 2011.

[25] M. H. Sial, M. S. Awan and M. Waqas, "Institutional credit and agricultural production nexus," 2011.

[26] P. Zarco-Tejada, N. Hubbard and P. Loudjani, "Precision Agriculture: An Opportunity for EU Farmers— Potential Support with the CAP 2014-2020," *Joint Research Centre (JRC) of the European Commission,* 2014.

[27] J. Sogo-Temi and S. Olubiyo, "The role of agricultural credit in the development of agricultural sector: The Nigerian case," *African Review of Money Finance and Banking,* pp. 101-116, 2004.

[28] J. Barron, E. Enfors, H. Cambridge and A. M. Moustapha, "Coping with rainfall variability: Dry spell mitigation and implication on landscape water balances in small-scale farming systems in semi-arid Niger," *Int. J. Water Resour. Dev.,* vol. 26, *(4),* pp. 543-559, 2010.

[29] M. Dilley, R. S. Chen, U. Deichmann, A. L. Lerner-Lam and M. Arnold, *Natural Disaster Hotspots: A Global Risk Analysis.* The World Bank, 2005.

[30] A. A. Abatan, B. J. Abiodun, K. A. Lawal and W. J. Gutowski, "Trends in extreme temperature over Nigeria from percentile-based threshold indices," *Int. J. Climatol.,* vol. 36, *(6),* pp. 2527-2540, 2016.

[31] P. G. Oguntunde, B. J. Abiodun and G. Lischeid, "Rainfall trends in Nigeria, 1901–2000," *Journal of Hydrology,* vol. 411, *(3-4),* pp. 207-218, 2011.

[32] I. Masih, S. Maskey, F. Mussá and P. Trambauer, "A review of droughts on the African continent: a geospatial and long-term perspective," *Hydrology and Earth System Sciences,* vol. 18, *(9),* pp. 3635-3649, 2014.

[33] J. Sonuga, "HYDROLOGICAL ASPECTS OF THE DROUGHT EVENT IN NIGERIA-1972/1973/Des aspects hydrologiques de la sécheresse en Nigérie en 1972/1973," *Hydrological Sciences Journal,* vol. 22, *(4),* pp. 487-502, 1977.

[34] R. M. Prothero, "Some perspectives on drought in north-west Nigeria," *African Affairs,* vol. 73, *(291),* pp. 162-169, 1974.

[35] A. Tarhule and M. Woo, "Towards an interpretation of historical droughts in northern Nigeria," *Clim. Change,* vol. 37, *(4),* pp. 601-616, 1997.

[36] M. Watts, "Hazards and crises: A political economy of drought and famine in northern nigeria," in Anonymous Praxis (e) Press, 2008, .

[37] E. Oladipo, "Some statistical characteristics of drought area variations in the savanna region of Nigeria," *Theoretical and Applied Climatology,* vol. 50, *(3-4),* pp. 147-155, 1995.

[38] F. Okorie, C. Ezedike and A. Nnaji, "Analysis of drought episode in borno state of north-eastern nigeria," in *Drought: Research and Science-Policy Interfacing*Anonymous CRC Press London, 2014, pp. 125-130.

[39] C. Keylock, "Towards an Interpretation of historical droughts in Northern Nigeria: A comment on a paper by Aondover Tarhule and Ming-Ko Woo," *Clim. Change,* vol. 41, *(2),* pp. 259-260, 1999.

[40] J. Ashley and M. Shugaba, "Coping with drought in north-eastern Nigeria," *Appr. Technol.,* vol. 21, *(2),* pp. 30-33, 1994.

[41] J. Ayoade, "Perspectives on the recent drought in the Sudano-Sahelian region of West Africa with particular reference to Nigeria," *Archiv Für Meteorologie, Geophysik Und Bioklimatologie, Serie B,* vol. 25, *(1),* pp. 67-77, 1977.

[42] M. Adeniyi and E. Uzoma, "Assessment of severity of drought in some northern Nigeria states using Drought Severity Index (DSI 5)," *Ghana Journal of Science, Technology and Development,* vol. 4, *(2),* pp. 1-10, 2016.

[43] P. K. Acheampong, "Climatological drought in Nigeria," *GeoJournal,* vol. 20, *(3),* pp. 209-219, 1990.

[44] A. S. Adeyemi, "Spatial Patterns of Droughts in Southwestern Nigeria," *Malaysian Journal of Tropical Geography,* vol. 27, *(1),* pp. 1-10, 1996.

[45] O. Adeaga, "Management of drought risk in the Sudano-Sahelian region of Nigeria," *IAHS Publ., (274),* pp. 157-162, 2002.

[46] N. Idris Medugu, M. Rafee Majid and F. Johar, "Drought and desertification management in arid and semiarid zones of Northern Nigeria," *Management of Environmental Quality: An International Journal,* vol. 22, *(5),* pp. 595-611, 2011.

[47] E. O. Oladipo, "Some aspects of the spatial characteristics of drought in northern Nigeria," *Nat. Hazards,* vol. 8, *(2),* pp. 171-188, 1993.

[48] P. McMichael, "Banking on agriculture: a review of the World Development Report 2008," *Journal of Agrarian Change,* vol. 9, *(2),* pp. 235-246, 2009.

[49] T. W. Lippman, "Saudi Arabia's quest for "food security","" *Middle East Policy,* vol. 17, *(1),* pp. 90-98, 2010.

[50] M. Jaffé and M. Zeller, "Legal regulations and agricultural production: the case of Cuba's cattle sector," *Post-Communist Economies,* vol. 22, *(4),* pp. 531-545, 2010.

[51] H. Rother, R. Hall and L. London, "Pesticide use among emerging farmers in South Africa: contributing factors and stakeholder perspectives," *Development Southern Africa,* vol. 25, *(4),* pp. 399-424, 2008.

[52] K. Palmer and J. Sender, "Prospects for on-farm self-employment and poverty reduction: An analysis of the South African Income and Expenditure Survey 2000," *Journal of Contemporary African Studies,* vol. 24, *(3),* pp. 347-376, 2006.

[53] K. Deininger, S. Jin and H. K. Nagarajan, "Land reforms, poverty reduction, and economic growth: evidence from India," *The Journal of Development Studies,* vol. 45, *(4),* pp. 496-521, 2009.

[54] E. Udoh, "An examination of public expenditure, private investment and agricultural sector growth in Nigeria: Bounds testing approach," *International Journal of Business and Social Science,* vol. 2, *(13),* pp. 285292, 2011.

[55] J. Chisasa and D. Makina, "Trends in credit to smallholder farmers in South Africa," 2012.

[56] E. Anthony, "Agricultural credit and economic growth in Nigeria: An empirical analysis," *Business and Economics Journal,* vol. 14, pp. 1-7, 2010.

[57] O. Bernard and M. Ibrahim, "An empirical analysis of credit supply and agricultural output in Nigeria," *Retrieved July 10th,* 2012.

[58] J. Faurès, M. Bernardi and R. Gommes, "There is no such thing as an average: how farmers manage uncertainty related to climate and other factors," *Int. J. Water Resour. Dev.,* vol. 26, *(4),* pp. 523-542, 2010.

[59] B. V. Path, "Agricultural indebtedness: Crisis and revival," *Economic and Political Weekly,* pp. 47-52, 2008.

[60] M. R. Kohansal, M. Ghorbani and H. Mansoori, "Effect of Credit Accessibility of Farmers on Agricultural Investment and Investigation of Policy Options in Khorasan-Razavi Province of Iran," *J.App.Sci,* vol. 8, pp. 4455-4459, 2008.

[61] V. Goşa and A. Feher, "Financial resource implications on agriculture results." *Agricultural Management/Lucrari Stiintifice Seria I, Management Agricol,* vol. 12, *(3),* 2010.

[62] S. A. Al-Rjoub, "Does bank lending affect output? Evidence from an emerging market," 2006.

[63] G. Feder, L. J. Lau, J. Y. Lin and X. Luo, "The relationship between credit and productivity in Chinese agriculture: A microeconomic model of disequilibrium," *Am. J. Agric. Econ.,* vol. 72, *(5),* pp. 1151-1157, 1990.