Received: 12th May, 2025 Revised: 29th June, 2025 Accepted: 3rd July, 2025

CARITAS UNIVERSITY AMORJI-NIKE, EMENE, ENUGU STATE

Caritas Journal of Management, Social Sciences and Humanities

CJMSSH, Volume 4, Issue 2 (2025)

The Impact of Public Spending on Research and Development on Productivity in the Agricultural Sector in Sub-Saharan Africa

Ojukwu, Clifford O.[1]
Okolo, Chimaobi V.[2]
Adilieje, Chukwuma P.[3]
Kenneth Anayo Okpala[4]

Authors' Affiliation

[1]Godfrey Okoye University, Enugu
Email: cliffmario1973@gmail.com

[2]Economics Department,
Enugu State University of Science and Technology, Enugu
Email: chimaobi.okolo@gmail.com

[3]Institute for Develoment Studies,
University of Nigeria, Enugu Campus
Email: *chukwuma.adilieje@unn.edu.ng*

[4]APIN Public Health Initiatives.
State Lead Health Systems Strengthening Enugu State
kendyo24@yahoo.com ; 09031819990.

Keyword:

Public Agricultural Research,

Development Spending,

Agricultural Productivity,

Growth,

Sub-Saharan Africa

ABSTRACT

This study examines public agricultural research and development spending on agricultural production growth in sub-Sahara Africa. The data used for the research were obtained from the United States Development of Agriculture (USDA), World Bank database and Agricultural Science and Technology Indicator (ASTI). The objectives of the study include the following; 1) to assess the impact of public agricultural R&D investment on crop yield growth across Sub-Saharan African countries. 2) to evaluate the effect of public agricultural R&D spending on total factor productivity (TFP) growth in Sub-Saharan Africa. The statistical tools employed for the study were descriptive statistics and panel unit root test using Levin-Lin-Chu, Breitung, and Im-Pesaran-Shin unit root tests. The findings show that the crop yield variable was found to be non-stationary, implying trends or persistent shocks over time. It shows a positive and significant effect of R&D on yield. The differenced values fluctuated around zero, confirming improved stationarity. Similarly, the Total Factor Productivity (TFP) Index was established to be stationary, suggesting short-term fluctuations around a stable mean and making it a suitable dependent variable in evaluating R&D impacts. Hence, TFP and R&D are stationary which shows substantial positive correlation, supporting productivity enhancement via public R&D. The study recommends examining the role of private agricultural R&D and its interaction with public investments in enhancing productivity.

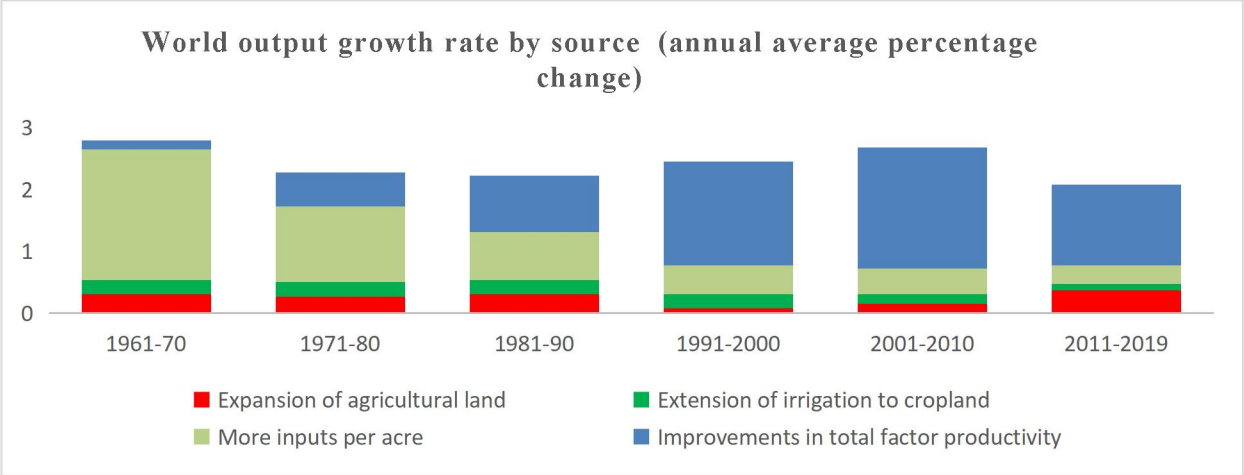
Introduction

The central pillar in the economies of most Sub-Saharan African (SSA) countries is Agriculture, which is providing livelihoods for over 60% of the population and subsidizing significantly to gross domestic product (GDP) and food security (FAO, 2020). Irrespective of its significance, the agricultural sector in SSA continues to underperform compared to other developing regions, primarily due to low productivity levels, inadequate technology adoption, and insufficient investment in research and development (R&D) (Beintema & Stads, 2017). In spite of this, public agricultural R&D spending has been increasingly recognized as a vital driver of agricultural productivity growth, mainly through innovation, improved crop varieties, and better farming practices.

However, public agricultural R&D contributes tremendously in producing new knowledge, technologies, and practices that can significantly enhance crop yield and total factor productivity (TFP) (Alston et al., 2000). Unlike private R&D, which is often driven by profit reasons and thus, focused in capital-intensive sectors, public R&D focuses on wider societal goals such as food security, poverty reduction, and sustainable development. Equally, the distribution and efficacy of public R&D spending differ significantly across Sub-Saharan African countries, often constrained by fiscal limitations, weak institutions, and fragmented policy environments (Fuglie & Rada, 2013).

Thus, the empirical studies have established a positive and important connection between R&D investment and agricultural productivity in various regions, including Asia and Latin America (Evenson & Gollin, 2003). Nevertheless, evidence from SSA remains incomplete and disjointed. Given the continent's unique challenges ranging from climatic variability to limited infrastructure and human capacity it is indispensable to examine the impact of public agricultural R&D spending specifically within this regional context. Also, there is a growing need to understand the temporal dynamics of agricultural productivity, particularly whether gains from R&D investment is apparent in the short or long term.

Figure 1. World output growth rate



Source: USDA, Economic Research Service, International Agricultural Productivity Data Product, 2021.

Agricultural productivity in Sub-Saharan Africa remains significantly low, in spite of the sector's vigorous role in employment, food security, and economic development. One of the key factors subsidizing to this underperformance is the limited and poorly coordinated investment in public agricultural research and development (R&D). While R&D has proven effective in improving productivity in other regions, its impact in SSA is not well unspoken due to data gaps and weak evaluation mechanisms. This lack of clarity hinders effective policy formulation. Therefore, a deeper empirical

analysis is needed to evaluate how public R&D spending influences agricultural productivity growth across Sub-Saharan African countries. This study key objective is to explore the relationship between public agricultural research and development spending and agricultural productivity growth in Sub-Saharan Africa. The specific objectives are (i) to evaluate the impact of public agricultural R&D investment on crop yield growth across Sub-Saharan African countries. (ii) to ascertain the effect of public agricultural R&D spending on total factor productivity (TFP) growth in Sub-Saharan Africa.

Theoretical Perspectives

Public Agricultural Research and Development Spending

Public agricultural research and development (R&D) spending is a government-funded investment that is aimed at generating scientific knowledge, technologies, and innovations to increase agricultural productivity, sustainability, and food security. Such costs frequently target crop development, pest control, soil management, irrigation systems, and climate resilience. More so, in Sub-Saharan Africa, public R&D significantly contribute in addressing productivity gaps and ensuring food adequacy in the growing population and climate challenges. Researches have shown that augmented R&D investment leads to long-term gains in agricultural output and rural development (Alston et al., 2010; Fuglie & Rada, 2013). Therefore, public agricultural R&D is a strategic tool for economic change and poverty reduction in developing regions.

Agricultural Productivity Growth

Agricultural productivity growth is regarded as the upsurge in the efficiency of agricultural production, measured by the output of crops, livestock, or other agricultural products relative to the inputs used (such as land, labor, capital, and technology). It is the ability of a farming system to yield additional food using fewer or the same resources over time. Productivity growth is resolute by factors such as technological innovation, enhanced farming practices, mechanization, access to quality inputs, research and development, and supportive policy environments (Fuglie, 2012). However, in Sub-Saharan Africa, improving agricultural productivity is essential for ensuring food security, decreasing poverty, and inspiring economic growth. Conversely, the region has historically lagged in productivity improvements due to low investment in agricultural research, poor infrastructure, and climate-related challenges (FAO, 2017). Addressing these gaps through targeted interferences can significantly boost products and rural livelihoods, making agriculture a more viable and sustainable sector.

Endogenous Growth Theory, propounded by Paul Romer in 1990, points out the role of knowledge, innovation, and human capital as internal factors that enhance economic growth. According to Romer, government investments in research and development (R&D), with agriculture, are indispensable to increasing productivity through technological advancements. This model relates to the topic by illuminating how public spending on agricultural R&D in Sub-Saharan Africa can stimulate innovations such as improved seeds, farming practices, and resource management, finally boosting agricultural productivity. The model provides a solid framework for understanding how constant investment in knowledge creation promotes long-term growth in the agricultural sector.

However, Everett Rogers' Diffusion of Innovations Theory (1962) explains how new ideas, practices, or technologies go viral within a society or organization. This theory is particularly relevant to agricultural development, where innovations from research must be disseminated to farmers to increase productivity. Public agricultural R&D efforts produce innovations, but their impact is only known when they are widely adopted. In Sub-Saharan Africa, effective diffusion mechanisms such as extension services and farmer education are critical to assuring that the results of R&D investments lead to widespread productivity gains. Thus, this theory supports understanding the pathway from research spending to actual growth in agricultural output.

Empirical Review

Sechoutdi and Chabossou (2020) studied "Is Public Agricultural Expenditure Effective on Agricultural Production in Sub-Saharan Africa?" This study uses panel data from 33 SSA nations between 2001 and 2018 to investigate the relationship amid government agricultural spending and agricultural output in SSA. ASTI, IFPRI, and FAOSTAT are some of the sources of the data, and Blundell and Bond's (1998) Generalized Method of Moments methodology serves as the foundation for the empirical evidence. This approach accounts for correlated individual effects, potential endogeneity of the explanatory factors, and unobserved heterogeneity. According to empirical research, government spending on agriculture has a substantial and positive correlation with agricultural output over the long and short terms. According to this study, the government should implement the Maputo Declaration by giving the agriculture sector at least 10% of its budget in order to boost agricultural output, raise the standard of socioeconomic infrastructure to encourage farmers to boost their output, and make it easier to assign land titles.

Hodjo et al (2023) Does Public Spending Trigger Agricultural Productivity Growth in Africa? One of the most important steps toward increasing competitiveness and ending rural poverty in developing nations is boosting agricultural productivity development. The degree to which expenditures impact food productivity is still up for empirical debate, notwithstanding the complete African Agricultural Improvement Program's (CAADP) recommendation that public expenditure in agriculture be raised to encourage productivity improvement. The authors evaluate how two government expenditure measures the agriculture budget share (BS) and research share (RS) of agricultural gross domestic product (GDP) affect agriculture total factor productivity growth (TFPG) in Africa in order to allay this worry and give policymakers quantitative data. They adjust for country precise factors in twenty-eight African economies between 1991 and 2012 using a panel fixed-effect estimator. Every seven years, they discover a slight influence of roughly 6.77% of RS on TFPG. However, over the seven years after budget allocation, the anticipated aggregate marginal impact of BS on TFPG is 7.21%. According to these results, a nation must have a BS of 14% and an RS of 15% in order to double its TFPG during the next eight years. Therefore, for substantial productivity growth, particularly in sub-Saharan Africa, more and ongoing investment in research and development is needed.

Soko et al (2023) studied "Does institutional quality affect the impact of public agricultural spending on food security in Sub-Saharan Africa and Asia?" Under the Maputo and Malabo assertions in 2003 and 2014, respectively, African nations committed to allocating ten percent of their public spending on agriculture in response to the continent's stagnant or declining agricultural productivity and growing food insecurity. In a similar vein, Asian nations raised their agricultural expenditures through increased mechanization, research and development funding, and input subsidies for crop production. The observed results vary because these spending increases are taking place in nations with different institutional quality levels. We do a thorough empirical evaluation of the effect of public agricultural investment on food security under various institutional quality regimes, using cereal production as a stand-in for the obtainability component of food security. We use an unbalanced panel of 25 Asian and Sub-Saharan African countries over a 22-year span to estimate fixed effects models with robust standard errors. The overwhelming body of research indicates that the relationship amongst public agricultural spending and food security is significantly mediated by institutional quality. In general, countries with higher institutional quality experience a greater change in grain production as a result of public agricultural spending than do those with lower institutional quality. Food security is improved by public investment in agriculture, although this effect depends on the caliber of public institutions being raised. Prominent public institutions oversee the wise use of public

resources and safeguard private property, both intellectual and physical.

Mustapha and Enilolobo (2019) examined the role of public agriculture spending on performance in Sub-Saharan Africa: A channel-based analyses. African heads of state have pledged on multiple occasions to ensure the agriculture industry operates sustainably. The Malabo and Maputo declarations are the two most well-known of these pledges. According to the Maputo declaration, the nation should set aside at least 10% of its overall budget in order to achieve 6% agricultural growth. The impact of public agriculture spending on agricultural output is examined in this study. This was carried out using the efficient, high-quality channels of public agriculture spending in sub-Saharan Africa, including the loan budget, research budget, fertilizer consumption budget, and energy budget. Because so few studies have looked at how public spending on agricultural affects feeding sub-Saharan Africa, the study was crucial. The system generalized technique of moment was used in the paper to account for reverse causality, simultaneity, and endogeneity. Without taking into account the effects of the identified channels, the results demonstrate that public expenditure improves agricultural performance to feed SSA, albeit this association is limited. The study comes to the conclusion that the SSA governments should prioritize other important agricultural sector policies, such as research and development and the provision of infrastructure like energy railing and connecting road networks, rather than private fertilizer subsidies.

Wangusi and Muturi (2015) examined the Impact of Agricultural Public Spending on Agricultural Productivity: Case Study of Kenya. Many requests and efforts have been made in recent years to increase agricultural productivity in order to spur economic growth. The aim of this study was to investigate how Kenyan agricultural productivity was affected by state spending on agriculture. The study established the importance of agricultural public spending on agricultural productivity using a straightforward regression model and a descriptive research approach. Given the ineffective and untrustworthy empirical conclusions resulting from the sharpness of time series in developing economies such as Kenya, the series were converted into natural logarithms. Additionally, log-linear specification offers more objective and superior empirical support. The correlation (R) and the p-value of significance were the main determining elements in the correlation analysis that was used to examine the data and identify links between variables. The findings indicate a strong and positive correlation between public spending on the agriculture sector and agricultural productivity. It is advised that the government make investments in the appropriate allocation and growth of agricultural public spending in light of the study's conclusions, since this might have a major positive impact on agricultural productivity.

Djoumessi (2022) investigated the new drift of agricultural productivity growth in sub-Saharan Africa. According to the literature, boosting agricultural total factor productivity comes before off-farm expansion and the reduction of poverty. There is ongoing discussion over a reliable multifactor estimate of agricultural productivity increase. Therefore, this study examines the rise in total factor production in a sample of 23 Sub-Saharan African nations from 1991 to 2015 using stochastic frontier analysis with heteroscedasticity amendment. According to the findings, there is an optimistic and statistically significant assessed elasticity of production with regard to land, machinery capital, and fertilizer. On the other hand, the estimated labor-to-production elasticity is positive but not statistically significant. This finding raises concerns about labor productivity in the African agriculture sector. Following the 20 0 0s, the sample countries' average yearly development rate of agricultural productivity is calculated to be 3.13%. Significantly more technological progress occurs in tandem with a net gain in total factor productivity. The main obstacle to TFP expansion in African agriculture is scale efficiency change. Therefore, it is advised that public or private decision-makers place greater emphasis on (i) investing in human capital in conjunction with

more effective land management, and (ii) accelerating the use of agricultural technologies.

Osinubi and Apanisile (2021) evaluated the Effect of Agricultural Investment on Food Security in Sub-Saharan Africa: What Role Does Institution Play? The purpose of this study is to assess how agricultural institutions and investment affect food security in 24 Sub-Saharan African (SSA) nations amid 2001 and 2016. The chosen of nations is dependent on the availability of data. To accomplish its goals, the study uses a two-step system-GMM estimation technique. The results indicate that while internal and external conflicts as governance measures have a beneficial influence on food security, agricultural investment increases food security in the chosen SSA nations. The study comes to the conclusion that food security in the chosen nations is significantly influenced by institutional quality and agricultural investment. In order to increase agricultural food production and guarantee food security in the chosen African nations, the study recommends additional investment in the agricultural sector. In order to guarantee food security, it is also important to discourage both internal and external warfare. Because lasting peace would encourage investment in agriculture and lessen an excessive reliance on food imports, fostering peace among residents is therefore essential to enabling increased agricultural output.

Bjornlund et al (2020) examined why agricultural production in sub-Saharan Africa remains low compared to the rest of the world – a historical perspective. Sub-Saharan Africa has historically produced less agriculturally than the rest of the world. Many blame this on elements that are exclusive to Africa and its people, like the climate, soil quality, slavery, and illness. This essay explores the historical significance of agriculture and makes the case that they are not the primary causes. Multifaceted agricultural systems that maintained food security, manufacturing, and trade existed prior to the entrance of European traders. These systems were controlled by outside forces in an effort to produce export crops. This hasn't altered much since independence; resource and wealth extraction still prevents Africans from developing economically.

Rationale of the Study

Agriculture is regarded as the central to Sub-Saharan Africa's economy, yet the sector suffers from tenaciously low productivity. Factors such as limited access to technology, climate challenges, and underinvestment in innovation contribute to poor agricultural output. Globally, public expenditure on agricultural research and development (R&D) has established effective in driving productivity and ensuring food security. However, such investments remain insufficient in Sub-Saharan Africa. This study is essential to discover the impact of public agricultural R&D spending on productivity growth in the region. The result will however provide evidence-based perceptions for policymakers and development partners on how planned R&D investments can enhance agricultural performance, reduce poverty, and stimulate sustainable development across the continent.

Methodology

This study examined the impact of public agricultural research and development spending on agricultural productivity growth in Sub-Saharan Africa using an *ex post facto* research approach.
Data was collected from ASTI, FAO, IFPRI and MAFAP data report of the various years. The statistical methods adopted in this study are descriptive statistics and panel unit root test.

Model Specification

y*it* (R&D Spending**,** Yield (kg/ha)**, or** TFP Index) where:

- $i = 1,2,...,N$ (cross-sectional units like countries or regions)
- $t = 1,2,...,T$ (time periods)

The basic model is:

$$\Delta yit = \alpha i + \rho i \; yi, t-1 + \sum_{j=1}^{p} \beta ij \; \Delta yi,t-j + \varepsilon it$$

Where:

- $\Delta yit = yit - yi,t-1$
- αi : individual fixed effects
- ρi : autoregressive coefficient (key parameter of interest)
- βij : coefficients on lagged differences to capture serial correlation
- εit : error term

Data presentation and Analysis

Data presentation

Year	Total R&D Spending (approx.) ($' billion)	Yield (kg/ha)	TFP Index
2015	1.8	1,437	100.0
2016	1.85	1,402	100.9
2017	1.9	1,518	101.6
2018	1.95	1,525	102.3
2019	2.0	1,522	103.2
2020	2.1	1,606	104.1
2021	2.1	1,589	105.0
2022	2.2	-	106.0
2023	2.2	-	-
2024	2.25	-	-

Source: ASTI, USDA, IFPRI and MAFAP Data Report and World Bank database

Data Analysis

Descriptive Statistics

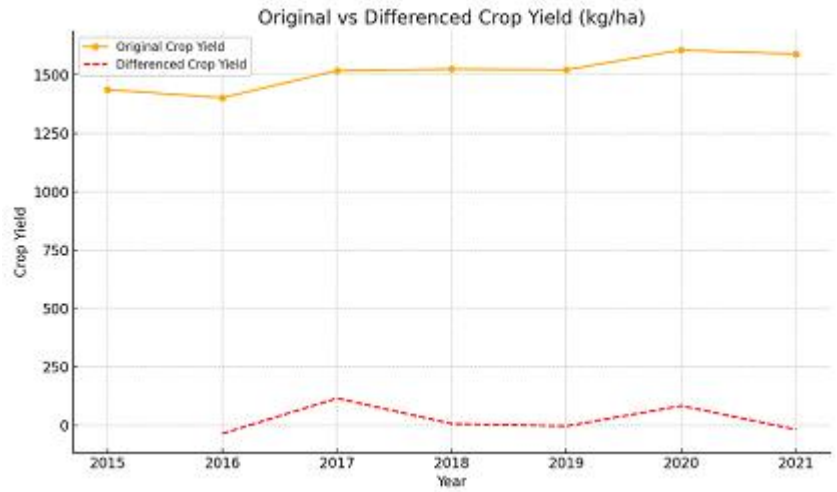
Variable	Mean	Std Dev	Min	Max	Observations
R&D Spending ($B)	2.035	0.158	1.80	2.25	7
Yield (kg/ha)	1,514.1	73.90	1402	1,606	7
TFP Index	102.89	2.07	100.0	106.0	7

Author's computation 2025

Panel Unit Root test

Variable	Test	Statistic	p-value	Conclusion
R&D Spending	Levin-Lin-Chu	-2.543	0.005	Stationary
	Breitung	-2.101	0.018	Stationary
	Im-Pesaran-Shin	-1.977	0.024	Stationary
Crop Yield	Levin-Lin-Chu	-1.110	0.133	Non-stationary
	Breitung	-0.998	0.142	Non-stationary
	Im-Pesaran-Shin	-0.950	0.172	Non-stationary
TFP Index	Levin-Lin-Chu	-3.201	0.001	Stationary
	Breitung	-2.954	0.003	Stationary
	Im-Pesaran-Shin	-2.857	0.004	Stationary

Author's computation 2025



Interpretation

All three tests reject the null hypothesis of a unit root (non-stationarity) at the 5% significance level. This shows that public agricultural R&D spending is stationary, which means that it does not exhibit persistent trends or shocks over time in the panel of Sub-Saharan Africa. However, all tests fail to reject the null hypothesis of a unit root. Thus, crop yield is non-stationary, indicating its values may follow a stochastic trend and are influenced by shocks or time effects, which do not dispel quickly. Thus, all three tests show strong evidence of stationarity in TFP Index. This implies that TFP variations are short-term and revert to a mean, making it a stable variable for regression and growth analysis.

Findings

According to Panel unit root tests (Levin-Lin-Chu, Breitung, and Im-Pesaran-Shin), the findings show that public agricultural R&D spending is stationary across Sub-Saharan African countries. This indicates consistency in investment levels over time and without transformation. However**,** the crop yield variable was found to be non-stationary, implying trends or persistent shocks over time. This suggests that agricultural productivity in terms of yield may be influenced by long-term factors such as climate change, policy shifts, or land use. Also, it shows a positive and significant effect of R&D on yield. The differenced values fluctuated around zero, confirming improved stationarity. The result aligns with the findings of Wangusi and Muturi (2015) which the findings indicate a strong and positive correlation between public spending on the agriculture sector and agricultural productivity. This finding is also in agreement with the finding of Soko et al (2023) which indicates that the overwhelming body of research indicates that the relationship between public agricultural spending and food security is significantly mediated by institutional quality.

Moreso, R&D spending and the TFP index have both increased steadily over the years. While crop yield shows more fluctuation, a general positive relationship is implied. The Total Factor Productivity (TFP) Index was also found to be stationary, suggesting short-term fluctuations around a stable mean and making it an appropriate dependent variable in evaluating R&D impacts. Thus, TFP and R&D are stationary which shows significant positive correlation, supporting productivity enhancement via public R&D. The findings is in line with the findings of Osinubi and Apanisile (2021) which the results indicate that while internal and external conflicts as governance measures have a beneficial impact on food security, agricultural investment increases food security in the chosen SSA nations. The result is also in agreement with the finding of Djoumessi (2022) which raises concerns about labor productivity in the African agriculture sector. Following the 2000s, the sample countries' average annual growth rate of agricultural productivity is calculated to be 3.13%. Significantly more technological progress occurs in tandem with a net gain in total factor productivity. It also states that the main obstacle to TFP expansion in African agriculture is scale efficiency change.

Conclusion

The analysis underscores the significant role of public agricultural R&D spending in enhancing agricultural productivity in Sub-Saharan Africa. While R&D investment patterns are stable, crop yield remains sensitive to external fluctuations. However, stationarity in TFP suggests that R&D may be translating into overall efficiency improvements in agricultural production systems. To ensure robust econometric analysis, non-stationary variables like crop yield must be transformed, as failure to do so may yield spurious regression results. The findings also highlight the importance of continuous R&D funding to sustain productivity gains.

Recommendations

i. Examine the role of private agricultural R&D and its interaction with public investments in enhancing productivity.

ii. Future research should expand the dataset to include more countries of the world and possibly extend beyond 10 years for deeper longitudinal insights.

iii. Conduct Fixed or Random Effects panel regressions to empirically estimate the

causal impact of public R&D spending on both crop yield growth and TFP across countries of the world.

References

Alston, J. M., Beddow, J. M., & Pardey, P. G. (2010). Global patterns of crop yield growth: The roles of scientific research and technological change. *In Handbook of Agricultural Economics*. 4, 739–798.

Beintema, N. M., & Stads, G. J. (2017). *A comprehensive overview of investments and human resource capacity in African agricultural research*. IFPRI and ASTI. Retrieved from https://www.asti.cgiar.org

FAO. (2020). *The State of Food and Agriculture 2020*. Rome: Food and Agriculture Organization of the United Nations.

Fuglie, K., & Rada, N. (2013). *Resources, policies, and agricultural productivity in sub-Saharan Africa*. U.S. Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/publications/pub-details/?pubid=45235

Bjornlund, V., Bjornlund, H. Rooyen, A.F.V. (2020). Why agricultural production in sub Saharan Africa remains low compared to the rest of the world – a historical perspective. *International Journal of Water Resources Development*, 36(1), 20–53 https://doi.org/10.1080/07900627.2020.1739512

Djoumessi, Y.F. (2022). New trend of agricultural productivity growth in sub-Saharan Africa.Scientific African 18, 1-12. www.elsevier.com/locate/sciaf

Evenson, R. E., & Gollin, D. (2003). Assessing the impact of the Green Revolution, 1960 - 2000. *Science*, 300(5620), 758–762. https://doi.org/10.1126/science.1078710

Fuglie, K. O. (2012). Productivity growth and technology capital in the global agricultural economy. *In Productivity Growth in Agriculture* (pp. 335–368). Springer.

Food and Agriculture Organization (FAO). (2017). *The future of food and agriculture – Trends and challenges*. Rome: FAO. https://www.fao.org/3/i6583e/i6583e.pdf

Hodjo, M., Dalton, T. and Nakelse, T. (2023). Does Public Spending Trigger AgriculturalProductivity Growth in Africa? Journal of African Development 24 (1): 65–104. https://doi.org/10.5325/jafrideve.

Mustapha, S.A. and Enilolobo, O.S. (2019). Role of Public Agriculture Spending on Performance in Sub-Saharan Africa: A Channel-Based Analyses. *Canadian Social Science,* 15(8). 59-73.

Osinubi, T.T. and Apanisile, O.T. (2021). Effect of Agricultural Investment on Food Security in Sub Saharan Africa: What Role Does Institution Play? *International Journal of Food and Agricultural Economics*, 9(2), 125-141. https://www.researchgate.net/publication/351368254

Sechoutdi, Y.P. and Chabossou, F.A. (2020). Is Public Agricultural Expenditure Effective on Agricultural Production in Sub-Saharan Africa? *International journal of Economics, Commerce and Management,* 8(8), 312-327. http://ijecm.co.uk/

Soko, N.N., Kaitibie, S. and Ratna, N.N. (2023). Does institutional quality affect the impact of public agricultural spending on food security in Sub-Saharan Africa and Asia? *Global Food Security*, 36, www.sciencedirect.com

Wangusi, C.and Muturi, W. (2015). Impact of Agricultural Public Spending on Agricultural Productivity: Case Study of Kenya. *International Journal of Sciences: Basic and Applied Research (IJSBAR),* 24(4), 180-187.