

Problems and Prospects of Vegetable Value Chain in Nigeria: An Empirical Review

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Abstract

Vegetables are important for maintenance of good health; their production and marketing are veritable sources of employment and livelihood. The vegetable value chain in Nigeria is currently undergoing a lot of transformation across the different stages which will help strengthen the chain and provide increase in food security. This study therefore examined the problems and prospects of vegetable value chain in Nigeria. Using secondary data sourced through review and synthesis of previous research, documented findings from journal articles, official statistics report from FAO, World Bank, NBS, FMARD, CPIDC and other reputable data base. The study revealed that there are a lot of potentials in the vegetable value chain in Nigeria that included generation of employment to youth and women, use of smart digital tools and enhancement of income and food security. Furthermore, finding showed that the value chain is still underdeveloped with several bottlenecks such as lack of access to quality inputs, innovative production methods, pest and diseases incidences, poor coordination within the chain, post-harvest losses, and insecurity. The value chain was also revealed to have skewed implemented policies and programs towards only one vegetable crop (tomato), there by neglecting other vegetable crops of relevant importance along the chain such as onion and chilli pepper. Vegetable value chain actors in Nigeria should therefore exploit opportunities within the chain to generate more income. It's also recommended that policy direction shall target more vegetable crops and put in place strategies and programmes that will ameliorate challenges affecting the vegetable value chain in Country.

Keywords: Vegetable, Value Chain, Agricultural Policies, Food Security, Nigeria.

Introduction

Agriculture remains the pillar of the Nigerian economy for growth, development, poverty alleviation, contribution to GDP, employment, and income generation (Olutumise, 2020). According to the United State Agency for international Development, (2020) the term "Vegetables" are used to describe plants or plant parts that are usually eaten with meal and are commonly salted, boiled or used as desserts and salad and have been a major component for human diets all over the world. Vegetables may be in form of root, fresh pod, immature fruit, ripe fruits, tender leaf, shoot, immature flower, shoot or bulb, which can include carrot, green beans, okra, tomato, amaranthus, bamboo, cauliflower, and others (Kughur *et al.*, 2018).

Vegetables are very important component of the diet of most Nigerians as well as an important cash crop for many small-scale farmers. It is found in virtually every part of the country and in most areas vegetable production and consumption are expanding rapidly (Saras, *et al.*, 2023). Vegetable crops produced in the past for subsistence purposes have been introduced into a commercial-oriented farming system, like yellow pepper, red pepper, garden egg, tomatoes, okra and different leafy vegetables (Onyishi, 2021). Tomato, pepper, and onion are important vegetables in the global economy due to their high consumption (Schreinemachers, *et al.*, 2018). Tomato is produced across Nigeria and smallholder farmers cultivating between 0.5 and 4 hectares of land account for 90% of production (Sahel, 2017). Tomato production is profitable in Nigeria, and average profit of tomato production under irrigation was ₦128,750 (\$ = ₦350) in Kogi and Benue State (Ayoola, 2014), while the rate of naira on naira invested on tomato production in Kano was 1.5 indicating profitability of the enterprise (Katanga *et al.*, 2018). Pepper is a rich source of vitamins in human diet. Pepper is a high value crop and has economic significance in the world market. It has potentials to generate foreign exchange and can be utilized in confectionary, medicinal, and culinary purpose (Mohammed *et al.*, 2016). Onion is an important vegetable and is of commercial importance throughout the world (Abdu *et al.*, 2015).

Onion consumption and demand is throughout the year (Obasi and Kalu, 2019). Onion is used as spice, vegetable, salad, and dressing. The production of onion can improve economic status and welfare of farmers. The proportion of vegetables required in a balanced diet per capita meal is of the order of 45 % of the total volume of food (Afodu, 2015). According to Nicholas *et al.*, (2012), development of agriculture along the value chain provides an avenue to lift many people out of poverty since it opens opportunities for decent jobs and dignified lives for millions of people. As a result, Nigeria government has identified investment in agriculture and value chains as one of its priority areas as part of its diversification strategy, and also to attain its cardinal goals which are food security, increase exportation, and enhance livelihood (Saras *et al.*; 2023).

Value chain is a full range of activities and participants involved in moving agricultural products from input suppliers to farmers' fields, and ultimately, to consumers (Miller and Jones, 2010). It helps in understanding of connection among actors in the chain and the way trade takes place. The value chain approach presents a good picture of the process of creating value. Vegetable crops could be used as an alternative means or on farm ground diversification to cope with failure of major food crops and hence contribute to poverty reduction.

Problem Statement

Despite the importance of vegetable crops value chain, the sector still remains relatively under-developed. According to Oyedele and Adenegan, (2017), Vegetable crops are being neglected and are not often mentioned as possible income-generating farm crop in Nigeria. Although to so many literatures have reported evidence of positive effects of vegetable

farming on poverty reduction and food security, little attention has been paid to the significance of vegetable crops along the crop value chain in Nigeria (Plaisier et al. 2019). There still certain areas that are still understudied within the vegetable value chain, areas such as contribution of vegetable production, processing, and marketing to improve the rural livelihood, support systems available for vegetable value chain actors, opportunities that exist along the vegetable value chain, and existing agricultural policies that help value chain actors exploit the full potential of the sector (Liverpool-Tasie et al, 2021). The rationale behind this review study was to identify prospect and challenges of vegetables value chain so as to guide policy direction, new entrants and existing actors into the vegetable value chain to make informed decisions about which specific aspect of value areas to pay more attention. In order to achieve ultimate aim of improving national food security and livelihood of various actors along the vegetable value chain.

Objectives of the study

The main objective of the study was to examine the problems and prospects of the vegetable value chain in Nigeria. Meanwhile the specific objectives were to:

- i. examine the production pattern in vegetable value chain;
- ii. examine the agricultural policies along the vegetable value chain;
- iii. describe the constraints along the vegetable value chain, and
- iv. identify the prospects along the vegetable value chain in Nigeria.

Theoretical/Conceptual framework

Sustainable Value Chain Theory

The concept of sustainable value chains (Fearne 2009), from which a framework for sustainable value chain analysis (SVCA) emerges to encompass environmental and social impacts within a collaborative model of value chain management. It explores the dimensions on which SVCA should focus and illustrates how and why taking broader perspectives ensures a chain's internal economic sustainability is compatible with its external socio-environmental consequences. Sustainable value chain aims to optimize resources and focus on stewardship in all activities throughout the entire chain (Thomas *et al.*, 2017). Sustainable value chain also involves procedures for improving production and environmental performance concurrently to achieve complete socio-economic improvement and better quality of life to consumers (Kung *et al.*, 2012). Porter and Kramer (2011) updated concept of 'shared value creation' – value that is mutually beneficial to both the value chain and society, reflects a number of trends in strategic management and value chain research. A narrow focus on efficiency may result in reducing waste and costs but is unlikely to create any additional value. Furthermore, there is growing interest in looking beyond internal economic costs and benefits to investigate why and how to incorporate broader societal costs and benefits in ways which contribute to long term (sustainable) competitive advantage.

Concepts of Value Chain

A value chain encompasses the full range of activities and services required to bring a producer or service from its production to its end use (Kaplinsky, 2001). Value chain includes process actors like input suppliers, producers, processors, traders and consumers. At one end are the producers – the farmer who grow the crop and raise the animal. At the other end are consumers, who eat, drink and wear the final products. In the middle are hundreds and thousands of individuals and firms, each performing one small step in the chain: transporting, processing, storing, selling, buying, packaging, checking, monitoring, and making decision. It also includes a range of services needed in the value chain including technical support (extension), business enabling and financial services, innovation and communication, information brokering. Value chain analysis often starts with linear mapping of activities in the chain from the initial input suppliers at the very beginning of the production process to the final consumption of products or services (Stamm and Drachenfels, 2011). It facilitates a clear understanding of the sequence of activities and the key actors and relationships involved in the value chain.

Material and Methods

Study Area

The scope of this study is Nigeria. Nigeria is made up of 36 States and the Federal Capital Territory (FCT), Abuja. It has 774 Local Government Areas (LGAs) and a population of 158.4 million (World Bank, 2010), based on the annual growth of 3.6% the population is now above 200 million. Nigeria is in West Africa on the Gulf of Guinea between Benin and Cameroon and lies between latitudes $4^{\circ}1''$ and $13^{\circ}9''$ N and longitudes $2^{\circ}2''$ and $14^{\circ}30''$ E. It has an area of 923,768 square kilometers and shares borders with Cameroon in the East, Chad in the Northeast, Niger in the North, and Benin in the West. Nigeria climate is arid in the North, tropical in the center, and Equatorial in the South. Mean maximum temperatures are 30°C – 32°C in the South and 33°C – 35°C in the North. High humidity is characteristic from February to November in the South and from June to September in the North while low humidity coincides with the dry season. Annual rainfall decreases Northward and rainfall ranges from about 2,000 millimeters in the coastal zone (averaging more than 3,550 millimeters in the Niger Delta) to 500–750 millimeters in the North (Federal Research Division, 2008).

Method of Data Collection

The data for the study was based on secondary data. The data was sourced through review and synthesis of previous research, documented findings from journal articles, official statistics report from food and agriculture Organization (FAO), World Bank, National bureau of statistics (NBS), Federal Ministry of Agricultural and Rural Development (FMARD), Center for Promotion of Import from Developing Countries (CPIDC) and other reports from different sources.

Data Analysis

The data for this study was analyzed using descriptive statistics such as graphs and tables.

Results and Discussion

Production Patterns in Nigeria Vegetable Value Chain

The result in Figure 1 shows the production of Tomatoes, Onions and Chili peppers value chain in Nigeria. Nigeria produced more than 3.9 million tonnes of tomatoes in 2019.

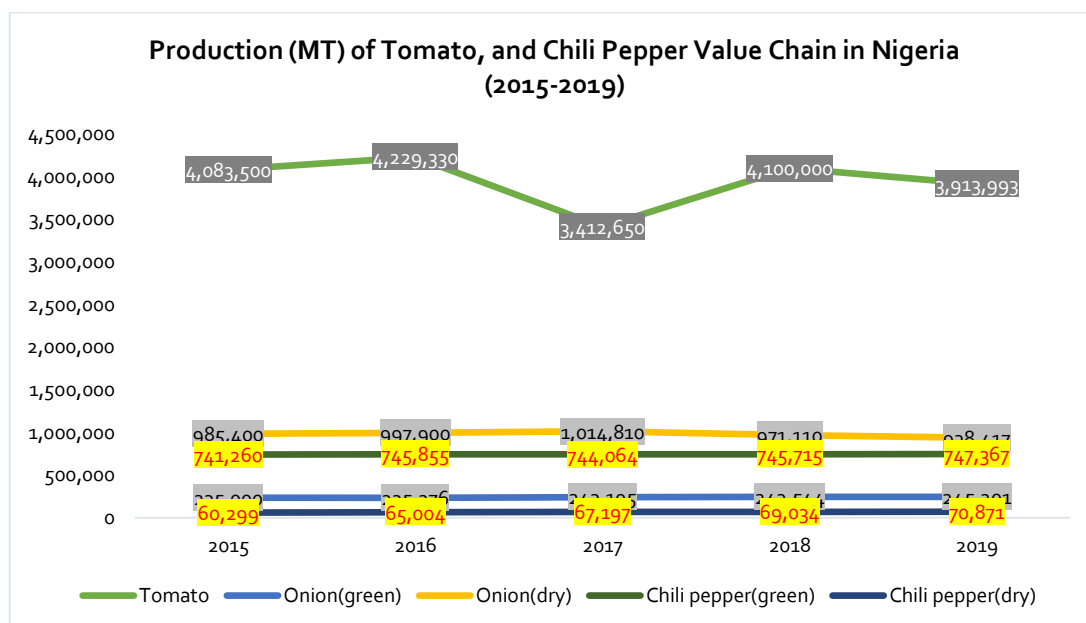


Figure 1: Production (tonnes) of Tomatoes, Onions, and Chilli Pepper in Nigeria 2015 – 2019 (FAOSTAT)

The result in figure shows that pattern of production of vegetables (Tomato, Pepper, and Onions) from from 2015-2019. During the last 5 years, production has been a bit volatile. Since 2016, the production levels have been on a declining trend, as during this period most tomato producers suffered significant losses due to the crop disease “tuta absoluta”. Sector experts indicate that this trend will improve given that there is renewed interest by the government to revive the value chain and some key investments are being made by large companies such as Dangote, Olam and small medium enterprise like Tomato Jos. At optimal production Nigeria registered an estimated 2.2 million tonnes of onions in production for 2019, thereby meeting its local demand, with around 0.3 million tonnes in excess. As of early November, the prices of onions have significantly increased due to scarcity of onions on the market. There has been a 325 percent increase in the price of dry onions from an average of N20,000 (44 Euros) recorded earlier in January 2020 to N85,000 (188 Euros) as of November 10, 2020. Also, a 261.1% increase in the price of green onions from N18,000 (30 Euros) to N65,000 (143 Euros), based on reports from CPIDC (2021). Other sources claim that Nigerian onions are exported to neighboring Niger, Benin, Senegal,

Cameroon and other countries (National Bureau of Statistics, 2017). Chili production volume is around 818,000 tonnes. It has grown steadily over the last 5 years. Sector experts predict that this trend will continue, because in 2018, the sector got a boost from a new species, yellow pepper (locally called Ose Nsukka - meaning Nsukka pepper) which is said to grow only on Nsukka soil in the Northern zone of Enugu state (CPIDC, 2021).

Agricultural policies along the Vegetable Value Chain in Nigeria

There are several agricultural policies in Nigeria. However, this study highlighted selected agricultural policies, programs and interventions with respect to vegetable value chains in Nigeria, the summary was presented in Table 1. Most of the highlighted policies were initiated by the federal government in Nigeria, with support from private and public organization. The aims of these policies were to promote an efficient road map for vegetables production and reduction of harvest losses through efficient storage and processing technologies as well as improving market access. In general, the result revealed that implementation of some of these policies will enhance growth and development in the vegetable value chain in Nigeria. the findings in Table 1 revealed that the policy programmers were skewed to improving only tomato vegetable crop, thereby neglecting emphasis on the Onion and chilli pepper as well as other vegetable crops that are paramount to food security and income generation. Therefore, hence forward, subsequent policies shall target intervention in other vegetable crops especially onions and Chilli pepper.

Table 1: Relevant policies to within the Vegetable value Chain in Nigeria

Relevant policies/Year	Description	Value chain	Support organization(s)
Nigeria Agricultural Waste Policy (2018)	The new policy document considers the wastes generated from agricultural production but lacks depth. A separate agricultural waste Management policy is currently in draft.	Agriculture	Nigeria federal ministry of environment
Tomato policy (2017)	Nigeria government plan to reduce importation of tomato products, increase local production, encourage value chain activities in production and processing of tomato, increase import tariff fees and additional fee of 1,500 USD per metric tonne, implementation was not successful.	Tomato	Federal government of Nigeria
Anchor Borrower Programme, (2016-2020)	CBN's Anchor Borrower's Programme is aimed at creating a link between off-taker companies' involved processing and smallholder producers of some agricultural commodities. Tomato was one of the target crop. Loan was provided by the CBN, tomato out grower association of Nigeria purchased thousands of plastic crates for their farmers through the loan.	Tomato	Central bank of Nigeria (CBN).
Various Government initiatives	Agricultural promotion policy (APP), Growth enhancement support (GESS), Agricultural credit guarantee scheme (ACGSF), Commercial Agriculture Credit Scheme (CACS), and Nigeria Incentive, based Risk Sharing System for Agricultural Lending (NIRSAL). These programmes are world bank funded projects which also involves the Federal Government of Nigeria and participating states, African Development	Agriculture	Federal Government of Nigeria, Federal Ministry of Agriculture (FMARD) World Bank, Africa Development Bank

	Bank and World Bank Funded Rural Agricultural Access and Marketing Project (RAAMP), (which is in the third phase). The Agro Processing, Productivity Enhancement and Livelihood Improvement Support – APPEALS Project is a 6-year project developed by the Federal Ministry of Agriculture and Rural Development (FMARD) in collaboration with the World Bank and other stakeholders.		
YieldWise program, (2016-2023)	TechnoServe is supporting value addition activities along the tomato value chain (providing equipment and certification), which, together with other project initiatives, will contribute significantly to reducing post-harvest losses, curtail the reliance on imported tomato products, and generate direct and indirect employment for women and youth. The Rockefeller foundation has launched YieldWise, a \$130 million initiative to demonstrate how sub-Saharan Africa can cut post-harvest losses in half by 2030. The initiative, which was 7-year programme.	Tomato	Technoserve, Rockefeller Foundation
Postharvest Loss Alliance for Nutrition (PLAN), (2017).	PLAN was developed as a tool to address the loss and waste of nutrient dense perishable foods and will begin by targeting horticulture crops, which are typically some of the most nutritionally dense foods in the human diet	Tomato, Pepper, onions (Horticulture in general)	GAIN
Nigeria Competitiveness Project (NICOP), (2018-2022)	Strengthen farmer and buyer organizations with better business practices, standardization and market linkages. Target states were kaduna, Kano, plateau, Kebbi, Oyo, Ogun and Lagos states.	Tomato and Chili	EU, GIZ, Federal Ministry of Agriculture (FMARD)
Toward Sustainable Agribusiness Clusters through Learning in Entrepreneurship (2SCALE) project	The IFDC/2SCALE project is collaborating with Tays Foods Limited (TFL) in Nigeria and the World Vegetable Center to work with onion farmers, traders, and other onion value chain actors to ensure more of the onion harvest makes its way to markets and consumers. TFL intends to build over 700 metric tons of onion storage and processing facilities for white onion powder production	Onions	IFDC /2 SCALE, Tays Limited, World Vegetable Center The project is funded by DGIS, Netherlands.

Source: Centre for promotion of import from Developing countries, (CPIDC) Report, 2021)

Constraints along the Vegetable Value Chain Nigeria

The major constraints along the vegetable value chain were presented in Table 2. Review findings showed poor access to quality inputs, pest and diseases incidences, low skills in terms of knowledge on good agronomic practices, unmanaged seasonal gluts, poor coordination within chain, post-harvest losses, poor road network, and importation of vegetables from foreign countries were the major bottlenecks to vegetable value chain in Nigeria. These issues play key roles in the production, processing, and marketing of vegetables in the country. Other challenges Identified were problems of bio security, theft, kidnapping and bandits in the production site and frequent delays by police and customs which affect vegetable marketing transportation during long distance travels. In order to enhance the overall vegetable value chain, there is need for the policy makers and intervention programs to provide strategies that will ameliorate the identified constraint so as utilized the paramount of vegetable value chain in food security and provision of employment for national development.

Table 2: Major Constraints of Vegetable value chain in the Nigeria

Constraints	Major Concerns	Literature
i. Lack of good quality input	Seed, fertilizer, and crop protectives	Sahel, (2017).
ii. Low Skills on crop management and GAP	Poor knowledge on good agronomic practices among small holder farmers in Nigeria	Suleiman <i>et al.</i> (2020).
iii. High rate of diseases and pests	Numerous outbreaks of pest and diseases that affects output and income of farmers in Nigeria	Suleiman, <i>et al.</i> (2020), Saras <i>et al.</i> (2023)
iv. Poor coordination with the rest of the chain	Poor coordination across other actors within the vegetable value chain in Nigeria	Utobo <i>et al.</i> (2022)
v. Poor crop handling and storage at harvesting	Poor handling of vegetable across all the various stages within the value chain	Centre for promotion of import from Developing countries, (CPIDC), (2021)
vi. Security challenges	Problems of bio security, theft, kidnapping and bandits across vegetable value chain in Nigeria	CPIDC, (2021)
vii. unmanaged seasonal production glut	Poor knowledge on how to manage glut especially for vegetables because of it perishable state in Nigeria.	Thompson, <i>et al.</i> (2018).
viii. Insufficient modern value chain facilities	Insufficient modern facilities existed along the vegetable value chain in Nigeria.	PWC,(2017), Utobo <i>et al.</i> (2022)
ix. Poor transport and packaging system	Poor vehicle condition used during transport, overloading of trucks and the use of poor packaging materials during transport of vegetables in Nigeria.	Suleiman <i>et al.</i> (2020).
x. Delay by security agents during long transit	Frequent delays by police and customs which affect vegetable produce during long distance	CPIDC, (2021)
xi. Poor road network	Presence of poor road network system across different areas especially in the rural locations of Nigeria	Ugonna <i>et al.</i> (2015).
xii. Traffic constraints and rough offloading at major vegetable value chain centers.	Too much traffic exists within the value chain from production, processing, and marketing which can lead to damage or food loss in Vegetable value chain.	Sahel, (2017), 2scale report (2021)
xiii. Importation of vegetables and concentrates.	The presence of too many importations affects the vegetable value chain in Nigeria.	CPIDC, 2021

Source: Author Concept, 2025

Prospects along the Vegetable Value Chain in Nigeria

The results in Table 3 highlights some opportunities along the vegetable value chain in Nigeria. The prospects ranges from cost effective production of opportunity for smallholder farmers, adoption of circular economy, value addition, use of smart digital tools, women and youth engagement, creation of alternative transportation sources, and government support. All these potentials along the vegetable value chain can enhance increased productivity, and income to value chain actors in Nigeria if properly harnessed. Policy interventions shall venture in to those already identified opportunities especially the use of smart Agricultural practices as well as promotion of women and youth engagement in vegetable value chain activities. This is in order to achieve ultimate goal of food security, employment generation and income through vegetable value chain activities.

Table 3: Opportunities along the Vegetable value in Nigeria

Opportunities	Key areas	Literatures
i. Value chain actors	Small holder farmers can be involved in production, processing, marketing of vegetable in Nigeria.	2scale report, (2021), Ibrahim (2016)
ii. Application of circular economy solutions	possibility of applying circular economy solutions to address food loss in the vegetable value chains in Nigeria	CPIDC, 2021.
iii. Improvement on existing local solutions to waste management	Some local solutions already exist, such as Zero energy cooling chambers, locally developed reusable plastic crates for packing during transport, aggregation packing houses, solar drying system, and Cool hubs.	2scale report, (2021)
iv. Value addition activities	Further the Value addition through processing is possible for different vegetable crops in Nigeria.	2scale report, (2021),
v. Application of digital smart tools	applying digital smart tools such as Blockchain, Artificial Intelligence, Drones, satellite imaging, digital sensors, and advanced data analytics to improve vegetable operations within the value chain.	CPIDC, (2021).
vi. Youth and Women Engagement	Opportunities exist for youth and women within the vegetable value chain in Nigeria.	Oluwalana <i>et al.</i> (2019)
vii. Group dynamics	Existence of farmers in form of association can be area of opportunities for farmers within the vegetable value chain.	2scale report, (2021)
viii. Alternative source of transport	Cool chain transport and rail as alternative to road in Nigeria	CPIDC, 2021
ix. Government support programs	Government support programs which can serve as linkages offtakes and value chain actors.	CPIDC, 2021

Source: Author's concept, 2025

Conclusion

This study investigated the problems and prospects of vegetable value chain in Nigeria. The study concluded that there are a lot of potentials in the vegetable value chain in Nigeria these included generation of employment to youth and women, use of smart digital tools and enhancement of food security. However, the value chain is still underdeveloped with several bottlenecks such as lack of access to quality inputs, innovative production methods, pest and diseases incidences, poor coordination within the chain, post-harvest losses, and insecurity. The value chain was also revealed to have skewed implemented policy direction to only one vegetable crop, there by neglecting other vegetable crops of relevant importance along the chain such as onion and chilli pepper.

Recommendations

The study proffers the following recommendation for and improved performance of the Vegetable value chain in Nigeria.

- Vegetable value chain actors in Nigeria should exploit more opportunities within the chain to generate more income, such as participation in the supply chain of quality inputs and outputs

- Intervention programmes shall improve capacity of the actors through trainings on modern production methods and marketing strategies.
- Government, NGOs, and private firms should come up with programmes and relevant policies which can tackle challenges of infrastructure and insecurity that can help improve vegetable value chain performance in Nigeria.
- The value chain actors should also improve mode of operation across the stages of the value chain to increase their productivity, income, and livelihood.
- Future studies shall focus on evaluating the enterprenual activities of various actors along the vegetable crops value chain.

Ethical Considerations

The secondary data sourced were obtained from licensed data basis available for research purpose. And the data was used for the purpose of this study review only.

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References

- 2Scale Report (2021). Diversifying market opportunities for onion farmers (2021). online: <https://www.2scale.org/en/partnerships/diversifying-market-opportunities-for-onion-farmers-in-sokoto-northwestern-nigeria-en>, viewed in January 2021.
- Abdu Z, Abba A, Chigoze AS, and Mohammed A.B (2015). Resource use efficiency in onion production among participating and non-participating farmers in Hadejua Valley, irrigation project, Jigawa state Nigeria. *Journal of Agriculture and Veterinary Sciences*. 8(8),69-73
- Afodu, N. C. (2015). Analysis of resource productivity and the level of fertilizer – manure substitution among vegetable farmers in the southern region of Nigeria. *Mediterranean Journal of Social Sciences*, 3(2), 35-46.
- Ayoola, J.B (2014). Impact of irrigation on economic viability of vegetable farming in selected local Government areas of Kogi and Benue states, Nigeria. *Proceedings of the annual national conference of the Nigerian Association of Agricultural Economists*. Held at the Federal University of Technology, Akure, Nigeria.
- Centre for promotion of import from Developing countries, (CPIDC) Report (2021). Food Loss in Nigeria – Value chain Analysis of Tomato, Onions and Chili Pepper Value Chains. 1-74.
- Fearne, A. (2009) Sustainable Food and Wine Value Chains, Government of South Australia, Available online: http://www.thinkers.sa.gov.au/images/Fearne_Final_Report.pdf (accessed 15 May 2010).
- Ibrahim, K.A (2016). Analysis of Value Chain of Irrigated Tomato in Kano State, Nigeria. A Thesis Submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria in Partial Fulfilment of the Requirements for the Award of Doctor of Philosophy (Ph. D.) Degree in Rural Development.1-170.
- Katanga Y.N, Danwawu S.S, Musa B. (2018). Economic Analysis of Tomato Production in Fagge local Government, Kano state, Nigeria. *Journal of Economics and Development Studies*.6 (2), 98-104.
- Kaplinsky, R. and Morris, M. (2001). A Handbook for Value Chain Research. Prepared for the IDRC, Institute of Development Studies, Sussex. 109.

- Kughur, P., Gyanden, O., Omaku, S. and Isa, M. (2018). Assessment of Input Needs of Women Vegetable Farmers in Gwer-East Local Government Area of Benue State, Nigeria; *Agricultural Sciences International Technology and Science Publication*, 2(1), 20-30.
- Kung, F. H., Huang, C. L. and Cheng, C. L. (2012), "Assessing the Green Value Chain to improve Environmental Performance: Evidence from Taiwan's Manufacturing Industry", *International Journal of Development Issues*, 11 (2), 111-128
- Liverpool-Tasie, L.S.O, T. Reardon, B. Belton. (2021). "Essential non-essentials": COVID-19 policy missteps in Nigeria rooted in persistent myths about African food value chains. *Applied Economic Perspectives and Policy*, 43(1), March: 205-224. <https://doi.org/10.1002/aep.13139>
- Obasi, I.O., and Kalu, O.N (2019). Structure and efficiency of onion market in Umuahia area of Abia state, Nigeria. *International Journal of Economic and Business Management*. 5(1), 40-47
- Olutumise, A.I (2020). Transportation System and Output Market Participation Nexus among Yam Producers in Southwest Region of Nigeria. *Economic Engineering in Agriculture and Rural Development*, 20(4), 365 – 379.
- Oluwalana, T., Okeleke, S. O. and Akinbosoye, T. B. S (2019). Economics Analysis of Small-Scale Vegetable Production in Odeda Local Government Area of Ogun State. *Direct Research Journal of Social Science and Educational Studies*, 6 (9), 127-132.
- Oyedele, O. A., and Adenegan, K. O. (2017). Impact of the production of underutilized vegetables on the livelihood of farmers in Southwestern Nigeria. *International Journal of Social Economics*. 44(12), 1669–1682
- Plaisier, C., Sibomana, M., Van der Waal, J., Clercx, L., Van Wagenberg, C.P. and Dijkxhoorn, Y., 2019. Approach for designing context-specific, locally owned interventions to reduce postharvest losses: Case study on tomato value chains in Nigeria. *Sustainability*. 11: 247. , doi:10.3390/su1101
- PWC (2017) X-raying the Nigerian tomato industry Focus on Reducing Tomato Wastage, online: <https://www.pwc.com/ng/en/assets/pdf/nigeria-tomato-industry.pdf>, viewed in November 2020.
- Sahel (2017). Catalyzing Sustainable Agriculture and Nutrition. *Sahel Capita Partners and Advisory Limited*. 15(1).
- Sanusi, M.M. and Dada, O.D (2016). Profitability Analysis of Marketing Tomato in Odeda Local Government Area of Ogun State, Nigeria. *Ife Journal of Agriculture*, 28(2), 91-101.
- Saras, J. Z., Oladimeji, Y. U., Sani, A. A. and Suleiman, R (2023). Profitability And Constraints of Peri-Urban Vegetable Production in Kaduna State, Nigeria. *Nigerian Journal of Agriculture and Agricultural Technology (NJAAT)*, 3(1), 230-239
- Schreinemachers, P., Simmons, E. B., and Wopereis, M. C. (2018). Tapping the economic and Nutritional Power of Vegetables. *Global Food Security*, 16, 36–45.
- Suleiman, R, Olorukooba, M.M , Oladele, O.N , Emeghara, U.U and Yahaya, U.F(2020). Benefits and Constraints Associated with Horticultural Farming Among Rural Dwellers in Birnin Gwari Local Government Area of Kaduna State, Nigeria. *Global Science Journal*, 8(6), 332-341.
- Thompson J.F, Mitchel F.G, Kashmire R.F (2018): Room Vacuum transport and Ice Cooling Crassestor (eds). Commercial Cooling of Fruit, Vegetable and Flower Published 21567, University of California, Division Griculture and Natural Resources. 23 – 30.
- Thomas, M., Costa, D. and Oliveira, T. (2016), "Assessing the role of IT-enabled process virtualization on green IT adoption", *Information Systems Frontiers*, 18 (4), 693-710.
- Porter, M.E. and Kramer, M.R. (2006) Strategy and Society, the Link Between Competitive Advantage and Corporate Social Responsibility, *Harvard Business Review*, 84 (12), 78- 92.
- Stamm, A. and Drachenfels, C.V. (2011). International Labour Organization Value Chain development: Approaches and activities by seven UN agencies and opportunities for interagency Cooperation. International Labour Office, Geneva.

- Ugonna, C. U., Jolaoso, M. A. and Onwualu, A. P. (2015). Tomato Value Chain in Nigeria: Issues, Challenges and Strategies. *Journal of Scientific Research and Reports*, 7(7), 501-515.
- USAID market links (2020). What is value chain Governance? Online: <https://www.marketlinks.org-good-practices/centre/value-chain/wiki/value-chain-governance-overview>. viewed November, 2020.
- Utobo, O., Ezeano, C.I., Umebali, E.E., Okeke, C.C. and Nwibo, M.O (2022). Profitability Analysis of Dry Season Fluted Pumpkin Production among Smallholder Farmers in Okigwe, Southeastern Nigeria. *FUDMA Journal of Agriculture and Agricultural Technology*, 8 (1), 8-17.
- World Vegetable Center (2020). Increasing production and reducing postharvest losses of onion in Nigeria, online: <https://avrdc.org/increasing-production-and-reducing-postharvest-losses-of-onion-in-nigeria/>, viewed in November 2020.