



ANALYSIS OF PROFITABILITY AND VALUE ADDITION ALONG GINGER VALUE CHAIN IN KADUNA STATE, NIGERIA

¹Sambo, A. S., ²Mohammed, A. B., ²Suleiman, A., ³Mustapha, A., ⁴Aminu, Y. A. and ⁵Bada, M. M.

¹Department of Agricultural Economics, Kaduna State University, Kaduna, Nigeria

²Department of Agricultural Economics and Extension, Bayero University, Kano

³Center for Dryland Agriculture, Bayero University, Kano, Nigeria

⁴North-West Development Commission, Headquarters, Kano, Nigeria

⁵Department of Agricultural Economics, Yobe State University, Damaturu

Corresponding Author's Email: ashafa.sambo@kasu.edu.ng, **GSM:** 08061616100

ABSTRACT

This study analyzed the profitability of ginger value chain in Kaduna State, Nigeria. Multi-stage sampling technique was used to select 160 producers, 55 wholesalers, 109 retailers, and 53 processors for the study. Seven exporters operating in Dawanau Market were sourced through key informants and all of them were selected. Primary data were collected using structured questionnaire, interview and analyzed using descriptive statistics and farm budgetary techniques. The results showed that ginger production in Kaduna State was profitable with gross margin of ₦273,107.29/ha. Similarly, among the marketers, results of marketing margin analysis showed that ginger marketing was also profitable, with marketing margins of ₦81.27/kg and ₦120.76/kg for wholesalers and retailers respectively. Our findings further showed that ginger processing was the most profitable segment along the value chain, with the processors recording processing margins as high as ₦397.44/Kg and ₦256.65/Kg for processed ginger with and without others spices respectively. Further, export margin of ₦333,032.82/ton recorded by ginger exporters showed that the ginger exporting enterprise was profitable. Our findings further revealed that the highest value addition along the value chain was in the processing segment of the chain, which amounted to ₦2,567.37 per kg. The study concludes that ginger enterprises along the value chain were profitable and worthwhile. It recommends that the government, through collaboration with development partners and/or value chain development projects should make adequate supply of high quality and affordable fertilizer, which constitute a major cost component in the production segment, in order to improve profitability along the entire chain.

Keywords: Profitability, Value-added, Ginger, Value-chain, Kaduna, State.

INTRODUCTION

Agriculture contributes to socioeconomic development through income growth, food security, households' livelihood, poverty alleviation, gender empowerment, and environmental sustainability (Mmasa, 2017). This applies especially to developing countries where the agricultural sector is at the heart of their economies. It accounts for more than 25% of their Gross Domestic Product (GDP), employs over 65% of their working adult population, represents a major source of their foreign exchange, supplies the bulk of basic food, and provides subsistence and other income to more than half of their population (Nwogwugwu *et al.*, 2023). This implies that developing the agricultural sector in developing countries like Nigeria can directly affect poverty reduction, improving livelihoods and households' well-being. One of the multiple ways by which the above can be achieved is through developing the key value chains that could drive the economy, and one of such key value chain crops is ginger. Ginger (*Zingiber officinale*) belongs to the order *Scitamineae* and the family *Zingiberaceae*. It is the underground stem (rhizome) of a perennial herb, which is used as a spice and preservative and has many medicinal and culinary uses. The global production output of the crop was put at 4.89 million tonnes, with India as the largest producer (2,225,000 tonnes), followed by China (660,834 tonnes) (FAOSTAT as cited in UNdata, 2024). In 2005, Nigeria occupied the fourth position in terms of ginger production behind China, India, and Indonesia. However, the annual production output for ginger in Nigeria has been fluctuating over the years. For example, in 2011, 2012, and 2013, total quantities of



ginger produced in Nigeria were 460,170; 380,000, and 496,920 tonnes respectively. There was a sharp decline in ginger output in the year 2014 which puts the total output at 58,190 tonnes and made Nigeria the 6th largest producer of the crop in the world in that year, with a world production share of only 2.7% (FAOSTAT, 2020).

In Nigeria, ginger is commercially produced in large quantities in Kaduna State, which is the largest producer, producing over 85% of the total ginger output of Nigeria, averaging over 400,000 metric tonnes per annum (Kaduna State Investment Promotion Agency (KADIPA), 2021). The potential for ginger production in Kaduna State is great. For example, Omeni (2014) reported the state as having the right soil and ecological requirements needed for ginger production which includes fertile loamy soil, annual rainfall of up to 1530mm in the Southern part of the state, the average daily temperature of 30°C, good drainage and availability of labour. Despite this enormous potential, ginger yields are reported to be low in the state. For instance, a report published by FAOSTAT (2020) showed that several farms in Kaduna State could only produce about 2-5 tonnes per hectare. Yet under improved cultivation conditions, and with high-yielding varieties, yields of more than 30-35 tonnes per hectare were recorded in other parts of the world (Geta & Kifle 2011; and Indiaagronet, 2017). This leaves a yield gap of about 28 tonnes per hectare. This could result in low market supply of the commodity to marketers, processors and even consumers of ginger, which could cause prices to go high in all the segments of the value chain, hence affecting profit margins.

Additionally, endeavours on innovations were restricted to production practices, with minimal or no coordinated efforts to further develop product quality, which is profoundly affected through its value chain. Production itself cannot be sustained without developing the marketing and processing segments of the value chain, they must be aligned as they complement one another in ensuring the sustainability of the enterprises. Reardon *et al.* (2012) noted that the midstream segment is increasingly important to be paid less attention to in academic and policy debates. In the export segment, Nigeria has remained an exporter of raw ginger without adding much value to the crop. As a result, the country loses a significant value of its export by failing to produce high-value products from this important cash crop through processing. Against the above background, this study seeks to explore and bring to light, in-depth empirical findings on ginger value chain; and see how profitable these activities are.

The objectives of this study were to:

- i. Estimate the costs and returns along the ginger value chain;
- ii. estimate the value added along ginger value chain

METHODOLOGY

The Study Area

The study area Kaduna State, whose map is shown in Figure 1. The State is located between 10°20'N 7°45'E and 10.333°N 7.7°50.0'E, and has a total of 23 LGAs, with land area of 46,053km² (www.kdsg.gov.ng/dengraphics). It is situated in the Guinea Savannah Agro-ecological Zone of Nigeria, with the Southern part of the state located in the Southern Guinea Savannah. It has two seasons; the dry season and the rainy (wet) season. The wet season is from April through October with greater variation as one moves up north of the state. There is heavy rainfall in the southern part of the state with an average of about 1530mm per annum, which makes it suitable for ginger production (Online Nigeria). According to the National Bureau of Statistics, the state has a population growth rate of 2.4%, with a 2022 projected population of 9,251,648 persons (www.kdsg.gov.ng/dengraphics). Agriculture is the mainstay of the economy of the state with about 80 percent of the people actively engaged in farming. The state is the largest producer of ginger in Nigeria, which is the major cash crop, produced in commercial quantities, with Kachia, Jaba, Kagarko, Jema'a, and Zangon Kataf Local Government Areas as the major areas of production (Kaduna State Investment Promotion Agency (KADIPA), 2021 and Kaduna State Bureau of Statistics, 2017). Additionally, People in the area are engaged in trading, with ginger as the major cash crop. Popular ginger markets in Kaduna State are Kachia, Maraban Waliyo, Kagarko, Kubacha, Kwoi, Gadu, and Kafanchan markets. Ginger from these markets and the production clusters are commonly off-taken to markets in the neighbouring states, and popular among such markets is the Dawanau market, Kano.



Figure 1: Map of Kaduna State, Showing the Study Area. Source: Bala (2016)

Sampling Techniques and Sample Size

Sampling of Ginger Producers

Multistage sampling technique was used to select ginger farmers for the study. In the first stage, four Local Government Areas (LGAs) were purposively selected based on their intensity of ginger production. As such, Jaba, Jema’a, Kachia and Kagarko LGAs were selected for the study. In the last stage, a random selection of ginger producers was conducted using microsoft excel randomization in each of the LGAs. This was achieved using a list of ginger producers obtained from Kaduna State APPEALS Project. Producers’ sample size was calculated using the Raosoft sample size calculator at 99% confidence interval. This gave a total of 160 producers sampled for the study.

Table 2: Sampling of Ginger Producers

LGAs	Sample frame	Sample size
Jaba	126	47
Jema’a	93	39
Kachia	92	38
Kagarko	88	36
Total	399	160

Source: Kaduna State APPEALS Project, 2021

Sampling of Ginger Marketers

Ginger marketers were selected using a multi-stage sampling technique. The first stage involved purposive selection of four LGAs based on the availability of ginger markets. Therefore, Jaba, Jema’a, Kachia and Kagarko LGAs were selected. One (1) prominent market was purposively selected from each of the LGAs selected in stage two due to concentration of ginger marketers. As a result, Kwoi market in Jaba LGA, Kafanchan market in Jema’a LGA, Kachia market in Kachia LGA and Kagarko market in Kagarko LGA were selected for the study. In the last stage, a random selection of wholesalers and retailers was conducted from a list of marketers obtained from Kaduna State APPEALS Project. This gave a total of 55 wholesalers and 109 retailers included in the study.



Table 3: Sampling of Ginger Marketers

LGAs	Markets	Wholesalers		Retailers	
		Sample frame	Sample size	Sample frame	Sample size
Jaba	Kwoi	48	12	98	27
Jema'a	Kafanchan	45	12	105	30
Kachia	Kachia	76	21	136	38
Kagarko	Kagarko	30	9	50	14
Total		199	55	389	109

Source: Kaduna State APPEALS Project, 2021

Sampling of Artisanal Ginger Powder Processors

The processors were sampled using multi-stage sampling. This was achieved using a list of ginger powder processors obtained from the Kaduna State APPEALS Project. Five LGAs were purposively selected in the first stage based on the availability of ginger processors. Hence, Chikun, Igabi, Kaduna North, Kaduna South and Zaria LGAs were selected. In the second stage, all (100%) of the processors were also selected for the study. This gave a total of 53 ginger processors selected for the study.

Table 4: Sampling of Ginger Processors (ginger powder)

LGAs	No. of members	Sample size (100%)
Chikun	1	1
Igabi	30	30
Kaduna North	2	2
Kaduna South	16	16
Zaria	4	4
Total	53	53

Source: Kaduna State APPEALS Project, 2021

Sampling of Ginger Exporters

Seven (7) ginger exporters operating in Dawanau Market, Kano were identified through a key informant and all of them were selected due to their limited number.

Data Collection

This study used primary data as its main source of information, which were collected using five different sets of structured questionnaires. The questionnaires were administered to the respondents by the researcher with the help of trained enumerators. Information elicited from the respondents are those regarding their socio-economic characteristics such as age, gender, marital status, main occupation, income, educational qualification, household size, and years of experience in actors' respective enterprises, etc. Information on profitability of ginger production, marketing, processing, and export were also collected. These assisted to achieve the objectives highlighted for the study.

Analytical Techniques

Descriptive statistics

Descriptive statistic tools were used to analyze the educed data to describe the constraints affecting ginger value chain actors in the study area. This involved the use of frequency distribution and percentages.

Gross margin analysis

Gross Margin was calculated as an indication of profitability or otherwise of ginger production enterprise. Gross margin is a useful analytical tool in situations where fixed cost is a negligible portion of the total cost. It is defined as the gross income minus the total variable cost (Olukosi and Erharbor, 2005). For this study, gross margin is used because the fixed cost component in ginger production is negligible. It is mathematically defined as:

$$GM = GFI - TVC \dots \dots \dots (1)$$



Where:

- GM = Gross margin received from ginger production (₦/ha)
 - GFI = Gross farm income received from ginger production (₦/ha)
 - TVC = Total variable cost involved in ginger production (₦/ha)
- Gross Farm Income is given as:

$$GFI = Q \times P \dots\dots\dots (2)$$

Where:

Q = Average quantity of ginger harvested (Kg/ha), P = Unit price (₦/Kg)

Total Variable Cost (TVC) of ginger production per hectare was determined using the equation below:

$$TVC = C_1X_1 + C_2X_2 + C_3X_3 + C_4X_4 + C_5X_5 + C_6 + C_7X_7\dots\dots\dots (3)$$

Where:

- C₁ = Unit cost of labour (₦), X₁ = Average quantity of labour per hectare (Man days)
- C₂ = Unit cost of seeds/rhizomes (₦), X₂ = Average quantity of seeds (Kg/ha)
- C₃ = Unit cost of fertilizer (₦), X₃ = Average quantity of fertilizer (Kg/ha)
- C₄ = Unit cost of pesticide (₦), X₄ = Average quantity of pesticide (Ltr/ha)
- C₅ = Unit cost of herbicides (₦), X₅ = Average quantity of herbicides (Ltr/ha)
- C₆ = Cost of mulching (₦/ha), C₇ = Unit cost of slicing and drying (₦)
- X₇ = Quantity of fresh ginger sliced and dried (Kg/ha)

Marketing margin analysis

Marketing margin analysis was used to estimate the costs and return in ginger marketing. It is defined as the difference between the price paid and price received for a commodity. It is mathematically given as:

$$MM = TR - TMC \dots\dots\dots (4)$$

Where:

- MM = Margin for ginger marketing (₦/kg)
- TR = Total revenue (₦/kg) and TMC = Total marketing cost (₦/kg)

NB:

$$TR = P \times Q \dots\dots\dots (5)$$

$$TMC = C_1 + C_2 + C_3 + C_4 + C_5 + C_6 \dots\dots\dots (6)$$

Where:

- P = Unit selling price of ginger (₦/Kg), Q = Quantity of ginger traded (Kg)
- C₁ = Purchase price of ginger (₦/Kg), C₂ = Cost of transporting ginger (₦/Kg)
- C₃ = Cost of handling (loading and off-loading) (₦/Kg), C₄ = Cost of packaging/sacks (₦/Kg),
- C₅ = Commission charges (₦/Kg), C₆ = Gate fees (₦/Kg)

Processing margin

The processing margin was computed to determine the profitability of ginger processing. It was determined using the model below:

$$PM = TR - TVC \dots\dots\dots (7)$$

Where:

- PM = Processing margin (₦/Kg), TR = Total revenue in ginger processing (₦/Kg)
- TVC = Total variable cost incurred in ginger processing (₦/Kg)

NB: TR and TVC were determined using the models below:

$$TR = P \times Q \dots\dots\dots (8)$$



$$TVC = C_1 + C_2 + C_3 + C_4 + C_5 \dots \dots \dots (9)$$

Where:

- P = Unit price of processed ginger (₦/Kg)
- Q = Quantity of processed ginger product (Kg)
- C₁ = Cost of raw ginger (₦/Kg), C₂ = Cost of transportation (₦/Kg)
- C₃ = Cost of other spices (₦/Kg), C₄ = Cost of packaging (₦/Kg)
- C₅ = Cost of milling ginger (₦/Kg)

Export margin

Export margin analysis was to determine the profitability of the exporting enterprises in the ginger value chain. The model below was used to achieve this:

$$EM = TR - TVC \dots \dots \dots (10)$$

Where:

EM = Ginger exporting margin (₦/ton), TR = Total revenue from exporting (₦/ton) and TVC = Total variable cost incurred in ginger exporting (₦/ton)

NB: TR and TVC will be determined using the models below:

$$TR = P * Q \dots \dots \dots (11)$$

$$TVC = C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 \dots \dots \dots (12)$$

Where:

- C₁ = Purchase price (₦/ton), C₂ = Cost of transporting ginger to port (₦/ton)
- C₃ = Cost of freight (₦/ton), C₄ = Cost of documentation (₦/ton)
- C₅ = Cost of inspection (₦/ton), C₆ = Port charges (₦/ton)
- C₇ = Other cost (loading into containers, additional cleaning) (₦/ton)

RESULTS AND DISCUSSION

Estimated Costs and Return of Ginger Production per Hectare

This section presents the estimated costs and return (per hectare) in ginger production in Kaduna State, Nigeria. The results are presented in Table 4. The result showed that the most important cost item was the average cost of seeds/rhizome used for planting, which amounted to ₦176,271.5 per hectare and accounted for 34.27% of the total variable cost (TVC). This was followed by the average costs of fertilizer and labour, which amounted to ₦156,442.6 and ₦98,936.32 per hectare respectively and accounted for 30.42% and 19.24% of the TVC respectively. Average total variable costs, yield (dried weight) and total revenue generated were ₦514,336.20, ₦1,401.2 and ₦787,365.11 respectively, while the gross margin was ₦273,107.29 per hectare. When we prorate the gross margin using the current (2025) market price per kilogram, we got a gross margin of ₦6,439,834 per hectare. The length of ginger production takes 5 months from planting to maturity. When we divided ₦6,439,834 by 5 months, the GM per month (₦1,287,966.82) is higher than the ₦72,000 minimum wage in Kaduna State. This implies that on the average, ginger production in Kaduna State is profitable and worthwhile. This finding is supported by that of Dahiru (2022) which reported that the cost of rhizome was the most important cost item in ginger production and accounted for about 30% of the TVC. He further reported a positive gross margin of per hectare, which is very close to the gross margin recorded for this study.

Table 4: Estimated Costs and Return of Ginger Production per Hectare

Cost items and revenue	Quantity (per ha)	Unit cost (₦)	Amount (₦/ha)	Percentage of TVC
Labour (Man-days)	82.15	1,204.34	98,936.32	19.24
Seeds/rhizome (Kg)	1,083.20	162.7	176,271.5	34.27
Fertilizer (Kg)	686.52	227.9	156,442.6	30.42
Herbicides (Ltr)	9.28	2,763.8	25,648.55	4.99
Mulching (Lump sum)			29,433.07	5.72
Slicing and drying (Kg)	3,984.81	6.92	27,604.21	5.36
Total variable cost			514,336.20	100.00
Average yield (Kg) (dried weight)			1,401.2	
Selling price (Kg)			561.92	
Total revenue generated			787,365.11	
Gross margin			273,107.29	
Operating ratio	0.65			

Source: Field survey, 2023

Estimated Costs and Return of Ginger Marketing per Kg

Table 5 presents the estimated costs and return (per kg) of ginger marketing in Kaduna State, Nigeria. For the wholesalers, the results showed that the average purchasing price was the cost with highest value which amounts to ₦582.35 per kg. Dahiru (2022) found that the average purchasing prices recorded by ginger wholesalers accounted for a high proportion of their total marketing costs. Further, the average total cost of marketing recorded by the wholesalers was ₦606.58 per kg. The wholesalers reported an average selling price of ₦687.85 per kg, hence the estimated average marketing margin was ₦81.27 per kg. Dahiru (2022) found that ginger marketing in Kaduna State was profitable among wholesalers.

Table 5: Estimated Costs and Return of Ginger Marketing per Kg

Cost items and revenue	Wholesalers		Retailers	
	Amount (₦/kg)	% TMC	Amount (₦/kg)	% TMC
Purchasing price of ginger	582.35	96.00	650.70	96.32
Cost of transportation	9.58	1.57	10.23	1.51
Cost of loading and off-loading	3.56	0.58	2.56	0.38
Cost of packaging/sacks	7.17	1.18	8.47	1.25
Commission charges	2.15	0.35	3.54	0.52
Market/gate fees	2.46	0.41	3.41	0.50
Total Marketing Cost	606.58	100%	675.55	100%
Selling price	687.85		796.31	
Marketing margin	81.27		120.76	
% marketing margin	15.33%		18.28%	
Operating ratio	0.88		0.85	

Source: Field survey, 2023

As for the retailers, similarly, the results showed that the average purchasing price of ginger was the most important cost item which amounts to ₦650.70 per kg, accounting for 96% of the total marketing cost. Dahiru (2022) found that the average purchasing prices recorded by ginger retailers in Kaduna State accounted for the highest proportion of their total marketing costs. The average total cost of marketing was ₦675.55 per kg, while the selling price per kg was ₦796.31 for the retailers. The estimated average marketing margin was ₦120.76 per kg, implying that ginger retailers were making



profit. These findings are in line with the findings of Ishaya (2014), Khanal (2018) and Dahiru (2022) who reported that ginger marketing in their respective study areas was profitable among retailers.

Estimated Costs and Return of Artisanal Ginger Powder Processing per Kg

The results in Table 6 presents the estimated costs and return of artisanal ginger processing (per kg). Cost of raw ginger is the item that comprise the highest cost component in the processing of raw ginger into ginger powder, which amounted to ₦2,010.58 per kg and ₦2007.94 of powdered ginger produced for ginger with and without spices respectively, and accounted for 48.09% and 70.26% of the TVC respectively. For ginger with spices, cost of spices was the second important cost component of ginger processing. It amounted to ₦1,297.33 per kg of ginger powder produced and represented 32.03% of the total variable costs. Total variable costs, selling price and processing margin were ₦4,180.51 per kg, ₦4,577.95 per kg and ₦397.44 per kg respectively for ginger with spices; and ₦2,857.80, ₦3,114.46 and ₦256.65 respectively for ginger without spices. These finding imply that ginger processing, with or without spices, was profitable and worthwhile in the study area. The findings are in line with those of Dahiru (2022) who also found that costs of raw ginger and spices were important in the processing of dried ginger into ginger powder.

Table 6: Estimated Costs and Return of Artisanal Ginger Processing per Kg (Ginger Powder)

Cost items and revenue	With other spices		Without spices	
	Amount (₦/Kg)	% TVC	Amount (₦/Kg)	% TVC
Cost of raw ginger	2,010.58	48.09	2007.94	70.26
Cost of transportation	145.63	3.18	153.42	4.93
Cost of other spices	1,297.33	32.03	----	----
Cost of packaging	473.85	10.35	541.82	16.96
Cost of milling	253.12	6.05	244.63	7.85
Total variable cost	4,180.51	100.00	2,857.80	100.00
Selling price	4,577.95		3,114.46	
Processing margin	397.44		256.65	
Operating ratio	0.91		0.92	

Source: Field survey, 2023

Estimated Costs and Return of Ginger Exporting per Ton

This results in Table 7 presents the estimated costs and return recorded by ginger exporters. The results are in Table 7. The Table showed that the purchasing price of ginger was the principal cost item, which amounted to an average of ₦2,164,285.71 per ton and accounted for 93.24% of the total variable costs. The total variables cost and selling price were ₦2,321,163.69 and ₦2,654,196.51 per ton respectively, while the exporting margin was ₦333,032.82 per ton. These findings indicated that the ginger export enterprise is profitable and worthwhile. This finding is supported by that of the Nepali Ministry of Agriculture and Cooperatives (2011) which found a positive gross margin for ginger exporting, hence profitable.

NB: Dollar to Naira conversion was done at official exchange rate of ₦862.15 per dollar as provided by the Central Bank of Nigeria as at 15th December, 2023.

Table 7: Estimated Costs and Return of Ginger Exporting per Ton

Cost items and revenue	Amount (₦/ton)	% TVC
Purchasing price	2,164,285.71	93.24
Cost of transportation to port	69,047.61	2.97
Freight charges	64,065.47	2.76
Documentation charges	15,178.57	0.65
Inspection cost	1,925.59	0.08
Port charges	3,148.80	0.14
Other charges	3,511.90	0.15
Total variable cost	2,321,163.69	100
Selling price	2,654,196.51	
Export margin	333,032.82	
Operating ratio	0.87	

Source: Field survey, 2023

NB: Average selling price in dollars = \$3,078.57/ton

Value Added Along Ginger Value Chain (₦/kg)

As ginger is moved from the farm gate through the mid and downstream segments of the value chain, value is added to it by the different actors operating along the chain. The results presented in Figure 2 showed that the highest value addition was in the processing segment of the chain, which amounted to ₦2,567.37 per kg. This is not unexpected considering that the processors had to change the physical form of the ginger into a form that is more desirable to the consumers, hence providing them with the utility of form. Thus, the consumers will be willing to pay a premium for the processed product.

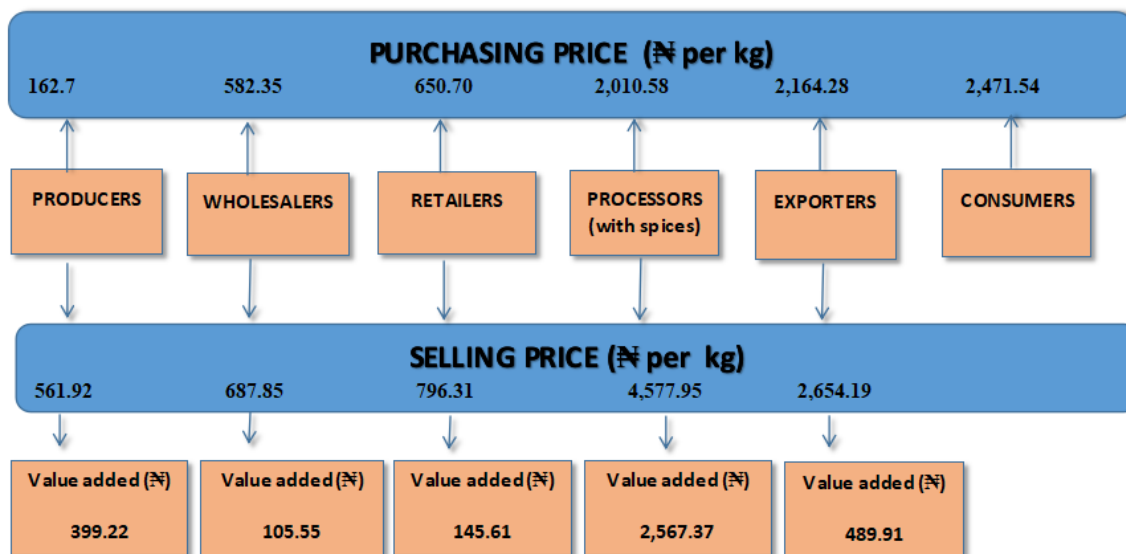


Figure 2: Value Added along Ginger Value Chain (₦/kg)

This was followed by value addition in the export segment which was ₦489.91 per kg. This is justified considering the utility of place provided by the exporters by shipping the commodity to overseas. The least value was added by the wholesalers which amounted to ₦105.55 per kg. This depicts the high volume-low margin feature of the wholesaling segment. This disagrees with the findings of Katanga *et al.* (2020) who reported that the highest value addition was in marketing segment of sesame value chain in Jigawa-Kano axis of Nigeria.



CONCLUSION AND RECOMMENDATIONS

Based on the findings of the study, it is therefore concluded that ginger enterprises along the value chain were profitable and worthwhile for all the actors. Furthermore, the ginger value chain has helped to provide employment to actors along the value chain. This could be leveraged upon by the government to provide employment opportunities to the teeming youths, which could reduce the menace of insecurity and youth restiveness in the state.

Based on the findings of this study, the following recommendations are put forward for the actors and other stakeholders of the value chain:

- i. Proper and adequate storage facilities should be provided to mitigate the issue of storage in the upstream segment of the value chain. Private investors can leverage on this to construct storage facilities for renting out to these value chain actors.
- ii. Local fabricators should be encouraged by farmers and policy makers to design and fabricate cost-effective and affordable farm machinery to address the issues of high cost and scarcity of manual labour.
- iii. Adequate measures should be put in place by development partners/projects to provide high-yielding varieties of ginger seed/rhizome at affordable prices in order to bring down its cost and improve productivity in the upstream segment specifically, and along the entire value chain in general;
- iv. The government, through collaboration with development partners and/or value chain development projects should make adequate supply of high quality and affordable fertilizer, which constitute a major cost component in the production segment, in order to improve profitability along the entire chain;
- v. Processors should purchase spices during the harvest season when prices are low for storing and future processing to reduce the high cost of spices and improve profitability in the processing segment.

REFERENCES

- Abah, A.D., Anayochukwu, M.J. and Nnana, A.M. (2018). Socioeconomic Analysis of Ginger Value Chain in Kaduna State, Nigeria. *American Journal of Marketing Research*. **4**(3): 54-67.
- Bala, F.K. (2016). Analysis of Women Ginger Production as a Means for Achieving Farm Household Food Security in Kaduna State, Nigeria. Unpublished M. Sc. Dissertation, Department of Agricultural Economics and Rural Sociology, Faculty of Agriculture, Ahmadu Bello University, Zaria, Kaduna State, Nigeria. Pp. 1 – 70.
- Centre for the Promotion Imports from Developing Countries (CBI) (2020). **Value Chain Analysis Nigeria Ginger**. Pp. 36.
- Dahiru, S. (2022). Analysis of Profitability and Value Addition among Actors of Ginger Value Chain in Kaduna State, Nigeria. Unpublished M. Sc. Dissertation, Department of Agricultural Economics and Extension, Bayero University, Kano, Nigeria.
- FAOSTAT (2020). www.fao.org/faostat/data. Accessed 29th August, 2021, 4:30pm.
- Geta, E. and Kifle, A. (2011). Production, Processing and Marketing of Ginger in Southern Ethiopia. *Journal of Horticulture and Forestry*. **3**(7): 207-213
- Indiaagronet (2017). **Ginger Cultivation**. Available at www.indiaagromet.com. Accessed on 23rd November, 2021. 7:20am.
- Ishaya, P. (2014). Analysis of the Ginger, Maize and Soybeans Marketing in Kachia Local Government Area, Kaduna State, Nigeria. Unpublished M.Sc. Dissertation, Department of Geography, Ahmadu Bello University, Zaria. Pp. 62.
- Khanal, K. (2018) Factors Affecting and Marketing Chain of Ginger in Salyan District, Nepal. *International Journal of Applied Sciences and Biotechnology*, **6**(2): 1-4.
- Kaduna State Bureau of Statistics (2017). Kaduna State Agricultural Structure Survey. Pp. 1-38. Available at www.kdbs.ng/app/uploads
- Kaduna State Investment Promotion Agency (KADIPA) (2021). Kaduna State Ginger Investment Policy and Strategy (GIPS). Pg 5.



- Katanga, Y.N.; Gama, E.N. and Abba, A. (2020). Assessment of Sesame Value Chain Actors in Jigawa State, Nigeria. *Badegg Journal of Agricultural Research and Environment*, **02**(02): 58 – 74.
- Mmasa, J. J. (2017). Impact of Ginger Farming to Smallholder Farmers' Income in Tanzania – Case of Same District. *Asian Journal of Agricultural Extension, Economics & Sociology*, **20**(2): 1-10.
- Nepal Ministry of Agriculture and Cooperatives (2011). High Value Agriculture Project in Hill and Mountain Areas (HVAP). A Report on Value Chain Analysis of Ginger subsector in Nepal. Pp. 21
- Nwogwugwu, C.C., Nwoke, E., and Osai, V.A. (2023). Role of Agriculture in Economic Development in Nigeria. *Journal of International Economics Relations and Development Economics*. **3** (1): 1-9.
- Olukosi, J. O. and Erhobo, P.O. (2005): Introduction to Agricultural Marketing and Prices. Principles and Application, *Living Book Series*, 3rd Edition, GU Publications Abuja.
- Omeni, B. (2014). Steps to take in Ginger Cultivation. www.agronigeria.com.ng. Accessed 8th September, 2021. 11:51am.
- Online Nigeria Community Portal. www.onlinenigeria.com/links/kadunaadv. Accessed 29th August, 2017. 10:00am.
- Reardon, T., Chen, K., Minten, B., & Adriano, L. (2012). The quiet revolution in staple food value chains in Asia: Enter the dragon, the elephant, and the tiger. Mandaluyong City, Philippines: Asian Development Bank.
- UNdata (2024). World Ginger Production Statistics by Country. Available at <http://data.un.org/Data.aspx>. Accessed on 18th July, 2024, 11:02am.
- Website of the Kaduna State Government of Nigeria (2016). www.kdsg.gov.ng/demographics. Accessed 29th August, 2020.