ANALYSIS OF GINGER VALUE CHAIN IN KADUNA STATE, NIGERIA

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ABSTRACT

Nigeria ranks first in area under ginger cultivation in the world. However, its contribution to world ginger trade is the fifth largest. This study analysed the ginger value chain in Kaduna State, Nigeria. The population of the study comprised ginger-producing households. Kachia, Jaba, Kagarko and Jema'a local government areas were studied. The multistage sampling technique was used for the study while a questionnaire and personal interviews were used for data collection from 369 respondents. The UG1 ginger variety was predominantly grown. The mean farm size was 2.40 hectares and mean output was 29.4 MT/ hectare. The major processing activities were cleaning, slicing, drying, sorting and packing. The value-added activities were washing, cleaning, drying, grading, bulking, transportation, storage, powder and drink production. Ginger powder and drink had higher profit margins. Access to finance and credit was a major weakness among actors. The study recommends research into high yielding varieties; formation/revival/strengthening of marketing associations and linkage to financial institutions for finance and credit.

JEL classification: Q130

Introduction

Value chain refers to the sequence of value-added steps and actors involved in the process from the production to delivery of a product to the market

(Worldbank, 2007). Rural livelihoods depend mostly on agriculture. Thus, enhancing the productivity and efficiency of agricultural value chains can stimulate both the growth of rural economies and a rise in the incomes of rural populations. As a result, development interventions in the agricultural sector now adopt the value chain approach as a strategy for poverty reduction (Laven et al., 2012). However, value chain participation can also threaten smallholders and small businesses when economies of scale in production are important, or where standards on products and processes are exacting (Ponte, 2011). The focus is how to ensure that smallholders participate beneficially. Therefore, interventions promoting value chain integration must take steps to mitigate such factors through the provision of inputs, extension services, market infrastructure, linkages to market and finance, group formation and strengthening, among other interventions that may be needed.

Ginger is a herbaceous spice grown extensively around the world for its pungent aromatic rhizome (Erinle, 1998; Nmadu and Marcus, 2012). It is an important commodity in world trade (Ajibade and Dauda, 2005, and is used in Asia and around the world as a spice and for medicinal purposes (Asumugha et al., 2006; Jakes, 2007; Egbuchua and Enujeke, 2013). Its acceptance and use are on the rise in Nigeria due to heightened health consciousness and acceptance.

Northern Nigeria is the largest user of ginger in the country (Abah et al., 2018). In Nigeria, ginger is mainly cultivated in Kaduna State (Obinatu, 2003; Nmadu and Marcus, 2012; Makarau et al., 2013; Ayodele and Sambo, 2014). Yields of 35 to 50 tonnes/hectare can be obtained under good agronomic practices (Asumugha et al., 2006; Jakes, 2007). Out of the estimated world annual ginger production in the 1980s of 50,000 tonnes (dry weight) of ginger, Nigeria accounted for 15,000 tonnes. In 2000, the world production was estimated at 717,461 tonnes from a land area of 296,650 hectares mainly from Nigeria, India, China, Indonesia, Bangladesh, Thailand, The Philippines, and Jamaica. In terms of area under ginger cultivation, Nigeria ranks first with 56.23 % of total world area under cultivation. This is followed by India (23.6 %), China (4.47 %), Indonesia (3.37 %) and Bangladesh (2.32 %) (Asumugha et al., 2006).

1.1 Statement of the problem

Nigeria has the best quality ginger to produce oils and oleoresins due to its high monoterpene and oil content (KADP, 2000; Chukwu and Emehuite, 2003). This is a huge opportunity for foreign exchange earnings for the country. The development of the ginger value chain, therefore, has the potential to create wealth and generate employment in the country (Olife et al., 2013). Ginger is one of ten commodities identified by the United States of America International Department (USAID) and Nigerian Export Promotion Council (NEPC) in 2002 as having the greatest potential for creating increased economic growth, external and internal trade, opportunities for employment, and increased income and wealth for Nigerians (Sidi et al., 2014).

However, the performance of the ginger value chain has been staggering. Ginger is produced mainly by smallholder farmers using rudimentary implements and traditional techniques with attendant low yields. According to Sawe (2017), Nigeria lost its position as the third highest exporter of ginger in the world in 2000. The country now occupies the fifth position. In 1993, the Federal Ministry of Agriculture attributed the situation to the failure of farmers to see ginger production as a business enterprise (Goni et al., 2007). Earlier, Meadows (1988) blamed the decline on a lack of interest by the Nigerian government and the impact of oil receipts on the nation's economy compared to ginger.

Some authors (Nmadu and Marcus, 2012: Ayodele and Sambo, 2014) have attributed the low productivity of ginger to inefficiencies in production. This also points to inefficiency in marketing (Abah et al., 2015) and limited access to marketing information (DFID, 2005). However, FAO (2010) and Emmanuel (2008) opined that there is the potential for Nigeria's ginger market to attain self-sufficiency with government commitment and deliberate investment strategy. This will require information on the activities of the key actors in the ginger value chain in Nigeria. This study was undertaken to provide the needed empirical information to guide policy on the development of the ginger value chain in Nigeria. The specific objectives were to:

1. identify the key stages in the ginger value chain, as well as, the actors, their linkages and functions;
2. examine the product flow and volume movement;
3. determine the value-added along the value chain;

4. describe the value chain governance;
5. identify the constraints and opportunities in the ginger value chain; and
6. make recommendations based on the findings.

1.2 Review of empirical studies on ginger value chain in Nigeria

Studies on the ginger value chain in Nigeria are limited. Nwaekpe et al. (2019) reported on a rapid value chain and SWOT analyses of ginger for alternative market creation in South-east Nigeria. The study area was Abia State, Nigeria. The purposive sampling technique was used to select 57 respondents. Data was collected using focus group discussions (FGDs), and intercept and semi-structured interviews. The following findings were made: the actors in the ginger value chain in Abia State include input suppliers, farmers, processors, wholesalers, retailers and consumers; ginger seed was not sold in the study area; two seed varieties (UG1 and UG2) were being grown; ginger production and market in the study area were very low; production was inefficient and not profitable; marketing was not profitable; wholesalers buy from outside the study area; the linkage between farmers and processors ranged from very weak to non-existent, while there was no linkage between either farmers and wholesalers or processors and wholesalers. This study was carried out in a non-ginger producing area using a very small sample size. The selection of respondents was purposive, and the applicability of the outcome to ginger-producing areas is doubtful, which affects the quality of the research. In addition, the study did not report on the governance structure of the ginger value chain which determines the activities and rules governing the various stages of the value chain. These are the gaps which this study tried to fill.

2. Methodology

The study area is Kaduna State in Nigeria. The state is one of the Northwestern states and is situated between latitudes $9^0$2 N, $11^0$35 N, and longitudes $7^0$15 E, $9^0$6 E (Kaduna State Statistical Yearbook, 2001). Ginger is cultivated in the southern part of the state. Figure 1 is a map of the state showing the study area. A multi-stage sampling procedure was used to select the respondents for this study from a population of ginger producing households drawing from Abah et al. (2018). The first stage was the purposive selection of the Southern region of

Kaduna State based on concentration of ginger producers (Nmadu and Marcus, 2012: Makarau et al., 2013: Folorunso and Adenuga, 2013). The second stage was narrowing it down to the four main ginger producing local government areas (LGAs); Kachia, Jaba, Kagarko, and Jema'a were purposively selected (KADP, 2004; 2007). The third stage involved randomly selecting 10% of the villages (37 villages) in the four LGAs. And at the fourth and final stage, 15 respondents were randomly selected from the list of ginger producing households in each of the 37 villages. This was achieved with support from the KADP ginger desk and respective village heads.

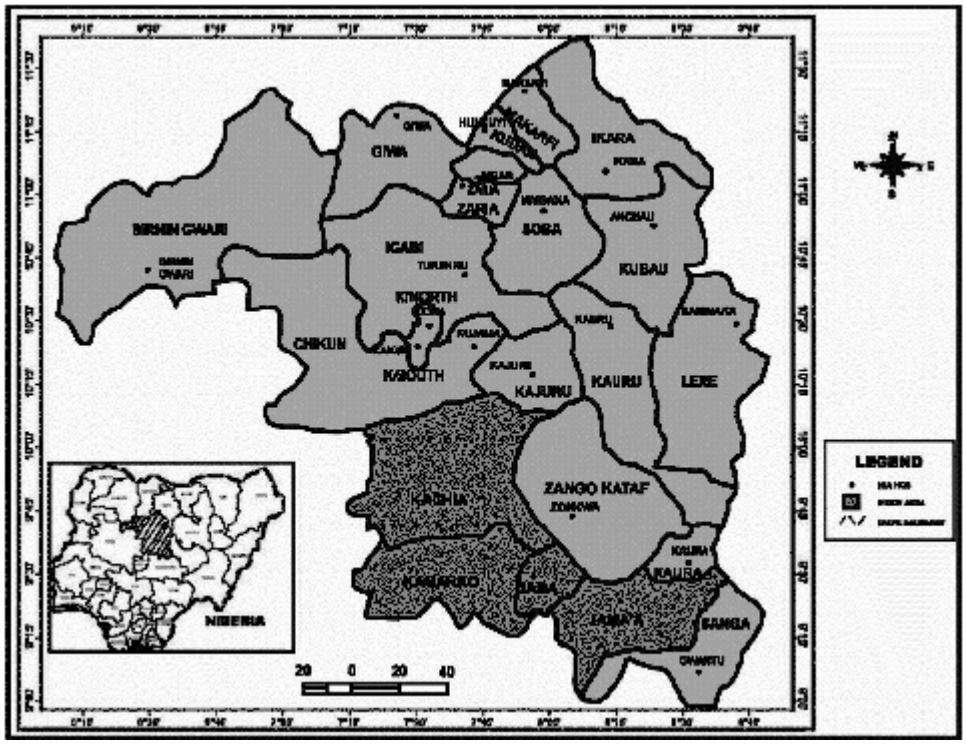

Figure 1: Map of Kaduna State Showing the Study Area.

Source: Adapted from Bala, 2016.

The study used primary data which was obtained with the aid of the questionnaire and personal interviews. The respondents were assured of confidentiality. This was to enhance their willingness to volunteer information. The local language was used for clarification where necessary, while questions

were limited to the last farming season. A total of 369 responses were analysed for this study. The research instruments were validated by content validity while pilot testing and Cronbach's alpha (α) analysis were used to test the reliability of the instruments.

Descriptive statistics, commodity chain analysis (CCA) and SWOT analysis were used to achieve the objectives of this study. The functional analysis component of the CCA was used to define the actors while the financial analysis component was used to calculate the value added (VA). The SWOT analysis was used to identify the strengths, weaknesses, opportunities, and threats. The VA by an agent is the difference between the value of the output (Y) and the value of the intermediate inputs (II) (KT, 2012; FAO, 2005). This is expressed as follows:

$$VA = Y - II$$

where:

VA = value added during the accounting period

Y = the value of the output produced during the accounting period

II = the value of intermediate inputs used

3. Results and Discussion

3.1 Description of actors, functions, and linkages in the ginger value chain

The analysis of the ginger value chain mapping in the study area is shown in Figure 2. The result shows that the key stages in the ginger value chain include input supply, production, processing, marketing, and consumption. The respective actors or players are input suppliers, producers, marketers, exporters, and consumers. This is consistent with the findings of Addisu (2016); Sidi et al. (2014); Adeoye et al. (2013) and KT (2012). The ginger value chain map facilitates a clear understanding of the sequence of activities, the key actors and relationships involved in the value chain. The clusters in the ginger value chain were characterized by predominantly weak, undeveloped and informal linkages among actors in the cluster. These actors include smallholder businesses, research institutions, financial institutions, government, and other institutions. The business model was buyer-driven.

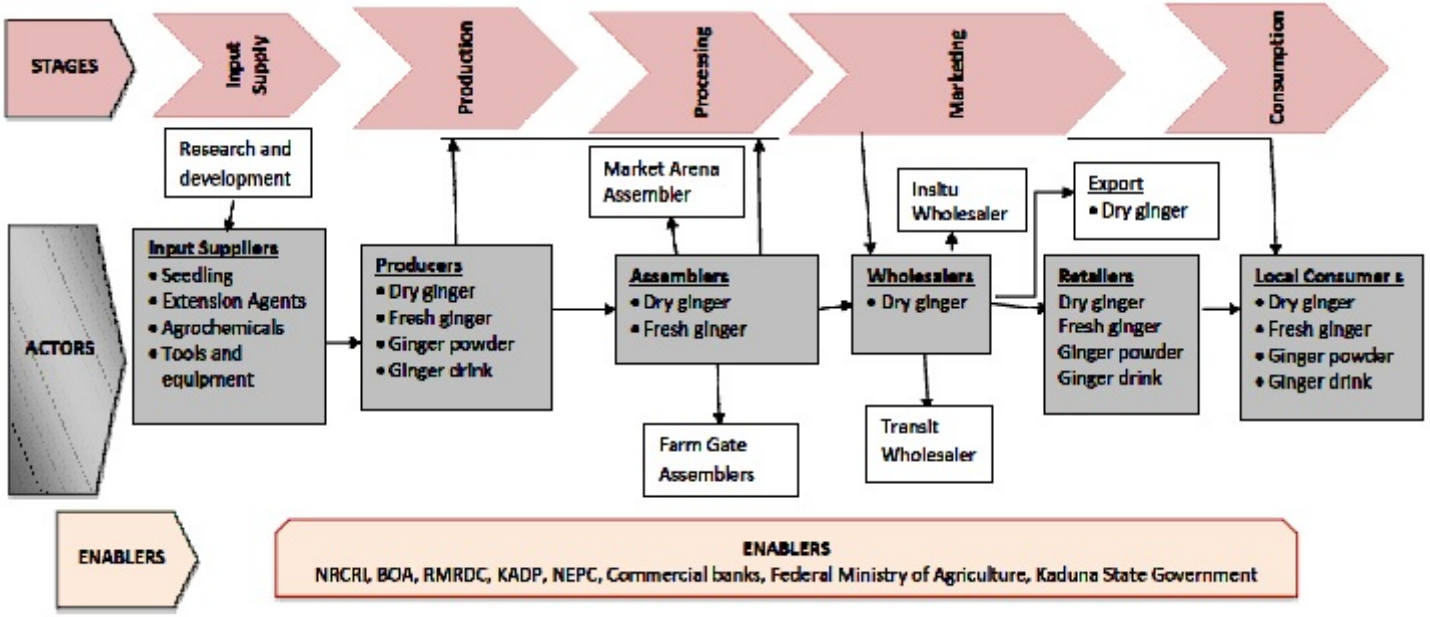

Figure 2. Ginger Value Chain in the Study Area.

Source: Field survey data, 2017.

3.2 Actors in the ginger value chain, their characterization and functions

The analysis of actors in the ginger value chain, their characterization and functions are shown in table 1. The results show five key actors along the ginger value chain: the producer (farmer), assemblers/aggregators/off-takers, wholesalers, retailers, and consumers. The ginger value chains identified include fresh ginger, dry ginger, ginger powder, and ginger drink.

Table 1. Ginger Value Chain Actors, Characterizations and Their Functions

Stages	Agents/actors	Characterization	Functions	Output
Input supply	Input marketers	Agrochemicals, fertilizers, tools, and equipment supply	Tools and equipment	Fertilizers, herbicides, pesticides, tools and equipment
	Extension agents	Inadequate trainers, inadequate research	Training of farmers	Trained farmers
	Farmers	Traditional, unimproved seedling	Seedling	Good seedling
Production	Farmers	Smallholders, unmechanized tools cultivate 0.1 – 3ha, low input, low output	Farming	Fresh ginger
Processing	Farmer	Handles 2 – 8tonnes of fresh ginger. Mostly post-harvest handling	-Washing, removal of roots, slicing, drying - Ginger drinks, powder	Dry ginger, ginger drinks, ginger powder
	Wholesaler	Handles 115 – 348tonnes dry ginger. Small to medium scale businesses	Cleaning, sorting, grading	Graded dry ginger
	Retailers	Handles 2 – 13tonnes dry/fresh ginger	Ginger drinks, powder	Ginger drinks
Marketing	Assemblers	Handles 14 – 45tonnes dry ginger and 4 – 13tonnes fresh ginger	Collect, bulk, supply	powder bulked ginger at market
	Wholesalers	Handles 115 – 348tonnes dry ginger	Purchase, sell	Clean, dry, grated ginger
	Retailers	Handles 2 – 13tonnes dry/fresh ginger	Purchase, un-bulk, sell	Small units of fresh, dry ginger
Consumption	Consumers	Fresh and dry ginger, powder, drinks, herbs	Consume, demand signal	Feedback

Source: Field survey data, 2017.

3.3 Input supplies arena

Input suppliers form the beginning of an agricultural value chain. This group of actors provides various inputs (e.g., training, fertilizers, pesticides, herbicides, seedlings, and farm tools or equipment) to farmers. They also guide the farmers on the application of the respective inputs provided. In many cases, input suppliers provide inputs across various agricultural commodities and are not vertically integrated. For instance, a fertilizer dealer supplies to every farmer who wishes to buy notwithstanding the crop being produced. The seedlings used by the ginger producers are usually reserved from the preceding harvest season. Other inputs like farm implements and agrochemicals are sourced from neighbouring towns. However, occasionally, seedlings are sourced directly from fellow ginger producers. The inputs utilized by ginger producers include basic farm tools (cutlasses, bowls, hoes, and sprayers) and agrochemicals (fertilizers, herbicides, and pesticides). Many producers apply cow dung in place of inorganic fertilizers. The cow dung is sourced from herdsmen in their neighbourhoods.

3.4 Producers

Next on the value chain are the producers. These are the ginger farmers. Most farmers live in rural areas where the farms are located. They are mostly smallholder farmers and often cultivate a range of crops to provide food for their families. The key functions of ginger producers are to establish and manage ginger farms. Every ginger producer in the study area cultivates with marketing in mind. Therefore, ginger is a 100% cash crop. Producers have direct links with input suppliers and form the actual beginning of ginger marketing. They also engage in simple processing activities. These include cleaning, slicing, drying and sorting. Two varieties of ginger are grown by the producers in the study area: UG1 (locally called *Tafingiwa* meaning elephant foot) and UG2 (locally called *Yatsunbiri* meaning monkey finger). The UG1 is the most widely grown and it gives higher yields than UG2. During the study, UG2 was only seen at Kagarko. The ginger farm sizes ranged from 0.21 hectares to 7.50 hectares, with a mean farm size of 2.40 hectares. The mean yield of ginger in the study area was 29,400 Kg/hectare (29.4 MT/ ha).

3.5 Marketers

This group of actors includes assemblers, wholesalers and retailers. Assemblers collect and bulk fresh or dry ginger for sale to wholesalers. There are two categories of assemblers in the ginger marketing system, namely farm-gate assemblers and market-arena assemblers. The farm-gate assemblers collect and bulk ginger from individual farmers at the farm gate while the market-arena assemblers collect and bulk ginger at the market and sell to wholesalers usually in the same market. Wholesalers were fewer in the market compared to other intermediaries. This is because of the huge capital required to run a wholesale ginger business. Some wholesalers enter into contractual arrangements with farmers.

The wholesalers also fall into two categories, namely in-situ wholesalers and transit wholesalers. The in-situ wholesalers resell their collection of ginger produce right in the market while the transit wholesalers transport their ginger produce to cities or areas where they hope to attain a higher margin, mostly to the northern parts of the country. The wholesalers sell to retailers as well as exporters. The retailers are the link between the marketers and the final ginger consumers or end users. They sell in small units to individual consumers. They also obtain information on the quality and quantity of ginger desired by consumers and give feedback to the wholesalers. Many marketers also carry out processing activities like cleaning, sorting/grading, and bagging.

3.6 Processors

There was very low sophistication in ginger processing. The major processing activities in the study area were cleaning, slicing, drying and sorting. The majority (>80 %) of ginger trade was in dry ginger. Ginger was also processed into powder and local ginger drinks on a small scale. Ginger processors either buy their produce (raw material) from assemblers or directly from producers. They operate mainly on a small-scale basis and make use of rudimentary implements for their processing activities. Processed ginger products, especially ginger powder and ginger drink were widely sold and accepted in the study area but were only sold locally. All (100 %) of the ginger handled by wholesalers were in dry form. This is because fresh ginger has a short shelf life and is highly susceptible to pests and disease.

3.7 Consumers

Consumers are the final users of ginger and ginger products. About 15% of the total ginger produced is consumed in the country, mostly in the northern states. The remaining 85% is exported. Ginger is used as a spice for food and confectionaries. It is sought after for its pungency and aroma. It is also consumed as drinks or as additives to spice local drinks. Some of the consumers interviewed believe that ginger has medicinal values for both man and animals. Ginger powder is added to food and animal feed as supplement and consumed. There is increasing acceptance and demand for ginger and ginger products in the country due to rising health awareness. The major export destinations for Nigerian ginger are the United States of America (USA), United Kingdom (UK), the Netherlands, France, and Germany (NEPC, 2004).

3.8 Facilitators/Enablers

Facilitators provide various support services to promote the business activities of the actors in the ginger value chain. These support functions include services such as core services (credit delivery), research and development, infrastructure and information. Support service providers are essential for value chain development and include sector-specific input and equipment providers, financial services providers, extension service providers, development partners, market information access and dissemination services providers, technology suppliers and advisory service providers. These represent the action arenas in the ginger value chain.

In the study area, there are many institutions supporting the ginger value chain in various ways.. The most common support providers are the Kaduna State Agricultural Development Project (KADP) Office, National Root Crops Research Institute (NRCRI), Federal Ministry of Agriculture and Rural Development (FMARD) and Raw Materials, Research and Development Council (RMRDC). There were several banks, including the Bank of Agriculture (BOA), operating in the study area that are expected to provide financial services and credit support to the actors in the ginger value chain. However, the actors were not receiving adequate financial services in the study area.

3.9 Product flow and volume movement in the ginger value chain

The result of the analysis of ginger product flow and volume movement mapping showed that farmers sold the majority (65%) of their ginger produce at the farm gate while the remaining (35%) ginger produced was sold to assemblers or wholesalers at the market. This was due to the poor state of rural roads. Furthermore, 90% of the ginger trade was done through wholesalers while retailers handled the remaining 10%. Selling at the farm gate attracted a lower price compared to selling at the marketplace. Farm-gate assemblers sold their collections mostly to wholesalers and a few retailers and producers (in the case of fresh ginger). The wholesalers sold mainly to exporters and a few individual retailers. The retailers in turn sold to small consumers. The processors purchase their ginger produce or raw materials from assemblers and producers. About 85% of ginger produced in Nigeria is exported in the form of dry split ginger to many countries.

3.10 Value added along the ginger value chain

Value addition is central to value chain analysis. The analysis of value addition along the ginger value chain is shown in Table 2. Four ginger value chains were identified, namely fresh ginger, dry ginger, ginger powder, and ginger drink value chains. The actors identified along the ginger value chain in the study area include producers (farmers), assemblers/aggregators/ off-takers, wholesalers and retailers.

Table 2. Value Addition by Actor and by Product in the Ginger Value Chain

Value Chain	Producer (₦)	Assembler (₦)	Wholesaler (₦)	Retailer (₦)
Fresh ginger				
Costs/kg	49.31	133.33		133.33
Sales/kg	133.33	156.67		180.40
Margin/kg	84.02	23.34		47.07
Dry ginger				
Costs/kg	167.65	300.00	342.17	333.33
Sales/kg	333.33	333.33	421.74	460.67
Margin/kg	165.68	33.33	79.57	127.34

Value Chain	Producer (₦)	Assembler (₦)	Wholesaler (₦)	Retailer (₦)
Ginger powder				
Costs/kg	2460.14			2866.67
Sales/kg	5000.00			5000.00
Margin/kg	2539.86			2133.33
Ginger drink				
Cost/litre	206.33			197.09
Sales/litre	500.00			500.00
Margin/litre	293.67			302.91

Source: Field survey data, 2017.

The results show that in the case of fresh ginger, values added at producer, assembler, and retailer levels were estimated at ₦84.02/kg, ₦23.34/kg and ₦47.07/kg respectively. The values added for dry ginger at producer, assembler, wholesaler and retailer levels were estimated at ₦165.68/kg, ₦33.33/kg, ₦79.57/kg and ₦127.34kg respectively. Furthermore, the values added for ginger powder at producer and retailer levels were ₦2539.86/kg and ₦2133.36/kg respectively, while, the values added for ginger drink at producer and retailer levels were estimated at ₦293.67/litre and ₦302.91/litre respectively.

The value-added activities in the ginger value chain in the study area were washing, cleaning, drying, grading, bulking, transportation and storage. These activities were conducted by the various actors in the value chain. Activities for processing ginger into drinks and powder were performed only by producers and retailers. Ginger powder and drinks attracted higher returns on investment. However, there was restriction on exportation of Nigerian ginger powder due to challenges of standardization. In addition, there was no facility for preservation of ginger drink. These hampered large-scale production. The dry ginger value chain was the longest and most lucrative. It accounted for 90% of the total ginger trade in the study area.

A breakdown of the value-added along the ginger value chain by LGA in the study area is shown in table 3. The results show that producers recorded a higher value-added of ₦85.06/kg and ₦174.84/kg for fresh ginger and dry ginger respectively in Kachia LGA. Assemblers in Jaba LGA also recorded a higher value-added of ₦23.48/kg for fresh ginger and ₦33.63/kg for dry ginger

respectively. Wholesalers in Jaba LGA also recorded a higher value-added of ₦80.86/kg for dry ginger. In addition, retailers in Jaba LGA recorded a higher value-added of ₦47.42/kg for fresh ginger while retailers in Jema'a LGA recorded a higher value-added of ₦127.43/kg for dry ginger. Furthermore, producers in Kachia LGA recorded a higher value-added of ₦2539.86/kg for ginger powder while retailers in Kachia LGA recorded a higher value-added of ₦2145.62/kg for ginger powder. In like manner, producers in Kachia LGA recorded a higher value-added of ₦294.88/litre, while retailers in Jaba LGA recorded a higher value-added of ₦307.68/litre for ginger drink.

Table 3. Value Addition by LGA in the Ginger Value Chain

Value Chain/LGA	Producer (₦)	Assembler (₦)	Wholesaler (₦)	Retailer (₦)
Kachia LGA				
Fresh ginger	85.06	23.34		47.08
Dry ginger	174.84	33.33	79.57	126.53
Ginger powder	2539.86			2145.62
Ginger drink	294.88			300.53
Jaba LGA				
Fresh ginger	84.54	23.48		47.42
Dry ginger	158.19	33.63	80.86	127.33
Ginger powder	2552.37			2133.36
Ginger drink	293.67			307.68
Kagarko LGA				
Fresh ginger	82.45	23.48		47.42
Dry ginger	164.01	33.03	78.28	128.14
Ginger powder	2527.34			2133.36
Ginger drink	292.45			300.53
Jema'a LGA				
Fresh ginger	84.02	23.04		46.73
Dry ginger	165.68	33.33	79.57	127.43
Ginger powder	2539.86			2121.10
Ginger drink	293.67			302.72

Source: Field survey data, 2017.

3.11 Governance of the ginger value chain in Kaduna State

In order to determine the governance structure of the ginger value chain, the opinions of the respondents on the number of buyers, number of sellers, relationship between actors, transaction, as well as supply capability, were analysed. In table 4, the mean number of buyers is 19 while the mean number of sellers is 380, indicating that the number of sellers is higher than the number of buyers in the ginger market. This means higher buyer concentration in the market. It is an indication of higher buyer influence over prices and other marketing decisions (Abah et al., 2015). Market power in the ginger value chain in the study area rises with movement up the chain. This power relation determines "how economic gains and risks are distributed among the actors in the value chain" and the extent to which standards may be set and enforced, with the aim of raising entry barriers for new competitors (Webber and Labaste, 2010).

Table 4. Distribution of Respondents by the Structure of Ginger Marketing

Variables	Kachia LGA		Jaba LGA		Kagarko LGA		Jema'a LGA		Pool Data	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Number of buyers (Mean = 19)										
0 - 20	72	76.6	69	75	72	77.42	68	75.56	281	76.15
21 - 40	14	14.89	16	17.39	11	11.83	13	14.44	54	14.63
≥41	8	8.51	7	7.61	10	10.75	9	10	34	9.21
Total	94	100	92	100	93	100	90	100	369	100
Number of sellers (Mean = 380)										
0 - 200	0	0	0	0	0	0	0	0	0	0
201 - 400	19	20.21	21	22.83	25	26.88	12	13.33	77	20.87
≥401	75	79.79	71	77.17	68	73.12	78	86.67	292	79.13
Total	94	100	92	100	93	100	90	100	369	100
Practice contracting										
Yes	18	19.15	15	16.3	21	22.58	16	17.78	70	18.97
No	76	80.85	77	83.7	72	77.42	74	82.22	299	81.03
Total	94	100	92	100	93	100	90	100	369	100
Seller/buyer transaction										
Simple	94	100	91	98.91	90	96.77	90	100	365	98.92
Complex	0	0	1	1.09	3	3.23	0	0	4	1.08
Total	94	100	92	100	93	100	90	100	369	100

Variables	Kachia LGA		Jaba LGA		Kagarko LGA		Jema'a LGA		Pool Data	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Capacity to supply to buyer specification										
Yes	90	95.75	85	92.39	91	97.85	74	82.22	340	92.14
No	4	4.25	7	7.61	2	2.15	16	17.78	29	7.86
Total	94	100	92	100	93	100	90	100	369	100

Source: Field survey data, 2017.

Furthermore, the majority (81%) of respondents have no form of off-taking agreement or contract with buyers or sellers. This shows that the information and knowledge required for a transaction to occur are simple and easily understandable by the respective actors. This is indicative of a market-style pattern of governance. However, few actors (19%) were engaged either as contract farmers or as buying agents. In the same vein, the majority (99%) of respondents indicated that the transactions between sellers and buyers were simple. This implies that producers can produce the required quality or specification with minimal input from buyers. This finding is a further pointer to the existence of a market-style pattern of governance in the study area.

The opinion of respondents on their capacity to keep up supply to buyer specification was also sought. The result showed that the majority (92%) of respondents had the capacity to meet transaction requirements. These may include supplying the required quality in the required quantity within a specified time frame, and points to the existence of a demand-supply gap.

3.12 SWOT analysis of the ginger value chain in Kaduna State

The internal and external situations of the key actors of the ginger value chain were analysed and classified into strengths, weaknesses, opportunities, and threats. The result is shown in table 5. The result shows that there is rising local demand for Nigerian ginger. This is due to the rising health consciousness in the country. This finding points to a good opportunity for ginger agribusiness. Poor access to credit was a uniform weakness for all actors. This is because most of the actors live in rural communities where access to financial services that are provided by formal financial institutions was lacking. In addition, ginger enterprises require huge capital which is beyond the capacity of most informal financial institutions. Furthermore, insecurity was a uniform threat. The security

situation is an environmental factor which is not peculiar to ginger enterprises. Producers were unable to mechanize ginger farming because most land areas were not in tractorable condition.

Table 5. SWOT Analysis of the Actors in the Ginger Value Chain

Variables	Producers	Marketers	Processors
Strengths	Experience	Experience	Experience
	Access to land	Access to ginger	Access to ginger
	Availability of seedlings	Availability of cheap labour	Availability of labour
Weaknesses	Lack of mechanization	Poor access to credit	Poor access to credit
	Poor access to credit	Poor quality control	Lack of storage facilities
	No improved variety	The upsurge of unethical practices among actors	International standard
	Distance to market	Lack of storage facilities,	Lack of access to modern processing facilities
	Bad roads,	Rejection of ginger powder for export	
	Limited research and development capability	Low integrity	
Opportunities	Increasing demand	Increasing local demand	Higher profit for processed ginger
	Raising prices	Multiple uses	Increased uses
		Increasing consumption	Increasing local acceptance/demand
Threats	Falling value of Naira	Pest and disease	Spoilage
	Climate change	Theft	Theft
	Insecurity	Fall in the exchange rate	Insecurity
		Insecurity	Pest and disease
			Fall in the exchange rate

Source: Field survey data, 2017.

4. Conclusions and Recommendations

The study concludes that the ginger value chain is buyer-driven and the governance structure follows a market-style pattern. The key stages in the ginger value chain are input supply, production, processing, marketing, and consumption. The producers source their inputs locally. The major variety of ginger grown in the study area was the UG1 type. The mean farm size was 2.40 hectares while mean output was 29.4 MT/ha. The major processing activities

were cleaning, slicing, drying, sorting and packing. The value-added at producer, assembler, and retailer levels for fresh ginger were ₦84.02/kg, ₦23.34/kg and ₦47.07/kg respectively. The value-added for dry ginger at producer, assembler, wholesaler and retailer levels were ₦165.68/kg, ₦33.33/kg, ₦79.57/kg, and ₦127.34/kg respectively. The value-added for ginger powder at producer and retailer levels were ₦2539.86/kg and ₦2133.33/kg respectively, while the value-added for ginger drink at producer and retailer levels were estimated at ₦293.67/litre and ₦302.91/litre respectively.

The value-added activities in the ginger value chain in the study area were washing, cleaning, drying, grading, bulking, transportation, storage, powder and ginger drink production. Ginger powder and ginger drink had higher returns on investment. The dry ginger value chain was the longest and most lucrative because it accounts for 90% of total ginger trade. The major opportunity in the ginger value chain was increasing demand while poor access to credit was a weakness.

The study makes the following recommendations:

1. The study found that the seedlings used by producers were usually reserved from the harvest of the preceding season. There is a need for research into high-yielding varieties. Ginger is one of the mandate crops of the NRCRI. There is the need for the Kaduna State government and the private sector to partner with the NRCRI to make available improved and high-yielding varieties of ginger to farmers at subsidized rates.
2. The study found that there is an increasing demand for ginger. However, there is limited access to credit. The actors should be encouraged to form and/or revive existing ginger marketing associations in order to benefit from group influence and take advantage of economies of scale. In addition, government should provide processing and storage infrastructure and facilitate linkage to finance and credit.
3. Regulations for monitoring and enforcement should be strengthened to ensure good practices and standardization among actors in the ginger value chain.
4. Ginger powder and ginger drinks attracted higher profit margins. Therefore, the government should explore ways of expanding their market by introducing improved technology and standard procedures to meet export requirements.

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