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Analysis of the Groundnut Value Chain in Ghana

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Abstract Performance of the groundnut value chain in Ghana was analysed by collecting primary data through the use of semi-structured questionnaire. The data was collected from 300 farmers in the Northern, Upper East and Upper West regions coupled by eighty 80 distributors, 60 processors and 100 consumers respectively in the Brong-Ahafo and Greater Accra Regions. Findings revealed that primary producer (farmer), distributor, processor and retailer of processed output (oil/paste) are the key actors in the value chain process. Estimates of costs and returns indicate that, for every litre of groundnut oil and kilogramme of paste produced along the oil and paste chain respectively, the farmer benefits most when he/she sells groundnut in the shelled form. This is followed by the distributor, the retailer of processed output and finally the processor. On the other hand, when the farmer sells groundnut in the unshelled form, the distributor benefits most from oil and paste chain with 116% increase in profit. Further estimates of return on investment per day indicate that, the distributor benefits most along the groundnut value chain. Assessment of power relations through the use of a scoring exercise revealed distributors as the dominant governors along the chain. It is recommended that groundnut producers should add value by shelling groundnuts before selling in other to increase profit accruing to them in the chain. Existing farmer and processor groups should be empowered and individual farmers and processors should be organised into groups as it is being practiced by most traders in the chain. This will enhance their share of power along the chain.

Keywords: *groundnut, value chain, process of value chain and Ghana*

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1. Introduction

Majority of the poor and food insecure households in Ghana are known to be food crop farmers and many are women [1,2]. Others are engaged in micro and small enterprises (of which over 66% are women). Others still are engaged in finding a survival income as daily casual labourers. According to [3], majority of the individuals who are persistently poor are women. Although there has been a substantial overall decline in the incidence of poverty in Ghana since measurements began in 1987, poverty still has a firm grip on rural areas especially in the northern part of the country.

Access to food in northern Ghana, in particular, is constrained by income poverty that results mainly due to low productivity, low remuneration, poor agricultural marketing systems and limited access to financial services. Addressing food insecurity in the area will require significant efforts in addressing the problems of agricultural production and marketing. Food security needs to be assured alongside growth, and the major strategy advocated for this is a concentration on commodities which are both sold and consumed. Such commodities include oilseeds (groundnut and soyabean), yams, rice, shea butter and fruits and vegetables [4].

Groundnut is cultivated by almost all farming communities in the transitional zone and northern Ghana. It is estimated that more than 70% of farmers in the three northern regions of Ghana cultivate groundnuts and together account for over 85% of the national output [5]. In Ghana, as in the rest of West Africa, groundnut is termed as the woman's crop due to the major roles women play in its production, marketing and processing. They function as farmers, traders and in some cases as labourers in planting, harvesting and shelling [6].

Like the other legumes, groundnut is a high-value crop with the potential of making immense contributions to the economies of these areas thereby improving standards of living of the rural poor especially women. Groundnuts and its products contribute to ensuring food security and meeting nutritional needs of the rural folks. It is not only important for the seed harvested and the oil extracted from it, but it also fixes nitrogen in the soil. The by-products of processing the nut into oil are further processed for human consumption as "kulikuli", a fried pretzel-like product made from defatted groundnut paste which is popular in northern Ghana. The flour is used for preparing various foods and the cake is used for producing animal feed.

Groundnut is cultivated in 108 countries worldwide. Asia with 63.4% of the total land area accounts for 71.7% of the world groundnut output. This is followed by Africa with 31.3% land area and 18.6% production, and North-Central America with 3.7% area and 7.5% production. Ghana is one of the top six countries producing groundnuts in Africa [7]. The country produced an average of 439,930 metric tons per year between 2003 and

2007. The notable groundnut growing areas in Ghana are the Upper East, Upper West, Northern and parts of the Brong Ahafo regions. These are the mostly food insecure areas with about 67% of the population employed by the agricultural sector. It is estimated that about 17%, 57%, 72% and 78% of households in the Brong Ahafo, Northern, Upper East and Upper West regions, respectively, are engaged in groundnut production [8]. Therefore, any poverty alleviation programme that includes the promotion of groundnut as part of its strategies could have high potential for achieving greater impact.

The Millennium Development Authority (MiDA) as part of its strategies developed a 3 year programme beginning in 2009, to assist 3,000 to 4,000 farmers to expand their groundnut farms. This intervention has the potential of increasing the current supply stream by up to 20,000mt annually thereby improving the demand – supply balance. Additionally, there are large tracts of fertile land and labour available to ensure increased groundnut production in Ghana [5]. However, due to the effects of increasing competition in agricultural markets, it is apparent that strategies aimed at reducing rural poverty need to move beyond a focus on increasing productivity, to addressing issues of efficient integration of the crop into domestic and international markets. Studies have shown that globalization and for that matter the increase in world trade is one of the few possibilities through which the underdeveloped countries could overcome poverty [9].

Since the late 1990s, the concept of commodity value chains has gained much currency in development policy agenda. Indeed, Ghana's Food and Agricultural Sector Development Policy (FASDEP II) has as one of its objectives increasing competitiveness and enhancing integration into domestic and international markets [10]. This is to be achieved through the promotion of strategic value chains that have the potential for growth and poverty reduction. Growing demand for commodities in the domestic markets (due to rapidly expanding cities and towns) and international markets results in emerging market opportunities but may also represent business risks for developing countries' value chains due to increased competition in these markets.

This can possibly lead to social and regional disparities of economic growth and the risk of marginalizing the poor [11]. Promotion of growth in smallholder agriculture in Africa requires significant vertical integration of smallholders with processing and marketing firms [12] and this vertical integration has the potential to exclude a large proportion of farmers, and in particular small farmers [13]. It has also been pointed out that integration of small farmers to buyer-driven global food chains can result in high transaction costs and high transaction costs in either production or marketing of commodities that are potentially remunerative exclude poor farmers from participating in growth opportunities [14].

However, developing appropriate strategies towards the development of particular commodity value chains will contribute to achieving better competitiveness in domestic and international markets. This will contribute to increased income for all operators along the chain, create employment and consequently improve livelihoods, particularly in rural areas where most food commodities are produced. It is against such potentials the commodity value chain has that the study seeks to analyse particularly the performance of the groundnut value chain in Ghana.

The study will proceed in the subsequent sections to look at relevant conceptual issues on commodity value chain, the methodology, and empirical evidence on the performance of analyze the performance of the groundnut value chain in Ghana. The last section of the paper will feature conclusions and policy recommendation/implications.

2. Performance of Groundnut Value Chain

Groundnut, an important cash crop, is an annual legume. Its seeds are a rich source of edible oil (43-55%) and protein (25-28%). About two thirds of world production is crushed for oil and the remaining one third is consumed as food. Its cake is used as feed or for making other food products and haulms provide quality fodder. The production levels of groundnut in Ghana have not been consistent; however, there is an indication of increasing production particularly in Northern Ghana. Output of groundnut in these regions increased from 150,000MT to 193,000MT in the 1990s. Since 2004, production has been between 400,000 – 450,000 MT (Technoserve, 2009).

According to [8], while there are potentials for both area and yield increases in major food crops in Northern Ghana, the widest potential has been with groundnuts, and the least with millet and sorghum. Farm households' engagement with the market varies considerably. Few sell millet and sorghum, especially in the two Upper regions. Groundnut is the most widely sold crop in all three regions.

Production of groundnut in Ghana is at the subsistence level and mainly carried out by small-scale farmers of whom majority are women. The commonly cultivated varieties are the Virginia and the Spanish/Valencia. In rural areas of northern Ghana where improved varieties have not yet been fully adopted, the predominant cultivars are the Virginia variety. However, in recent years, demand for the Spanish variety has increased due to its high oil content, shorter maturity period and ease of lifting [5].

According to [15], demand for groundnut products has been driven by a number of factors. In Africa, population growth has been the primary factor. Another important factor has been substitutability. Groundnut oil competes directly with oil from soybeans, sunflower, palm and cotton oil, among others. Groundnut meal must compete with meal from these oilseeds and also with cereal-based products such as gluten.

Value chain

The term "value chain" is sometimes confused with that of supply chain, production chain and marketing channels in that, they all comprise the movement of a product or service to the end user. They all aim at identifying opportunities for and constraints to increasing productivity. [16] defined value chain as the activities required to make a product or provide a service. This definition is quite ambiguous as it does not give a clear distinction among the above mentioned chains. It is argued that value chain and supply chain are the same but the choice of one depends on the angle of analysis [17]. The value chain however consists of series of activities that create and

build value. It tends to indicate how value is created for the customer. The value chain is usually defined as the chain of activities which transform raw materials into something that can be purchased by the final consumer [11].

Value Chain Analysis is a method for accounting and presenting the value that is created in a product or service as it is transformed from raw inputs to a final product consumed by end users [18]. According to [19] value chain analysis helps diagnose pro-poor impacts in supply chains and identify the best interventions. This analysis gives answers to a set of questions: who runs the production process, who participates at which stage, where do the different stages take place, how are they linked, who has which benefits, etc. The answers are needed to find the relevant points of intervention for a successful integration of poor population sections [20].

[20] indicates that value chain analysis should comprise the following: choosing the sector to asses; analyzing the market; mapping the value chain; measuring the performance of the chain and establish benchmark; and analyze performance gap. Stated a bit differently, [21] indicate that value chain analysis should comprise the following: the point of entry for value chain analysis; mapping value chains; product segments and critical success factors in final markets; how producers access final markets; benchmarking production efficiency; governance of value chains; and upgrading in value chains

Value Chain Mapping

According to [21], though value chains are usually depicted in a single stream (horizontal or vertical), intra-chain linkages are most often two ways in nature. Also, value chains are complex in the real world and a given value chain may feed into a number of different value chains. This assertion by Kaplinsky and Morris is corroborated by [22] who argue that, far from the concept of simplicity and easy clarity of focus as suggested by the theory of value chain, the real world is much messier, and an arbitrary decision must be made on what to map in a value chain analysis.

The Figure 1 shows the theory and reality of value chain mapping. In reality the value chain has many potential dimensions, both tangible and intangible which could be included in the value chain map. However, there is no such thing as a comprehensive, all-encompassing value chain map. Therefore, depending on the scope and objective of the value chain analysis, the dimensions that are to be mapped are chosen. These could be the product flows, the actors involved in the chain, costs and margins at different levels, information flow among others.

Many value chains have more than one or two products produced from the initial raw material, each of which will follow its own set of processes to final consumption. In these cases, the process map will be more complex and sophisticated and involve parallel sets of processes as shown in Figure 1. The letter A, represents a particular raw material at the initial stage of a particular value chain. The letters B, C, D.....M represents various products resulting from A at different segments of the chain. The bold and broken arrows indicate the major and minor channels for flow of inputs and output along the chain.

An output from a previous stage serves as input for the proceeding one. In reality, A goes through several stages and result in more than one end product, thus M, E and F. Each of these products have different processes altogether, therefore, comprising many stages and actors which may be complex or not possible to present on one map. For simplicity, the major products at the main segments are presented on a map, thus, A, B and C. For example, the groundnut value chain has lots of end products, namely; oil, paste, powder and other confectioneries. This implies many actors and processes, which cannot be illustrated in one map. Therefore, for simplicity and considering the scope of the value chain analysis, actors along the production chain linkages are categorize into the main occupations in the groundnut value chain. These are production, distribution of raw groundnuts, processing, and retailing of processed products.

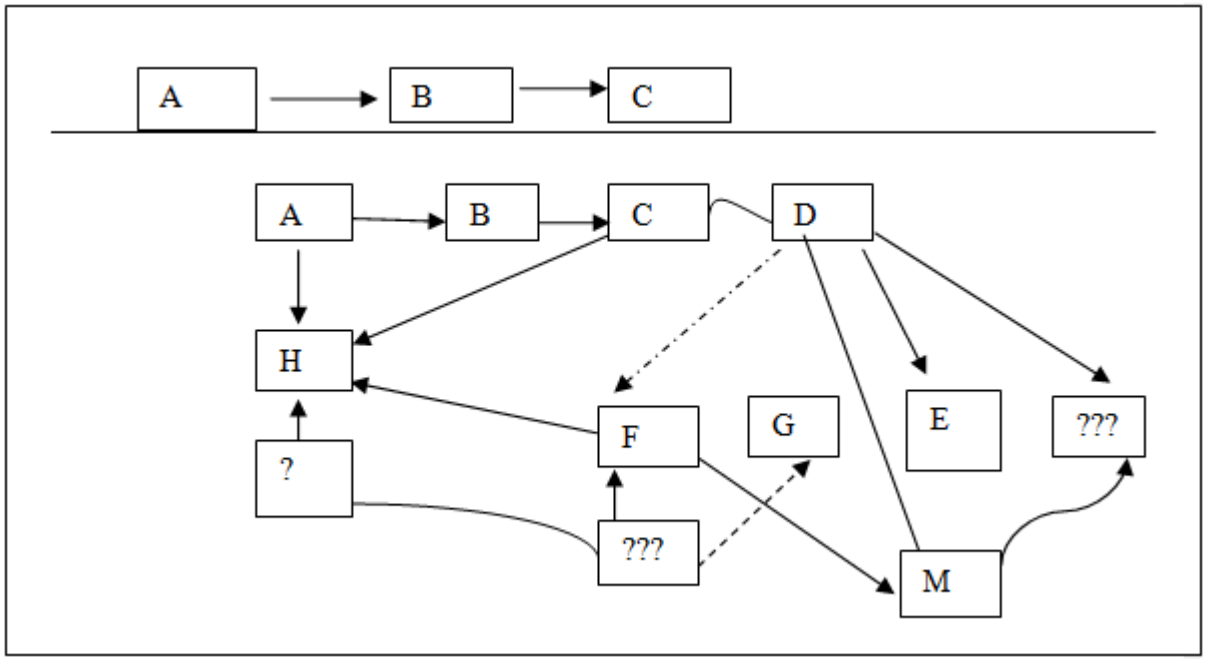

Figure 1. Value Chain Mapping: Theory and Reality (Source: [22])

Value Chain Governance

A distinguishing characteristic of value chain analysis is the emphasis not only on the dynamics of end markets but also on the dynamics (governance) and shifts in relationships. Value chain governance refers to the relationships among the buyers, sellers, service providers and regulatory institutions that operate within or influence the range of activities required to bring a product or service from inception to its end use. In value chain analysis, identification of the type of governance structure that exists is necessary as it contributes significantly to the selection of interventions to increase competitiveness of entire the chain.

Value Added and the Value Chain

The value added per unit of product is the difference between the price obtained by a *value chain operator* and the price that the operator has paid for the inputs delivered by operators of the preceding stage of the value chain and the intermediate goods bought in from suppliers of inputs and services who are not regarded as part of the value chain [23]. In short, value added is the worth that is added to a good or service at each stage of its production or distribution [24]. Part of the additional value created remains in the chain (referred to as value captured), another part is captured by suppliers external to the chain. Value added is a useful measure as to whether a firm is competitive in its current operating and regulatory environment.

Before deciding to enter a new market or business a person must first determine which business is the most profitable one for him/her. This is particularly important for poor people who have limited resources and so cannot afford to choose the wrong market or sector [25]. Revenues, costs and margins should therefore be analyzed in value chains. Analysis of cost and margins enables the researcher to determine how "pro-poor" a value chain really is. The cost is the money that an actor in the value chain contributes, while the margin is the money that an actor in the chain receives, minus the costs.

Actual costs and margins help determine whether a value chain is a good source of income for the poor and whether it is accessible for the poor. Historic costs and margin, on the other hand finds out what the financial trends have been and whether the chain has potential to grow in the future. Cost and margin analysis of a value chain is only useful if producers (farmers or whomever) are treated as micro-entrepreneurs (i.e. small commercial actors seeking the most profitable use of their limited resources in the market place) rather than as subsistence actors.

Gender and Value Chains

Gender is an important aspect of value chains analysis, but one which is often overlooked and/or oversimplified [26]. According to [27], it is imperative for gaining an understanding of the totality of production, distribution and consumption within an economy. From literature on gender and value chains, there is increasing a high incidence of women employed in buyer-driven commodity chains. A gender approach to value chain analysis allows for the consideration of

1. groups and individual men and women access to productive activities.
2. differential opportunities for upgrading within the chain; thus gender based division of activities.
3. how gender power relations impact economic rents among actors throughout the chain.

Value chain analysis benefits the rural poor, who are mostly women, to the greatest possible extent or, at least, does not worsen their position relative to other demographic groups. The ongoing liberalization of markets means that the poor will be marginalized unless they are strategically positioned in domestic and /or international markets [28]. There is therefore the need for in-depth analysis of such chains (the integration) to ensure the growth-equity "win-win" situations.

3. Methodology

The study used the mixed method approach to collect both quantitative and qualitative data. The simple random and purposive sampling methods were used to select 300 farmers at the farm level to be included in the study. The 300 farmers were selected from the three regions, Norther, Upper East and Upper West (100 farmers each). Two districts were randomly selected in each region for the study. Snowball sampling method was used to select a total of 140 respondents at the distributing (assembling, wholesaling and retailing) and processing segment of the chain. Again, 100 consumers of groundnut oil were randomly selected from the Northern, Upper East, Upper West, Brong Ahafo and the Greater Accra regions. In all, there were 540 respondents representing the various categories of actors as well as consumers were sampled for the study.

Questionnaires were used to collect data from the randomly selected respondents and an interview guide was used to elicit information from key informants. As part of the analysis, Statistical Product and Service Solutions (SPSS Version 16) and Microsoft Excel (2016) were used to generate frequencies and percentages; charts and graphs; and estimate cost and returns for the study. The results are presented in the next section.

4. Empirical Evidence

Evidence from the data in Table 1 suggests that the groundnut industry is an important sector for women. Out of the 300 farmers interviewed, 41% were women. This percentage involvement of women in groundnut cultivation is higher than the 11% found by [29] among sorghum farmers in Ghana and the 2% for rice farmers in Tolon-Kumbungu District, by [30]. At the marketing segment, 84% of respondents are females. The males are mostly found at the assembling stages while retailing is done solely by women. All respondents at the processing segment were females. This implies that promoting the groundnut industry will enhance the livelihood of women, their households and the rural economy as a whole.

The level of education of farmers as indicated in Table 1 is slightly higher than that of processors and far lower than that of distributors. Only forty percent of the farmers interviewed had had some form of formal

education, while majority (80%) of respondents at the marketing segment of the chain had formal education. Only 35% of the respondents at the processing segment had formal education. It is also shows that majority of respondents at the production, marketing and processing segments of the chain have crop production, trading and processing as their major occupations respectively. This means that any intervention made in the groundnut value chain will be effectively adopted and implemented by respondents because the various segments serve as the main source of employment opportunities for them.

Table 1. Characteristics of key actors

Respondents	Respondents' Characteristics	Frequency	Percentage
Primary Producers (Farmers)	**Gender**		
	Male	177	59.0
	Female	123	41.0
	Education		
	Formal	120	40
	No Formal	180	60
	Major Occupation		
	Crop production	252	84
	Other	48	16
Distributors	**Gender**		
	Male	13	16
	Female	67	84
	Education		
	Formal	64	80
	No Formal	16	20
	Major Occupation		
	Trading	51	64
	Others	29	36
Processors	**Gender**		
	Male	0	0
	Female	60	100
	Education		
	Formal	21	35
	No Formal	39	65
	Major Occupation		
	Processing	52	86
	Others	8	14

Source: Fieldwork, 2016.

4.1. Mapping of Key Actors, Functions and Existing Linkages along the Groundnut Value Chain

Value Chain Actors and their Functions

Figure 2 provides an overview of the groundnut industry, the structure and flow of goods and services, as well as the linkages between various actors operating within the groundnut value chain. Following is a discussion on each segment of the chain as groundnuts are being transformed from seeds to finished products ready and available for consumption.

Input Suppliers

The chain starts with supply of inputs by input suppliers. Inputs include seeds, agrochemicals, farm equipment and tractor services. The agro-inputs used across the study are primarily seeds and these are mainly sourced from farmer' previous produce. The study revealed that 59% of groundnut producers' source seeds from previous produce and this concur with a previous study by [31], which says that most smallholders select seeds from their own harvest for the next production cycle. Only 28% purchase seed from market and 13% receive seed as gifts from NGOs, friends or relatives. It was revealed from the study that the use of fertilizers is minimal in traditional groundnut production.

Groundnut Producers

Groundnut production is predominantly at the micro-scale level and it is dominated by small-scale farmers, majority (59%) of whom are males. Even though it is dominated by males, there is an appreciable female involvement compared to other crops like sorghum and rice as identified by [29]. The production activities or functions involve: land preparation, sowing, and maintenance in the sense of weed control, fertilization (in few cases), pest and disease management, harvesting and finally farm gate processing or post-harvest management. Primary producers employ hired labourers to carry out activities such as weeding and harvesting of groundnuts. However, in most cases family labour is employed in addition to the hired labour to reduce labour cost. Only 13% and 25% of producers employ solely hired and family labour respectively, the remaining 62% of producers employ both forms of labour concurrently.

Groundnut is mainly produced under rain-fed conditions and has mainly one cropping season in a year. However, in some parts of the Upper East region, particularly in the Kassena- Nankana West district, few farmers farming around dams are able to crop twice in a year. Farm sizes are generally small with an average 0.8 ha. This confirms a research conducted on groundnuts in Uganda by [32]. Results from research indicated that, groundnut is being cultivated on small scale basis with farm sizes ranging from 1-2 acres (0.4-0.8ha). Harvested nuts are sun-dried for 5-7 days depending on the intensity of the sun. This corroborates the findings of [33]. The dried nuts are either sold in the shelled or unshelled form depending on the farmer. Forty-eight percent of the respondents sell nuts mostly in the unshelled form while 52% sell in the shelled form.

Distributors (assemblers, wholesaler and retailers)

The groundnut assembling, wholesale as well as retail markets for both dry and processed nuts are dominated by women. Retailers are exclusively women. Though traders operate as individuals, most of them are members of trader-associations. Each bigger market especially in southern Ghana has an association for groundnut traders which are often headed by the commodity "queens". The status and function of the queen is an expression of traditional hierarchies; she establishes informal market rules such as setting of prices for groundnut and the authorization of new entrants and this is binding on all members of the association.

Dried groundnuts from producing regions are marketed both within and outside the regions. These are either traded at the farm gate, local market either in community or neighbouring community/town, wholesale market within the district or region or wholesale market outside the region. Apart from acting as intermediary at the market, distributors buy groundnut directly from

producers or markets located in production areas and supply to end users. Rural assemblers within the farming communities purchase from farmers and sell to wholesalers and at times retailers in the cities. At certain times also, a number of distributors, particularly wholesalers, travel from one community to the other or even sometimes across the boundaries of the country to Burkina Faso to purchase groundnuts themselves. This is usually common during the lean season.

Most of the assemblers use their own money to finance transactions. They can also get cash advances from wholesalers, who play important roles in informal finance in rural and urban areas. The study revealed that, some wholesalers in Accra do not travel to producing centers to buy groundnuts themselves all the time; sometimes, they deposit money into the accounts of their agents at the centers. The agents in turn do all the purchases and send groundnuts through transport operators to these wholesalers.

Processors

Processors, whose scale of operations seems to be concentrated at small scale levels, represent an important sector for women. All processors interviewed (100%) are women. They process groundnut into oil, groundnut cake, paste, roasted groundnuts and other groundnut based products. Most of the processing takes place at the individual or household level. However, in Techiman in the Brong Ahafo region, Technoserve (an international NGO) has assisted some women processors to organize themselves into cooperatives. This enables them to take up large orders and maintain continues supply to institutional buyers and wholesalers from cities like Sunyani, Kumasi and Takoradi.

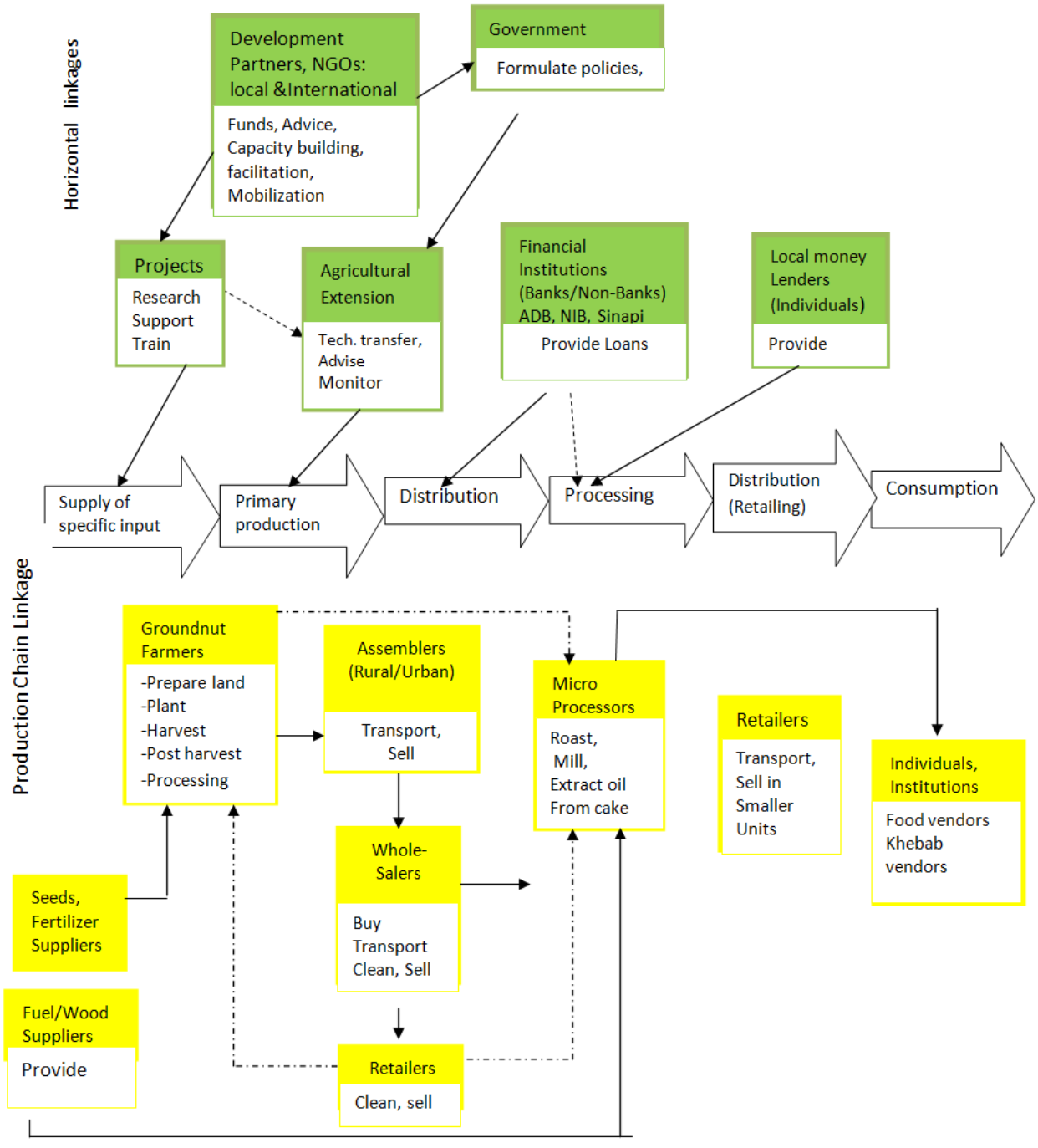

Figure 2. Groundnut Value Chain Actors, Functions and Existing Linkages (Source: Field survey, 2016)

Retailers of Oil and Paste

Retailing of groundnut oil and paste is solely undertaken by women. Retailers may trade a combination of paste, oil, roasted groundnuts or several other commodities. They go to the homes of individual processors or markets for their supplies. Village-level retailers buy processed products from urban processors almost every market day. Depending on the relationship between retailers and processors as well as the financial standing of both parties, some retailers (20%) sometimes buy oil/paste on credit and settle their debt after sales. Research findings indicate that twenty-seven percent (27%) of retailers also give cash advances to processors prior to supplies. They add relatively little value to products before sales compared to other actors along the chain.

Horizontal Linkages

There are several institutions and organizations (governmental and non-governmental) that create the framework and conditions for the activities of the groundnut sector. These are not directly involved in the creation of the final output but their activities impact on the performance and efficiency of the value chain. Among these support institutions is the Ministry of Food and Agriculture (MoFA) whose traditional function is to ensure sufficient food production at reasonable prices for domestic consumption as well as increased production of raw materials to feed domestic industries and for export. This is achieved through the formulation and implementation of public policy on food production and agricultural issues. For several years now the district extension officers have been offering technical advice to individual farmers and production associations. They also serve as source of current market prices to farmers. Research findings, as indicated in Figure 3 shows that the most important source of agricultural information to the farmer is the AEAs, representing 47% followed by the radio which represented 23%

The Savannah Agricultural Research Institute (SARI) of the Council for Scientific and Industrial Research (CSIR), which is located in the study area, has for the past years been engaged with groundnut farmers, in the field of research and development of new varieties. Though it is not the core mandate of CSIR-SARI to provide extension services to farmers, the institute always come out with what it calls fact-sheet, alongside every new variety of groundnuts it releases. This fact-sheet which contains certain variety-specific agronomic practices is handed over to MoFA to facilities its extension delivery to groundnut farmers. The main problem the institute is facing is farmers' unwillingness to buy these certified seeds. They rather select the next season's seeds from previous harvest, thereby resulting in all sort of problems associated with admixtures.

International business and development organizations such as ICRISAT, Technoserve, ADRA, ACDEP among others have activities in the study area to promote groundnut production, in the form of provision of technical and managerial assistance to farmers, groups and small scale entrepreneurs. There are other local non-governmental organizations (e.g. Northern Empowerment Agency) supporting groundnut farmers particularly women in the Northern Region and some parts of the Brong-Ahafo region. This support is in the form of input (seeds), money for ploughing, health related awareness programmes among others.

There are also banks and non-bank financial institutions assisting some actors in the chain, especially distributors. For example, the National Investment Bank in Wa and the Agricultural Development Bank and "Sinapi Aba" Microfinance in Brong-Ahafo and Northern Regions have schemes to assist traders to finance their operations.

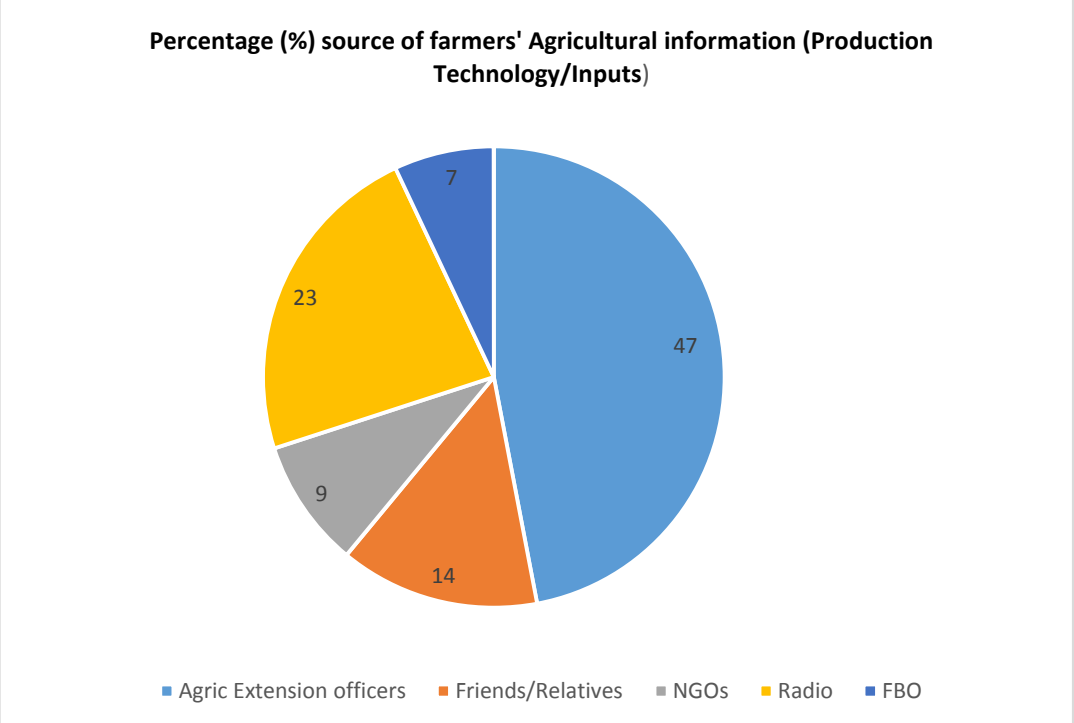

Figure 3. Sources of farmer's Agricultural information (Source: Field Survey, 2016)

Table 2. Costs, Profit and Margins per Litre of Oil: Farmer Sells Groundnut in the Shelled Form

Added cost, profits, and margins per kilogramme (kg) of groundnut (for farmer and distributor) per litre of oil (for processor and retailer						Added cost, profits and margins per litre of oil processed (3kg of groundnut yields 1 litre of oil)						
	Costs		Revenue	Profit	Margin	Cost			Profit		Margin	
Actor	Unit Total Cost (UTC) A	Added Unit Cost (AUC) B	Unit Price C	Unit Profit (UP) d=c-a	Unit Margin (UM) Δc	UTC	AUC	% Added Unit Cost	UP	% Total Profit	UM	% Retail Price
Farmer	1.20	0.78	2.48	1.28	2.48	**3.60**	**2.34**	62.40	**3.84**	63.16	**7.44**	56.53
Distributor	2.69	0.21	3.22	0.53	0.74	**8.07**	**0.62**	16.53	**1.50**	24.67	**2.22**	16.87
Processor (Oil+Cake)	10.33	0.72	6.28 4.42 10.68	0.35	3.04	**10.33**	**0.72**	19.20	**0.35**	5.76	**3.04**	23.10
Retailer (oil)	5.91	0.07	6.72	0.39	0.46	**5.91**	**0.07**	1.87	**0.39**	6.41	**0.46**	3.50
Total							**3.75**	100	**6.08**	100	**13.16**	100
Added unit cost refers to the added costs at each stage of production net the procurement cost (cost of commodity in process from the previous stage.												

Source: Field survey, 2016.

Table 3. Costs, Profits and Margins per Litre of Oil: Farmer Sells Groundnuts in the Unshelled Form

Added cost, profits, and margins per kilogramme (kg) of groundnut (for farmer and distributor) per litre of oil (for processor and retailer						Added cost, profits and margins per litre of oil processed (3kg of groundnut yields 1 litre of oil)						
	Costs		Revenue	Profit	Margin	Cost			Profit		Margin	
Actor	Unit Total Cost (UTC) A	Added Unit Cost (AUC) B	Unit Price C	Unit Profit (UP) d=c-a	Unit Margin (UM) Δc	UTC	AUC	% Added Unit Cost	UP	% Total Profit	UM	% Retail Price
Farmer	1.01	0.51	1.86	0.85	1.86	**3.03**	**1.53**	47.52	**2.55**	39.05	**5.58**	42.40
Distributor	2.14	0.30	3.22	1.08	1.36	**6.42**	**0.9**	27.95	**3.24**	49.62	**4.08**	31.00
Processor (Oil+Cake)	10.33	0.72	6.28 4.42 10.68	0.35	3.04	**10.33**	**0.72**	22.36	**0.35**	5.36	**3.04**	23.10
Retailer (oil)	5.91	0.07	6.72	0.39	0.46	**5.91**	**0.07**	2.17	**0.39**	5.97	**0.46**	3.50
Total							**3.22**	100	**6.53**	100	**13.16**	100
Added unit cost refers to the added costs at each stage of production net the procurement cost (cost of commodity in process from the previous stage.												

Source: Computed from Field Survey, 2016.

4.2. Estimation of Costs and Returns along the Groundnut Value Chain

4.2.1. Distribution of Profit along the Groundnut Oil Chain: Farmer Sells Groundnut in the Shelled Form

The total profit created in the groundnut value chain on one litre of locally produced groundnut oil is GH¢ 6.08. From Table 2, GH¢ 3.84 constituting 63.16% of the total profit created accrues to the farmer on every 3kg (the equivalent of a litre of oil) of shelled groundnuts sold. The groundnut distributor gets 24.67 % of the total profit created. The processor, upon every litre of oil handled gets a profit of GH¢ 0.35 (5.76%). A profit of GH¢ 0.39 (6.41%) accrues to the oil retailer. The farmer, therefore, gets most of the profit created along the chain. This is followed by the distributor, oil retailer and subsequently the processor who gets the least.

4.2.2. Distribution of Profit along the Groundnut Oil Value Chain: Farmer Sells Groundnut in the Unshelled Form

Results from Table 3 show that when groundnut is sold in the unshelled form, the total profit created per litre of oil processed is GH¢ 6.53 and out of this the farmer gets GH¢ 2.55 representing 39.05% of the total profit. The distributor on the other hand accumulates 49.62% while the processor and retailer get GH¢ 0.35 (5.36%) and GH¢ 0.39 (5.97%) respectively. The distributor gets most of the profit when groundnuts are sold in the unshelled form. Her share increases from GH¢ 1.50 when she buys groundnuts in shelled form to GH¢ 3.24, when she buys in the unshelled form, this represents a 116% increase.

Comparing results in Table 2 and Table 3, it is seen that, the farmer's profit decreases from GH¢ 3.84 when he sells in the shelled form to GH¢2.55 when groundnuts are sold in the unshelled form. This represents a 34% decrease in

profit compared to the decrease in cost from GH¢1.56 to GH¢1.32 (a 15% decrease). It can therefore be concluded that farmers who sell groundnuts in the shelled form earn about 34% more than their counterparts who sell in the unshelled form. This is also true for groundnut farming in Uganda [33].

4.2.3. Distribution of Return on Investment (ROI) along the Oil Chain: Farmer sells Groundnut in the Shelled Form

Return on investment represents the returns a particular actor gets on every cedi invested. From Table 4, ROI by the farmer, distributor, processor and oil retailer are GH¢ 1.07, GH¢0.19, GH¢ 0.03 and GH¢ 0.07 respectively. Therefore, comparing performance on basis of return on investment (ROI), it can be concluded that the farmer benefits more from the oil chain when he sells his produce in shelled form. This return on investment to groundnut farming is about three times greater than that to rice farming, a competing investment. Research conducted by [30] in Northern Ghana revealed an ROI of GH¢0.31 and GH¢ 0.28 to farmers of the improved and indigenous rice varieties respectively.

Table 4. Return on investment (ROI) per litre of oil: Farmer sells groundnut in shelled form

Actor	Profit	Cost in generating margin	Return on investment (ROI)
Farmer	3.84	3.60	1.07
Distributor	1.50	8.07	0.19
Processor	0.35	10.33	0.03
Retailer	0.39	5.91	0.07

Source: Computed from Fields survey, 2016.

4.2.4. Distribution of Return on Investment (ROI) along the Oil Chain: Farmer sells Groundnut in the Unshelled Form

It is discernible from Table 5 that though the distributor has the highest profit margin created along the chain when groundnuts are sold in the shelled form, it is not the best venture in the chain on the basis of ROI. It can be seen that the distributor invests a lot more than the farmer to get the margin accruing to her. Yet the distributor's return per cedi invested is GH¢ 0.51 and that of the farmer is GH¢ 0.84. In this sense, the processor is even much worse off. She invests more than all the other actors yet receives the least margin.

Table 5. Return on investment (ROI) per litre of oil: Farmer sells groundnut in unshelled form

Actor	Profit	Cost in generating margin	Return on investment (ROI)
Farmer	2.55	3.03	0.84
Distributor	3.24	6.42	0.50
Processor	0.35	10.33	0.03
Retailer	0.39	5.91	0.07

Source: Computed from Fields survey, 2016.

4.2.5. Distribution of Profit along the Groundnut Paste Value Chain: Farmer Sells Groundnut in the Shelled Form

For a kilogramme of groundnut paste, the total profit created along the chain is GH¢ 2.42, out of which 52.89% accrues to the farmer. The distributor, processor and paste retailer get 21.90%, 12.40% and 12.81% respectively. Comparing the results from Table 2 and Table 6 it can be seen that the percentage of total profits (12.40%) accruing to the processor in the paste chain is higher than that of the oil processor (5.76%). This can partly be attributed to the relatively higher turn-over of the groundnut paste. On the average, the paste processor is able to process 149.5kg of raw groundnuts weekly, compared to the oil processor who processes 93kg per week.

4.3. Distribution of Return on Investment (ROI) along the Groundnut Paste Chain

From Table 7, the return on investment to the farmer when a kilogramme of paste is processed is GH¢ 1.07, meaning, for every cedi the farmer invests, he/she gets a return of GH¢ 1.07. That for the distributor is GH¢ 0.20; both the processor and the retailer get GH¢ 0.08 each. Comparing results from Table 4 and Table 7, it can be said that though the oil processor and retailer do better in terms of profit (GH¢ 0.35 and GH¢ 0.39) compared to the paste processor and retailer (GH¢ 0.30 and GH¢ 0.31 respectively), they also invest a lot more to get that margin accruing to them. The return per cedi invested accruing to the oil processor and retailer are GH¢ 0.03 and GH¢ 0.07 respectively. That to the paste processor and retailer are GH¢ 0.08 each. This implies, it pays more to invest in processing and retailing of groundnut paste than in processing and retailing of groundnut oil. In order to improve the ROIs of groundnut oil processors, they should be assisted to expand their scale of production from small to medium or large scale, as this will reduce per unit cost of processing due to economies of scale.

Table 6. Costs, Profits and Margins per kilogramme of Groundnut Paste

Actor	Costs			Revenue	Profit		Margin	
	Unit Total Cost (UTC) A	Added Unit Cost (AUC) B	% Added Unit Cost	Unit Price c	Unit Profit (UP) d=c-a	% Total Profit	UM Δc	% Retail Price
Farmer	1.20	0.78	63.94	2.48	1.28	52.89	2.48	61.20
Distributor	2.69	0.21	17.21	3.22	0.53	21.90	0.74	18.30
Processor	3.43	0.21	17.21	3.73	0.30	12.40	0.51	12.60
Retailer (Paste)	3.74	0.02	1.64	4.05	0.31	12.81	0.32	7.90
Total		1.22	100		2.42	100	4.05	100

Source: Field work, 2016.

Table 7. Return on Investment (ROI) per Kilogramme of Groundnut Paste

Actor	Profit	Cost in generating margin	Return on investment (ROI)
Farmer	1.28	1.20	1.07
Distributor	0.53	2.69	0.20
Processor	0.30	3.43	0.08
Retailer	0.31	3.74	0.08

Source: Computed from Fields survey, 2016.

4.3.1. Distribution of Return on Investment per Day (ROID) along the Groundnut Oil Chain (Shelled and Unshelled Groundnut) and Paste Chain

Results from Table 8 indicate that, it takes the groundnut farmer approximately 308 days to generate the profit accruing to him/her, while it takes the distributor, processor and retailer approximately 28 days each to generate the profit accruing to them. The estimated Return on Investment per Day (ROID) along the groundnut oil chain (when farmer sells groundnut in the shelled form) for the farmer is GH¢ 0.004. That for the distributor, processor and retailer are GH¢ 0.007, GH¢ 0.001 and GH¢ 0.003 respectively.

4.3.2. Distribution of Return on Investment per Day (ROID) along the Groundnut Oil Chain (Shelled and Unshelled Groundnut) and Paste Chain

Comparing results from Table 8 to Table 2 and Table 4, it can be said that though the farmer does better in terms of profit and ROI (GH¢ 3.84 and GH¢ 1.07) compared to the distributor (GH¢ 1.50 and GH¢ 0.19), he/she uses a lot more days to generate that profit and ROI accruing to him/her. Similarly, along the groundnut paste chain, the distributor benefits most with ROID of GH¢ 0.007, then, the farmer, processor and retailer with ROID of 0.003 each. It can be concluded that, indeed the distributor benefits most along the groundnut value chain as indicated by actors in assessing power relations in the chain through a scoring exercise (Table 9).

4.4. Assessing Power Relations in the Chain

The percentages in Table 9 represent the share of power perceived by chain actors as the level of "influence and importance" the various actors in the groundnut value chain exert for each of the indicators for determining dominant governors in the chain. The higher the percentage, the more dominant a particular group of actors are, with regards to governance along the chain. From Table 9, the level of "influence and importance" producers exert with regards to share of profit generated in the chain is 20%, that of processors is 30% while the remaining 50% goes to distributors. This is similar for almost all the other indicators. Therefore it can be concluded that, distributors are the dominant governors in the groundnut value chain. One factor attributing to the position of distributors is their much higher degree of organization as compared to that of producers and processors. They form very effective groups or associations where they control flow of information across the chain, thereby improving their negotiation position vis-a-vis the producers and processors. The study revealed that majority of distributors (78%) belonged to one association or the other. When asked where producers mostly get market information from especially that on prices, 55% said they get it from buyers or distributors; 36% get information from radio and the remaining 9% from other sources such as association heads, extension officers and mobile phones.

Distributors are also better able to protect themselves from competition from other potential traders. Results from scoring exercise indicate that while the level of influence and importance exerted by producers and processors are 0% and 30% respectively, that of distributors is 70%. Unlike trading where a new entrant needs a permits from market queens or other members of groundnut traders associations, a new farmer needs no permission from anybody provided he/she has the resources.

Table 8. Return on Investment per Day (ROID) per Litre of Oil (when Farmer Sells Groundnut in Shelled and Unshelled Form) and per kilogramme of Groundnut Paste (Shelled Form)

Actor	ROID per Litre of Oil (Shelled Form)			ROID per Litre of Oil (Unshelled Form)			ROID per Kilogramme of Paste (Shelled Form)		
	ROI	Days	**ROID**	ROI	Days	**ROID**	ROI	Days	**ROID**
Farmer	1.07	308	**0.004**	0.84	308	**0.003**	1.07	308	**0.003**
Distributor	0.19	28	**0.007**	0.50	28	**0.018**	0.20	28	**0.007**
Processor	0.03	28	**0.001**	0.03	28	**0.001**	0.08	28	**0.003**
Retailer	0.07	28	**0.003**	0.07	28	**0.002**	0.08	28	**0.003**

Source: Computed from Fields survey, 2016.

Table 9. Results of the Scoring Exercise

INDICATORS	**Level of "influence and importance" exerted by Main Actors along the Chain for each of the Indicators (%)**		
	Producers	Distributors	Processors
Share of Profit	20	50	30
Bargaining Power	20	40	40
Information Concentration	10	60	30
Protection from Competition	0	70	30

Source: Based on Field Survey, 2016.

Also, with regards to bargaining power, a factor possibly resulting in the position of producers is that, they do not actively seek market outlets. Findings from the study indicate that apart from the few farmers (19%) who sell groundnuts in wholesale markets within district, region or outside region of production, the majority (66%) sell their produce on farms or at their residence, thus remaining unaware of market demand, supply and prices. Fifteen percent of them also sell in local markets within communities of production or in neighbouring communities. Moreover, relationships that result in distributors pre-financing production reduce the bargaining power of producers, as they are bound to often sell their produce to distributors, and often on terms proposed by the latter. Out of the 75 producers who received support or credit for groundnut production, 11% sourced their credit from distributors.

The findings in Table 9 are similar to those of [34] on the "gari" value chain, in that, distributors are identified to be the dominant governors in both chains. However, when it comes to share of profit along the chain, the proportion of importance and influence exerted by the groundnut farmer is 20%, while that of the cassava farmer is 10%. This can be explained in part by the relatively perishable nature of cassava. Groundnut on the other hand can be stored to attract relatively higher prices in the lean season. This to some extent also increases the bargaining power of the groundnut farmer, especially during the lean season compared to the cassava farmer.

5. Conclusion and Policy Recommendation

Based on the findings, it can be concluded that the main actors along the groundnut value chain are the input suppliers, groundnut producers, distributors (assemblers, wholesalers and retailers), processors and retailers of processed products. Other actors include governmental institutions, non-governmental organization, banks and non-bank financial institution, as well as local money lenders. It was further revealed that farmers who sell their groundnuts in the shelled form benefit more from the value chain relative to their counterparts who sell in the unshelled form. When groundnuts are sold in the unshelled form, it is the distributor, rather than the farmer who benefits most in terms of profit.

Comparing the performances of the actors on the basis of return on investment per day (ROID), it can be concluded that the groundnut distributor benefits most from both the oil and paste chains whether groundnut is sold in the shelled or unshelled form. It can also be concluded that, margins are somehow evenly distributed along the groundnut paste chain compared to that of the oil. The paste processor can be said to be better off than the oil processor in terms of profit margin accruing to each and on the basis of ROI and ROID. Distributors are the key governors in the groundnut value chain.

In the commercialization process, MOFA and other stakeholders should assist farmers to adopt off season farming using the available small scale irrigation schemes. This will increase productivity and ensure continuous supply of groundnuts in the country. Existing processor groups or co-operatives should be empowered (in terms of group dynamics, management principles and financial literacy) and individual processors should be organized into groups as it is practiced by some traders in the chain. This will facilitate their access to credit which was a major constraint to groundnut processing. In order to ensure efficient use and sustainability of credits given to processors.

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