



VALUE CHAIN ANALYSIS OF SELECTED AFRICAN INDIGENOUS VEGETABLES IN MEZAM DIVISION, CAMEROON

Zie, T. C., Tambi, M.D. and Wimbam, M. B.

Department of Agribusiness, University of Bamenda, Cameroon

¹**Corresponding Author's Email:** Chizie71@yahoo.com, tambi2015@yahoo.co.uk;

ABSTRACT

This study unveil the value chain analysis of selected African indigenous vegetables in Mezam division, Cameroon. Both primary and secondary data sources were used. Data were obtained from a convenience sample of participants from four sub-Divisions in Mezam Division. That is Bamenda I, II, III and Tubah Sub-Divisions. Primary data was collected among 300 producers in the Mezam division using a well-structured questionnaire through random sampling. Ratios and descriptive statistics were used to estimate the result. Results revealed that most commonly grown indigenous vegetables were fluted pumpkin (23.7%), garden egg (19.0%), bitter leaf (14.7%), huckle berry (12.6%), water leaf (8.0%), and Amarantha (6.3%). Also, the findings revealed that, value chain actors identified were; input suppliers, chain facilitators, producers, wholesalers, retailers, collectors, processors and consumers. To add, through focus group discussions, each value chain actor was identified to perform unique roles in the value chain of AIVs with the input supplier supplying the producers with agricultural inputs and they are easy to access. The study equally shows that difficulties in accessing the facilitators limits the flow of market information. The study recommends that, to strengthen the interaction among the value chain actors, rules have to be develop that bind the relationship between producers and traders most especially positive attitudes toward partnership, interaction, networking and information flow needs to be developed among the main actors in the value chain. This will help the chain actor's work in an integrated way to improve production, reduce post-harvest losses, and to strengthen sustainable market linkage in Mezam Division. With a strong relationship between traders and producers, searching for market information and dissemination will be crucial.

Key words: Actors, indigenous vegetables, Mapping, Value Chain.

INTRODUCTION

About 30,000 edible plants are found throughout the world, 7,000 of which are grown or collected as food (Natarajan, 2002). According to Smith and Eyzaguirre (2007), about 3,000 species of these plants have been commercialized with only about 20 consumed on large scale. In the world today, African Indigenous Leafy Vegetables are increasingly recognized to contribute to micronutrients and bioactive compounds to the diets of populations in Africa. The Sub Saharan Africa region is a natural habitat for more than 45,000 species of African Indigenous Leafy Vegetables of which, about 1,000 can be eaten as green leafy or fruit vegetables that happen to be the mainstay of traditional diets of the people. According to Jaenicke and Hoeschle (2006) African indigenous vegetables are those species with under exploited potential contributing to food security, health (nutritional/ medicinal), income generation, and environmental services. Other scholars defined the African indigenous vegetables as a crops species both indigenous and traditional vegetables that have been part of the food systems in Sub-Saharan Africa for generations (Smith and Eyzaguirre, 2007). In addition to the fact that indigenous vegetable historically constitutes a significant portion of the daily diet of countries such as Cameroon, due to the low per capital intake of



animal products (Chadha *et al.*, 2008), indigenous vegetables are now sold by supermarkets in major cities and appearing on the menus of some restaurants and hotels in the sub-region.

Indigenous vegetables from Africa, including Fluted pumpkin, Bitter leaf, amarantha (*Amaranthus* spp.), African eggplant (*S. aethiopicum*) have been shown to be richer in micronutrients such as iron, Vitamin A (Weinberger and Msuya, 2004), possess antibiotic, probiotic and prebiotic properties (Park *et al.*, 2002; Erasto *et al.*, 2004; Veluri *et al.*, 2004) anti-oxidants and phytochemicals that help protect people against non-communicable diseases (Yang and Keding, 2009; Uusiku *et al.*, 2010). African eggplant, a readily cultivated vegetable crop, has recently been found to possess protective properties against ulcers induced experimentally, making it a cheap source of natural anti-ulcer remedy (Chioma *et al.*, 2011). Rural families have traditionally made conscious efforts to preserve these plants around their homesteads, in crop fields and communal lands. Marketing development of underutilized plant species (AIVs) is one way to increase social welfare by generating income for the local producers and chain actors and by promoting the sustained use and conservation of agricultural biodiversity (Will, 2008). Value Chain is a full range of activities which are required to bring a product or service from conception, through the different phases of production, transformation and delivery to final consumers.

In Kaplinsky and Morris' approach, value chain analysis seeks to characterize how chain activities are performed and to understand how value is created and shared among chain participants (Kaplinsky and Morris, 2000). Even though studies have been carried out in Mezam Division on vegetable productions, relatively few studies have been conducted on African indigenous vegetables. Studies that have been conducted mostly focuses on the, nutritional attributes, nature of marketing outlets, but have hardly looked at indigenous vegetables marketing chain, particularly from seed production and distribution through to product marketing. Very little or no research has been done to assess the interaction of the structure, conduct a relationship among value chain actors along the African indigenous vegetables value chain in Mezam Division. Several scholars have recognized that more attention is required to upgrade agricultural value chains to increase quality-based competitiveness of domestic agricultural produce, thereby improving food security and contributing to poverty alleviation (Demont and Maimouna, 2015; FAO, 2014). This study seeks to;

- i. Identify the socioeconomic characteristics of the indigenous vegetables producers,
- ii. Identify various African Indigenous Vegetables produced in Mezam Division,
- iii. Identify value chain actors, their roles along the indigenous vegetable value chain, and to Map out the value chain of Garden Egg (*Solanum melongena*), Okongobong (*Cucurbita moschata*, Bitter leaf (*Vernonia amygdalina*) which are the indigenous vegetables selected for this study in Mezam Division.

METHODOLOGY

Considering the study area, the North West is one of the regions in Cameroon; it is composed of seven divisions: Boyo, Bui, Menchum, Mezam, Momo, Ngo-Ketunjia and Donga-Mantung Division. This study covers Mezam Division. Mezam Division is located in the North West Region of Cameroon with its capital called Bamenda. It is located 366 km north-west of Yaoundé. The area covers an approximate area of 200km² and is situated between latitude 5°58'42.6''N, and longitude 10°08'52.0''E. It is bounded to the North, East, and West by Menchum, Boyo and Momo Divisions and to the South by the Western Region. As at 2010, the projected total population of Mezam stands at 802,100 inhabitants. Mezam Division is considered ideal for this study due to its high potential production and demand/



marketing of indigenous vegetables of which producers are still unable to bring out the various actors involved in the marketing of these indigenous vegetables.

Sampling technique and sample size

A three stage random sampling procedure was used for the selection of participants of this study. In the first stage, Mezam Division, in the North West Region was selected purposively based on its potential it has for indigenous vegetables production. In the second stage, with the consultation of the ministry of Agriculture, out of the Seven (7) sub Divisions, four (4) sub Divisions were indicated as major areas for indigenous vegetable production namely Bamenda I, II, III and Tubah (MINADER, 2012). In the third stage, with the help of the Yamane (1967) formula, 300 farmers were selected randomly based on population of AIV production in Mezam Division for the interview. A total of 300 respondents were randomly selected and interviewed for this study. Even though the sample size was small, but it was sufficient enough for statistical analysis. This is because, usually the sample size depends on the size of the production population. Due to the fact that the specific population (1,200) in to indigenous vegetable production in the various sub-Divisions was revealed from the MINADER's data base, the Taro Yamane (1967) formula was implemented to get the sample size for this study.

$$\text{Yamane formula: } n = \frac{N}{1+N(e)^2} = n = \frac{1200}{1+1200 (0.0025)} = 300; n = \text{Sample Size,}$$

N= Population and E= Margin of error (0.5%)

Method of Data collection

Data was collected using a structured questionnaire and an interview guide which was administered by the author herself. Primary data was collected from the selected indigenous vegetable producers with the help of a structured questionnaire. Secondary data was collected from the ministry of agriculture (MINADER), articles, journals, and university library.

Method of Data analysis

The data obtained were summarized, coded and analyzed using SPSS (Statistical package for science version 25), Descriptive statistics was generated to analyzed respondents opinions on various aspects of indigenous vegetables production and marketing. The data were presented using frequencies, cumulative frequencies and percentages, tables and mean. Also, focus group discussions was conducted with 4 groups made of 12 respondents (men and women) each comprising of indigenous vegetable producer, traders, consumers to support interpretation of results obtained from field survey. The most important topics and domains discussed during the focus group are indicated below. Each topic is defined initially to facilitate understanding and identify areas that its content is too broad and need separation into two or more topics. This is indicated in table 1.

Table 1: Domains Develop for Focus Group Discussion

Topic of discussion at each stage of the value chain	Domain
Input supplier, facilitator of value chain	<ul style="list-style-type: none">▪ Here, I was interested to know the role of the input supplier in the chain, types of input supplied and facilitators in the chain?▪ Am interested to know if producers have access to facilitators and their function in the value chain
Marketing	<ul style="list-style-type: none">▪ Here, I wish to get an insight of the different actors, their roles in indigenous vegetable value chain

Source: author



To realize this, I made use of the chief of Agric-post in the area to establish the focus group. At the beginning of each meeting, confidentiality was explained and the ground rules of group discussions outlined and consent forms was collected. During the focus group discussion, the discussions were audio recorded. Each group meeting, food was cooked, drinks and salt distributed to each participants. Table 2 below, indicates the place and numbers of participants for the focus group meeting.

Table 2: Place, Language and Number of Focus Group Participants

Focus Group	Sub-Divison	Language	Female	Male	Percent (%)	Percent (%)
Producer+Input Supplier	Bamenda II	English, Ngiembah	5	7	41.7	58.3
Producer+ Facilitators	Bamenda II	English Ngiembah	8	4	66.7	33.3
Producer+ Traders	Bamenda II	English Ngiembah	12	0	100	0
Consumer +Traders+ Processors	Tubah	English	11	1	91.7	8.3
TOTAL	2 Sub-Division	2	36	12	75	25

Source: Author

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of Indigenous Vegetable Producers

These characteristics present socio economic aspects of respondents that is age, gender, family size, and experience, level of education, access to extension services. Survey results revealed that, majority (83.0%) of the respondents were females, and (17.0%) were males. This implies that females dominated in AIVs production due to the fact that women are the main food providers in Mezam Division. The findings is in line with that of Mbu D *et al.*, (2017) in their work on women in agricultural production and food security in rural Cameroon.



Table 3: Socio-economic Characteristics of Survey Respondents

Characteristics	Frequency	Percent (%)
Distribution according to Gender		
Female	249	83.0
Male	51	17.0
Total	300	100
Distribution according to Age		
20-35	70	23.3
36-45	97	32.3
46-55	92	30.7
56 and above	41	13.7
Total	300	100
Distribution according to Marital Status		
Single	35	11.7
Married	181	60.0
Divorce	54	18.0
Widow	30	10.0
Total	300	100
Distribution according to Household Size		
1-5	183	61.6
6-10	114	38.0
11 and above	3	1.0
Total	300	100
Distribution according to Farming Experience		
less than or equal to 10	43	14.3
11-20	174	58.0
21 and above	82	27.7
Total	300	100
Distribution according to Educational Level		
No formal education	61	20.3
Primary	73	24.3
Secondary	98	32.7
University	68	22.7
Total	300	100
Distribution according to Land Tenure		
Inheritance	87	29.0
Renting	76	5.7
Owner	196	65.3
Total	300	100
Distribution according to Access to Credit		
Yes		44.3
No		55.7
Total	300	100

Source: author

The results in Table 3 indicates that 32.3% of the respondents were middle age adults ranging between 36 and 45 years old, while 30.7% , 23.3% and 13.7% of the respondents were between 46-55, 56 and above years of age, respectively . This implies that most of the farmers engaged in African indigenous vegetables (AIVs) production were adults (36-45 years old). Accumulation of wealth and strength for labor is highly dependent on age of respondents. The result of this findings indicates producers are under the productive class.



Marital status is an institutional factor that has great influence on family matters. The results obtained showed that majority (60.3%) of the respondents who were engaged in AIV production and marketing production were married, while 18.0%, 11.7%, 10.0% were single, widowed and divorced respectively. These results implies that married respondents dominates in the AIVs production and marketing probably due to the fact that they had households' responsibilities hence, income obtained from AIVs production is important for alleviating household income and improving household food security. Therefore, their engagement in AIVs production and marketing was conceived to be means of livelihood to sustain their families.

Total family size in this study refers to the number of members who were currently living within the family. The results further showed that, respondents household category with household size of 1-5 persons was the highest with a percentage of 61.17% followed by 6-10 persons with a percentage of 38.0% and only 1.0% was over 11. Large family size is an indicator for availability of labor provided that the majority of the family members are within the age range of active labor force. Availability of labor in the household is again one of the important resources in AIVs production and marketing. Majority (58.0%) of the respondents indicated that they have been into AIVs production and marketing between 11 to 20 years, 27.3% of the respondents indicated to have been into AIVs production for over 21 years and only 14.3% of the respondents had been into production for less than or equal to 10 years. This shows that the respondents in this study are not novice in farming activities especially in AIVs production and Marketing. This indicated that study sample was composed of experienced farmers. In terms of educational background, majority (32.7%) of the respondents had university Education followed by Secondary Education (24.3%), No formal education (22.7%) and only 20.3% of the respondents had primary Education. This implies that majority of the respondents engaged in AIVs production and marketing in the study area had one form of formal education or the other. Education has been found to have a positive and direct influence on production (Oluoch-Kosura *et al.*, 2004). In other words, education could increase the ability of farmers to use their resources efficiently, while giving them leverage on effective information diagnosis, analysis, and interpretation.

In addition, the results in Table 3 revealed that 65.3% of the respondents own their land while 29.0% and 5.7% inherited and rented for AIVs production, respectively. Land holding is an indicator of wealth and social status in the community. This means that farmers who owned their own piece of land will be more initiated in production of AIVs. As depicted in Table 3, only 44.3% of sampled producers had access to credit. The main objectives of the credit were to purchase inputs like seedlings for vegetables, manure and fertilizers and 55.7% had no access to credit. The reason behind refusal of credit was because the majority of farmers cover cost of production of indigenous vegetable by selling the vegetables and other food crops from their farms. Although credit was accessible and available for poor farmers to build asset and food secured by purchasing the different packages designed by the regional government, there is lack of attention to access by AIVs producers because they are afraid of loss due to the Perishable level of these vegetables.

Indigenous Vegetable Production Characteristics

Mezam Division has different types of indigenous vegetable grown with different intensities in terms of land, other resource allocation, purpose for production and marketability. Results revealed that most commonly grown indigenous vegetable in terms of number of sampled producers were fluted pumpkin (23.7%), garden egg (19.0%), bitter leaf (14.7%), huckle berry (12.6%), water leaf (8.0%), and Amarantha (6.3%).



Table 4: Proportion of Sampled Household Producing Indigenous Vegetables in Mezam

Crop Type	Frequency	Percent	
Fluted Pumpkin	71	23.7	
Garden egg	57	19.0	
Bitter-leaf	44	14.7	
Huckle Berry	38	12.6	
Water leaf	24	8.0	
Amarantha	19	6.3	
Huckle berry + Waterleaf + Bitter leaf	18	6.0	
Anchia	15	5.0	
Bitter leaf + Fluted Pumpkin	14	4.7	
Total	300	100	
<i>Actors In Indigenous Vegetable Value Chain</i>			
Production (Producer)	Input Suppliers	281	93.6
	Chain Enablers/Facilitators	19	6.4
	Total	300	100
Marketing	Retailers	106	35.4
	Wholesalers	86	28.7
	Collectors	74	24.6
	Processors	34	11.3
	Total	300	100
Consumption	Consumer	300	100.0
	Total	300	100

Source: author

Results revealed that 93.6% as input suppliers and 6.4% as value chain facilitators. These inputs include seeds, fertilizers, manure, pesticides etc. In the marketing of indigenous vegetables. As seen on table 4 above, 35.4% of the respondents identified that they sold their vegetables to Retailers, 28.7% revealed they sell to wholesalers. Furthermore, 24.6% identified collectors, 11.3% identified sales directly to processors. Also 100% of the indigenous vegetable goes to the consumer at the end of the chain. This implies that the value chain actors that mostly participate in the indigenous vegetables value chain are; input suppliers, chain facilitators, retailers, wholesalers, processors and consumer.

Functions of Indigenous Value Chain Actors as Revealed through Focus Group Discussion

Value chain actors identified had their specific functions as can be seen on table 5. From table 5, results indicated that, all focus group acknowledges the function of input supplier to provides seeds, fertilizer, manure, pesticide etc in Mezam Division, and 50% of the participants revealed this inputs are available and very accessible by producers. Also 25% of respondents acknowledges the function of the facilitator. However, 50% of the respondents noted that they performed their function but they are difficult to access as they have norms/conditions which some of them can't meet up. 100% of the participants confirmed the functions of the processor, retailer and consumer. Generally, from the observation, most of the participants preferred to talk about what they do (how the participated in the value chain) as they have a better understanding compared to the other actors functions. 75% of participants acknowledges the functions of the collectors and wholesalers in the market. Even though in the course of the discussion most of them complained of the perishability of this indigenous vegetables.



Table 5: Function of Various Value Chain Actors

Functions	P+Is	P + F	P +T	C+ Pr	T+ %
Suppliers: providers of input (seeds, fertilizer, pesticide	1	2	2	1	100
Producer: produced and manage AIV farms	1	1	1	1	100
Facilitators (IRAD, NGOs, MINADER, cooperatives/associations): providers of support services (credit, research, trainings, and marketing) to other actors also buy from farmers and processed collectively.	3	1	3	0	75
Collectors: AIVs independent operators in the primary Market. Buy, assemble, sort repacked, and transport to sell in major towns	0	1	1	1	75
Wholesalers: buy from collectors or processors and transport to sell in major towns	0	1	1	1	75
Processor: processed (washed, sliced, dry and package) AIV and sells to retailers and consumers	1	1	1	1	100
Retailer: buy in bulk from producers, collectors, wholesalers and sell to consumers	1	1	1	1	100
Consumer: buys from retailer for consumption	1	1	1	1	100

Source: Author

N/B-1. P+Is= Producer +Input Supplier, P+F= Producer + Facilitator, P+T= Producer +Traders, C +T+Pr = Consumer+ traders + Processors. N/B-2: 0= if not mention by group; 1 = if mention by group, 2= if inputs are available and accessible, 3= Facilitators are difficult to accessible.

Mapping of Indigenous Vegetable Value Chain

Mapping a value chain facilitates a clear understanding of the sequence of activities and the key actors and relationships involved in the value chain. Mapping of value chain functions is considered to shows the relationships and integrations of the processes and activities performed along the value chain. Major functions include input supply, production, trading, processing and consumption. Figure 2, 3 and figure 4 displays the processes in Garden Egg, Okongbong and Bitter leaf value chain map, respectively.

Value Chain Map of Garden Egg in Mezam Division

Garden egg (*Solanum melongena* L) which belongs to the Solanaceae family is a popular vegetable crop grown in Mezam Division. The fruit can be eaten raw or served as a baked, grilled, fried or boiled vegetable and can be used in stews. The area devoted to the cultivation of the crop globally is about two million hectares (FAO 2007). Due to its high use, it is produced in high quantities and sold within the rural and central markets. Due to that, there are so many actions that are being carried out by value chain actors before it reaches the final consumer. This is summarized in the map below.

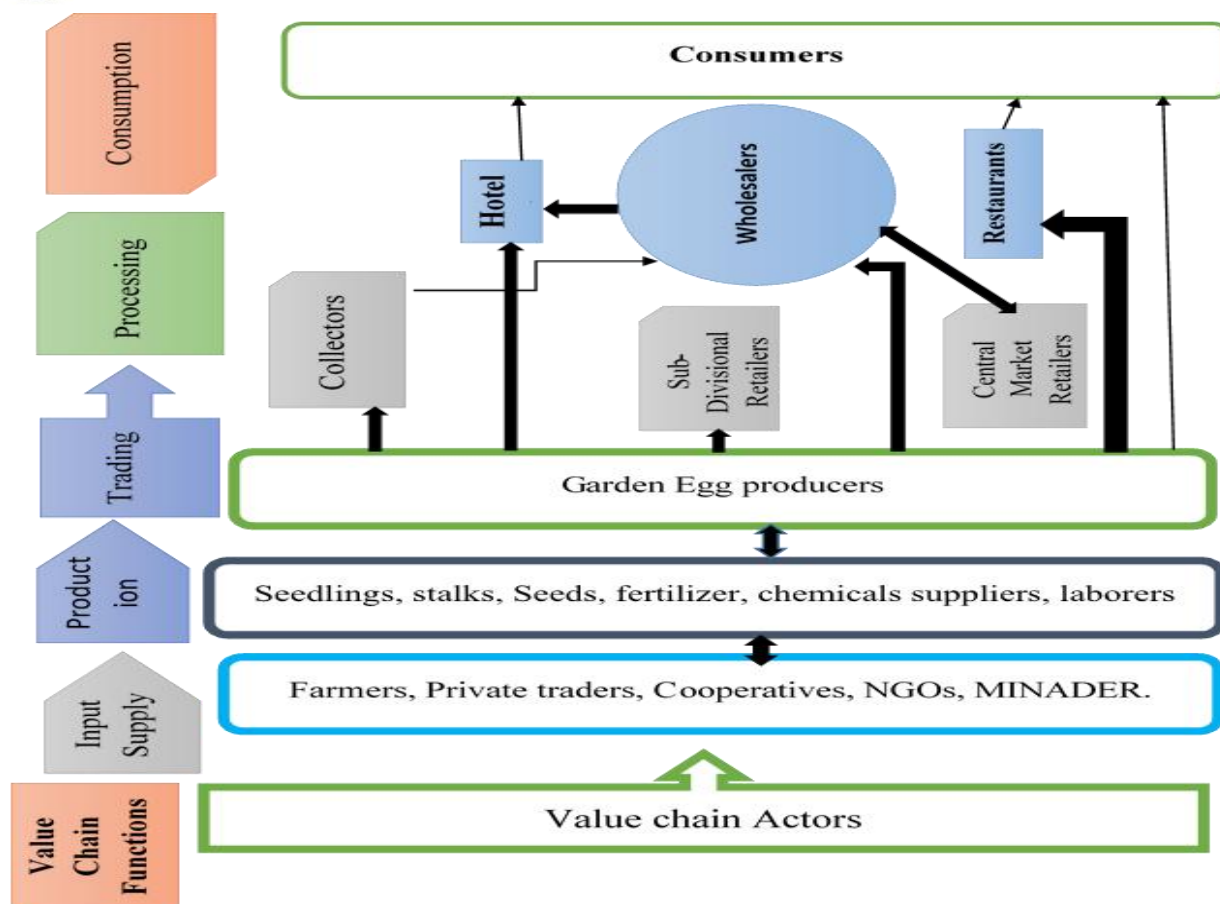


Figure 1: Value Chain Map of Garden Egg
Source: Author

Mapping out the value chain of garden egg as seen in figure 1 indicates the movement of inputs from input suppliers, position of chain facilitators in the map, involvement of actors and how the final product moves within the traders to the final consumer. Figure 1 indicates the wholesaler buys directly from the producer, and sell to the central retailer. The sub-Divisional retailers buys from the producers and sell to the central retailer. The central retailer supplies to the wholesaler and to final consumer. The collectors buys from the producer and sell to the wholesaler, the wholesaler supplies to Hotels in huge quantities.

Value Chain Map of Fluted Pumpkin

Fluted pumpkin is by far the most popular and one of the most nutritious vegetables, it is common and commonly eaten in West Africa, especially Cameroon which Mezam Division falls within as one of the production zone etc. it is known by many names such Okongbong, and fluted pumpkin. Due to its high nutritional value and medicinal properties, it is produced in high quantities and sold within and out of the rural and central markets. Due to that, there are so many actions that takes place before it reaches the final consumer. This will be summarized in the map below.

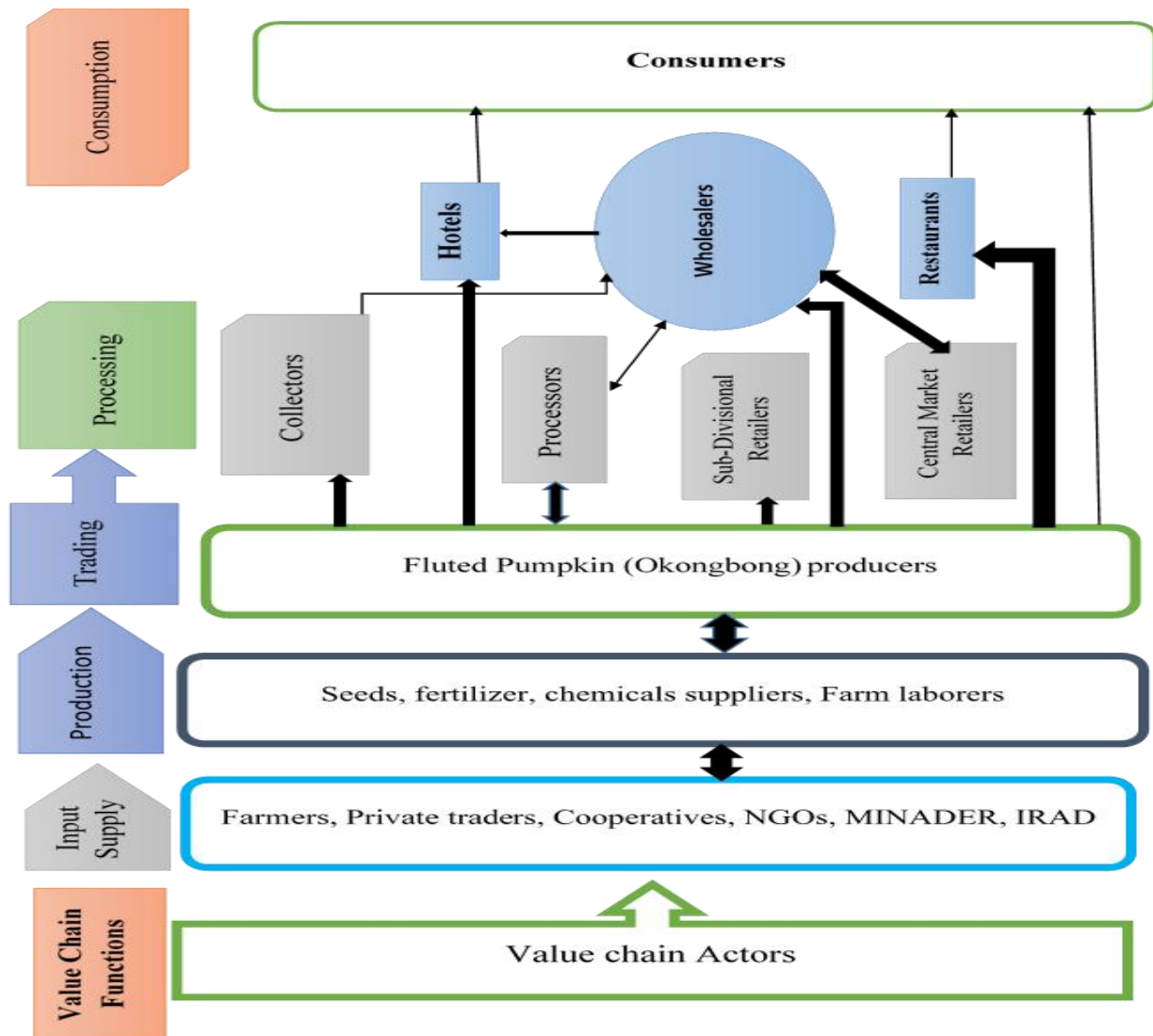


Figure 2: Value Chain Map of Fluted Pumpkin
Source: Author

Mapping out the value chain of fluted pumpkin as seen in figure 2 indicates the movement of inputs from input suppliers, position of chain facilitators in the map, involvement of actors and how the final product moves within the traders to the final consumer. Figure 2 indicates the wholesaler buys directly from the producer, and sell to the central retailer. The sub-Divisional retailers buys from the producers and sell to the central retailer. The central retailer supplies to the wholesaler and to final consumer. The collectors buys from the producer and sell to the wholesaler, the wholesaler supplies to Hotels in huge quantities. And the Processor purchases from the producer and wholesaler, adds value to the vegetable by washing, sorting, slicing, drying and packaging. This is a method of preservation of the vegetable which reduces post-harvest loss as a result of perishability.

Value Chain Map of Bitter Leaf

Bitter leaf is one of the wonderful leaves in this study area, both in nutrition, medication and growth. This wonderful plant is found mainly in across North West Region and other part of the Country Cameroon. This plant is found in almost, if not all compound, this is because of the way it is loved by the people, why? It is used to prepare one of the most

loved soups (Ndole). And some medicinal usefulness of it like cure of stomach problems, reduction of blood sugar level with its bitterness. It is also used to feed animals like goat and sheep. Due to its high nutritional value and medicinal properties, it is produced in high quantities and sold within our rural and central markets. Due to that, there are so many actions that are being carried out by value chain actors before it reaches the final consumer. This is summarized in the map below

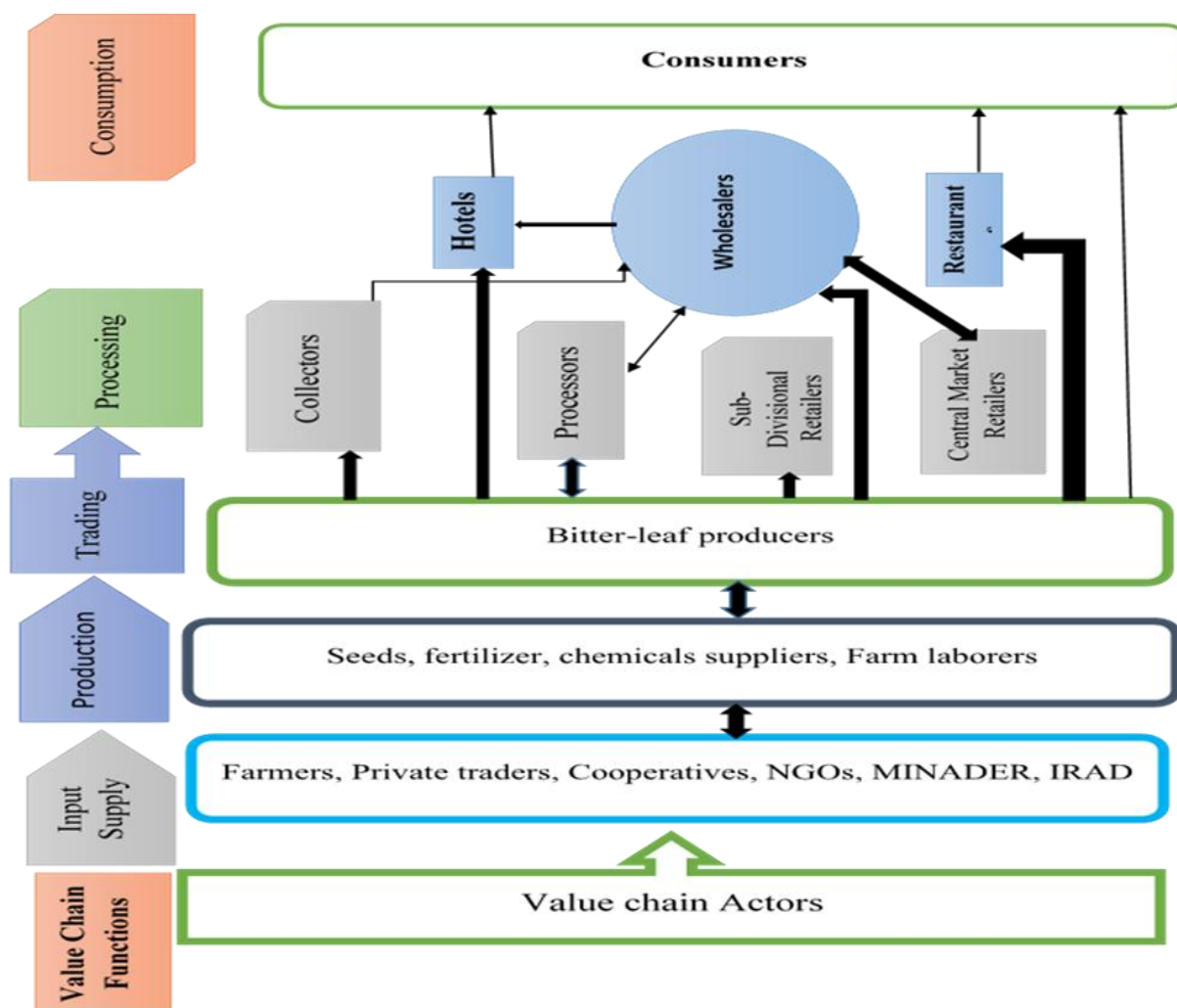


Figure 3: Value chain Map of Bitter Leaf
Source: Author

Mapping out the value chain of bitter leaf as seen in figure 3 indicates the movement of inputs from input suppliers, position of chain facilitators in the map, involvement of actors and how the final product moves within the traders to the final consumer. Figure 3 indicates the wholesaler buys directly from the producer, and sell to central retailers and as well the processors. The sub-Divisional retailers buys from the producers and sell to the central retailer. The central retailer supplies to the wholesaler and to final consumer. The collectors buys from the producer and sell to the wholesaler, the wholesaler supplies to Hotels in huge quantities. And the Processor purchases from the producer and wholesaler, adds value to the bitter leaf by washing, sorting, slicing, drying and packaging. This is a method of preservation of the vegetable which reduces post-harvest loss as a result of perishability.



CONCLUSION AND RECOMMENDATION

The study concluded that, fluted pumpkin, garden egg, bitter leaf and huckle berry were mostly cultivated among the indigenous vegetable identified in Mezam. Also, input suppliers, retailers, wholesalers, collectors, processors, chain facilitators and consumers were the main active chain actors identified in AIVs value chain. To add the study equally observed that each chain actor played unique roles to facilitate the production/marketing of these AIVs, with the input supplier supplying the producers with agricultural inputs and they are easy to access. The study equally shows that difficulties in accessing the facilitators limits the flow of market information. The study recommends that, to strengthen the interaction among the value chain actors, rules have to be develop that bind the relationship between producers and traders most especially positive attitudes toward partnership, interaction, networking and information flow needs to be developed among the main actors in the value chain. This will help the chain actor's work in an integrated way to improve production, reduce post-harvest losses, and to strengthen sustainable market linkage in Mezam Division. With a strong relationship between traders and producers, searching for market information and dissemination will be crucial.

REFERENCES

- Chadha, M. L., Oluoch, M. O., AKA, J. K., Mtukuso, A. M., and Daudi, H, (Eds.). (2008). Vegetable research and development in Malawi. Proceedings of the National vegetable research and Development Workshop, Lilongwe, Malawi.
- Chioma, A.O., Obiora, C.E., and Chukwuemeka, E.O. (2011). Does the African garden egg offer protection against experimentally induced ulcers? *Journal of medicinal Food*, **14**(10): 1032-1037.
- Demont, M., and Maimouna, M. (2015). Upgrading value chains: A review of the literature. *Journal of chain and Network Science*, **15**(2), 151-171.
- Dolan, C. and Humphrey, J. (2000). "Governance and trade in Fresh vegetables: The Impact of UK supermarkets on African horticultural industries" *Journal of Development Studies*, **35**: 147-177.
- Erasto, P., Bojase-Moleta, G. And Majinda, R.R.T. (2004). Antimicrobial and antioxidant flavonoids from the root wood of *Bolusanthus speciosus*. *Phytochemistry* **65**: 875-880.
- FAO (Food and Agricultural Organization). 2007. Agro-Industrial Supply Chain Management: Concepts and Applications. Agricultural Management, Marketing and Finance Occasional Paper. Food and Agriculture Organization, Rome, Italy.
- Food and Agricultural Organization, FAO, (2014). Second International Conference on Nutrition; Better Nutrition-better lives. Rome, Italy 19-21, November, 2014.
- Jaenicke, H. and Hoeschle-Zeledon, I. (2006). Strategic framework for underutilized plant species research and development, with special reference to Asia and the Pacific, and to Sub-Saharan Africa. International Centre for Underutilized Crops (ICUC), Colombo, Sri Lanka, and Global Facilitation Unit for Underutilized Species (GFU), Rome, Italy.
- Kaplinsky, R. and Morris M. (2000). Globalization and Equalization: What can be learned from Value Chain Analysis? *Journal of Development Studies*, **37**(2): 117-146.
- Mbuh, D.T., Johannes. T.A., Mary-Juliet, B. (2017). Women in Agricultural production and food security in rural Cameroon. *International journal of Agricultural policies and Research*, **5** (3): 70-79.
- Ministry of Agriculture and Rural Development (MINADER), (2012). Annual Agricultural sector statistics book (AGRISTAT). Cameroun, vol 17



- Natarajan, B. (2002). Conservation of biological diversity and indigenous traditional knowledge as exemplified by the cases of Asia and Africa. *African Journal of Indigenous Knowledge Systems*. 1: 37-45.
- Oluoch-Kosura, W. A., Marenja, P. P. and Nzuma, M. J. (2004). "Soil fertility management in maize production systems in Kenya: Current options and future strategies" In *Integrated Approaches to Higher Maize productivity in the New Millennium: Proceedings of the Seventh Eastern and Southern Africa Regional Maize Conference*. February 5-11, 2002, Nairobi, Kenya. Ed. D.K. Friesen and A.F.E. Palmer, Nairobi: CIMMYT Maize program and Kenya Agricultural Research Institute; 350-355
- Park, J.C., Hur, J.M., Park, J.G., Kim, H.J., Kang, K.H., Choi, M.R. and Song, S.H. (2002). Inhibitory effects of various edible plants and flavonoids from the leaves of *Cedrela sinensis* on human immunodeficiency virus type 1 protease. *Journal of Food Science and Nutrition*, **5**: 170–173.
- Smith, I. F. and Eyzaguirre, P. (2007). African Leafy Vegetables: Their role in the world health organization's global fruit and vegetables initiative. *African Journal of Food Agriculture Nutrition and Development*, **7**(3): 1-17.
- Uusiku, N.P., Oelofse, A., Duodu, K.G., Bester, M.J., Faber, M. (2010). Nutritional value of leafy vegetables of sub-Saharan Africa and their potential contribution to human health: A review. *Journal of Food Composition and Analysis* **23**: 499-509.
- Veluri, R., Weir, T.L., Bais, H.P., Stermitz F.R. and Vivanco, J.M. (2004). Phytotoxic and antimicrobial activities of catechin derivatives. *Journal of Agricultural and Food Chemistry*, **10**: 1077-1082.
- Weinberger, K. and Msuya, J. (2004). Indigenous vegetables in Tanzania—Significance and prospects. Shanhua, Taiwan: AVRDC—the World Vegetable Center, Technical Bulletin No. 31, AVRDC Publication 04-600. 70 pp.
- Will, M. (2008). Promoting Value Chains of Neglected and Underutilized Species for pro-poor Growth and Biodiversity Conservation. Guidelines and Good practices. Global facilitation Unit for Underutilized Species, Rome, Italy.
- Yamane, T. (1967). Statistics: An introductory Analysis. (2nd ed.). Harper and Row, New York. pp. 234-235
- Yang, R.Y. and G.B. Keding 2009. Nutritional contribution of important African vegetables, p. 105–135. In: Shackleton C.M., Pasquini M.W. and Drescher A.W. (eds.). African indigenous vegetables in urban agriculture. London, UK: Earthscan. 298 pp