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CONSTRAINTS TO SWEET POTATO VALUE CHAIN IN EBONYI STATE, NIGERIA

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ABSTRACT

One of the main growing regions for sweet potatoes in Nigeria is Ebonyi State. The majority of sweet potato is grown on a modest scale, and it is concentrated in Ikwo and Ishielu local government areas of the state. The production, processing, and marketing of sweet potatoes all face significant issues, which were the focus of this study. Using a multi-stage sampling technique, primary data were gathered from 400 small-scale sweet potato producers in the study area. Focus group discussions (FGD) and an interview schedule were the tools employed for data collection. These techniques were used to collect data, and descriptive statistics and means were used to analyze the data. By transcribing the discussants' comments, the FGD was analyzed. The results showed that farmers were economically active, inventive, married, experienced, and engaged in small-scale enterprise. Most of the responders had completed some type of formal education. The perishable nature of sweet potatoes with mean (2.84) pests and diseases (2.82), high cost of farm labor (2.76), insufficient funding (2.75), and lack of knowledge about sweet potato processing technologies (2.71) were the main obstacles to the sweet potato value chain. It was suggested that farmers of sweet potatoes should receive effective and efficient extension training on improved processing techniques, as well as the provision of subsidized farm inputs like agro-chemicals like fertilizer, insecticides, and pesticides to farmers so they can buy them and increase their yield.

Keywords: Sweet potato, Value chain, Constraints

Introduction

Sweet potato is an important root crop that provides food to a significant portion of the world's population, particularly in the tropics and subtropics, where the majority of sweet potato is grown and consumed. According to Odebode (2004), Nigeria produces a significant amount of sweet potatoes, which are valuable in the diets of tropical rural poor. Due to its low production costs, this crop is used as a yam alternative and is utilized as a vegetable, desert, source of starch, and low-input crop.

More than 80% of the sweet potatoes grown in Nigeria were consumed by people. However, sweet potatoes are now employed in Nigeria for industrial purposes as well as for human use. In the North and Central of Nigeria, it is consumed in boiled form, dried and processed into flour, or even used to make a fermented drink called Kunu. Besides being a component in West African foods like fufu and amala, sweet potato leaves can also be used to make soups (Tewe, Ojeniyi, and Abu, 2003). In comparison to rice and wheat, sweet potatoes can yield more edible energy per hectare. They are also a great source of carbohydrate and vitamin A (CIP, 2003).

As a monoculture or as part of an intercrop with other crops such as maize, yams, cassava, and vegetables, sweet potatoes are frequently farmed at

the subsistence level (Akoroda, 2009). It is a drought-resistant crop that could improve food and nutrition security, particularly for Nigeria's subsistence and small-scale farmers. Drought stress causes a 25% yearly output loss for sweet potatoes, compared to a 50% yield loss or complete failure for basic crops like maize. Despite this benefit, agricultural experts continue to undervalue its value as a crop for food security and pay it insufficient attention (Motsa et al., 2015). According to Ume, Onunka, Nwaneri, and Okoro (2016), sweet potatoes are able to quickly create a ground cover that allows them to combat weeds like stringa, prevent soil erosion, and maintain soil fertility, all of which may contribute to their high production.

A value chain is a set of procedures or actions that work to increase the value of a product or article by evaluating the opportunity cost of a new order along the value chain (Lee et al, 2018). It encompasses all operations related to the production, processing, marketing, and use of sweet potatoes. A value chain is a set of tasks carried out by people or organizations in order to generate specific outputs (Muktasam, 2012). A value chain includes all the steps necessary to take a product from its inception to delivery to customers locally, nationally, or worldwide. These steps include the supply of input from different producer services and a combination

of physical transformation during the various phases of production (Kumar et al. 2018). According to Juliano and Darwanto (2016), the activities that comprise a value chain from producers to consumers can be classified into two main categories: primary and supporting activities. Primary activities are the main activities of an organization and include the following: (1) inbound logistics, which is the provision of inputs for the production process; Example, seeds and pesticides from input supplies stockiest (2) operations, which is the processing of raw materials or production inputs; This area can be split into more departments. For example, the operation in case of sweet potatoes industry includes farm preparation (ridging, planting, weeding, harvesting, handling, processing etc); (3) outbound logistics, which is the distribution process of production outputs through pre-existing marketing channels; and (4) marketing and sales, which are activities related to introducing goods and services to consumers. Supporting activities, on the other hand, refer to extra activities that are part of the value chain. These activities include: (1) procurement, which is the acquisition of inputs; (2) technology development, which is the application of technology to increase revenues or profits; (3) human resource management, which is the management of employees to increase efficiency; and (4) firm infrastructure, which is the entirety of information management-related activities.

According to FAO (2008), Nigeria produces 3.46 million tons of sweet potatoes annually, ranking it among the largest producers of sweet potato in Sub-Saharan African (SSA). Despite past severe neglect, the important crop known as the sweet potato currently holds a leading position in the world as a source of food and industrial raw materials (Njoku, 2007). According to the Food and Agriculture Organization (FAO), 2008, sweet potatoes are now produced, sold, and used in almost all ecological zones of Nigeria. However, despite the obvious potential of sweet potatoes to contribute to meeting Nigerians' food needs, their full exploitation and utilization are limited by their bulkiness, perishability, low farmers' knowledge of their value addition, and low consumer acceptability. In the majority of Sub-Saharan African nations, sweet potatoes are primarily seasonal, which causes significant variance in the amount and quality of roots in markets and accompanying price variations. Despite being one of the most significant food and vegetable crops in the world and being crucial in the fight against vitamin and other nutritional deficiencies, sweet potatoes are still seen as a small crop and food for the underprivileged. In Nigeria, there is not much commercial processing done to produce flour and chips that can be stored for consumption all year round. As a result, it is given a low priority on the food list. However, if improved production and acceptability of the crop are to be

attained, farmers still need to have a thorough understanding of sweet potato value addition. Because of this, the crop's high potential under the current cropping strategy has yet to be translated into higher output. The fact that farmers in Nigeria lack adequate fundamental understanding of sweet potato value addition has been cited as one of the reasons for the country's inability to enhance sweet potato production. This study therefore intends to identify constraints militating against sweet potato value chain in Ebonyi state.

Methodology

The instruments for data collection were a structured interview schedule and focus group discussions (FGD). The study region included the three agricultural zones of Ebonyi State: Ebonyi South, Ebonyi North, and Ebonyi Central, all of which were sampled in stages. Two local government areas (LGA) were purposefully chosen for each zone in the second stage depending on cropping intensity. For Ebonyi Central, Ikwo and Ishielu LGAs were chosen, Ohaukwu and Abakaliki LGAs for Ebonyi North, and Afikpo-South and Onicha LGAs for Ebonyi South. Twelve Council Wards were created in the third stage by intentionally choosing two Council Wards from each LGA. Selecting respondents who are sweet potato growers in the study area used a simple random selection procedure. Due to the increased population in the Ebonyi Central Zone, 28 respondents were randomly chosen from each of the four council wards, providing a total of 116 respondents there. In the Ebonyi-North and Ebonyi-South zones, twenty seven (27) respondents were chosen in each of eight council wards, for a total of two hundred and sixteen (216) respondents in the zones. This brings the total number of respondents used for the interview schedule to three hundred and twenty eight (328). Twelve council wards were chosen, and one FGD was held in each of those wards for a total of 12 FGDs. There are 72 participants overall, divided among the six discussants in each group. Descriptive statistics were employed in the analysis of the study's data to explain the socioeconomic characteristics of the sweet potato producers. The limitations harming the sweet potato value chain were rated on a three (3) point Likert scale. Very serious (3), moderately serious (2), and Not serious (1) were the ratings provided. The decision-making standard was mean 2.0 ($3+2+1/3 = 2.0$). This indicated that scores below 2.0 were not considered to be substantial constraints, whilst scores above 2.0 were considered to be very serious constraints. By transcribing the participants' comments, focus group discussions were analyzed.

Result and Discussion

The outcome in Table 1 displays the socioeconomic characteristics of the respondents in the research area. According to the figures, there were roughly 53.93% women and 46.07% men. This suggests that

women make up the majority of farmers in Ebonyi State in terms of gender distribution and sweet potato production and processing. This is in agreement with the findings of Amusa *et al.* (2022) who stated that the mean contribution of women ($\bar{x}=3.47 \pm 0.16$) in decision-making in post-harvest activities was relatively higher compared to that of men ($\bar{x}=2.54 \pm 0.48$). The study also revealed that about 78.01% of the respondents were within the age range of 31-50 years. It suggests that young people of active age dominated the activities in sweet potato production and processing in the study area. This finding is consistent with the findings of Masamha et al (2017), who discovered that among the Kigoma region, Tanzania farmers, most female household heads were aged 17–30 years (34.1%) and 31–45 years (31.7%) while male household heads, the majority (43.7%) were aged 31–45 years. This implies that most of the farmers who engaged in cassava production were energetic individuals who had the ability to carry out the various farm operations required in the field. Results indicated that 78.1% of respondents were married, indicating that most of the state's sweet potato growers were married. The table also demonstrates that the farmers had disproportionately big homes since they regarded having more children after getting married as a substitute for hiring labour. Farmers have varied degrees of education, with roughly 75.39% having formal education, according to the respondents' educational status. This suggests that the majority of farmers were educated. The majority of farmers are in a better position to access and process advances in sweet potato production and subsequently value addition, as indicated by the high literacy rate among this demographic.

More (47.12%) were grown across 1-3 hectares. Others (26.70%, 5.76%) correspondingly farmed between 4-6 ha and over 7 ha. This suggests that small-scale farming accounts for the majority of the sweet potato industry. This finding is in agreement with the findings of Ifeanyi-Obi et al., (2017), who discovered that majority of the cocoyam farmers in south east of Nigeria owned farms of one hectare and below. Farmer's estimated annual income indicated that 10.47% of the respondents had an estimated annual income of less than ₦100,000, 15.18% earn up to ₦100,000-₦200,000 per annum while 53.40% of the respondents had an estimated annual income of ₦201,000-₦300,000 and 20.94% earn up to ₦301,000-₦400,000, per annum. The implication of this result is that majority about 74.34% of the respondents earn between ₦200,000-₦400,000 annually which still indicates that they are small scale farmers they still need income from other crops or other sources to augment the ones they get from marketing sweet potatoes and their products.

According to Table 2's findings, the perishable nature of sweet potatoes, with a mean of (2.84), ranked as the top primary challenge for sweet potato farmers in the research area. This restriction severely restricts

sweet potato output to a micro level. This is due to the fact that sweet potatoes typically shrink when stored and should not be kept for longer than two weeks before they start to lose their color and start to degrade. Due to the perishable nature of sweet potatoes, the majority of rural farmers choose to sell their produce at lower prices so that it won't start to deteriorate if they don't sell all of the sweet potatoes when they are harvested. This negatively impacts the farmers' income, which implies low income, which in turn affects the farmers' standard of living. The farmers might not be qualified to access high-quality food, household goods, or effective medications. If this situation persists, farmers might not be able to continue growing sweet potatoes for the upcoming planting season.

The second biggest barrier to sweet potato production, with a mean of (2.82), was pests and diseases. Pests and diseases, in accordance with the respondents, prey on leaves, vines, and tubers following harvest as well as inside market stores prior to sales. The price of the infected sweet potato will be significantly decreased when it is offered for sale, which has a detrimental impact on farmers' earnings. Naturally, if a sweet potato farm has pests and diseases, the cost of production will rise due to the need to buy chemicals to reduce the incidence of disease, which lowers the profit that farmers would have received at the end of the growing season if their farms were not affected or free from pests and diseases. The market value of healthy plants is high, whereas diseased plants suffer from substantial yield decrease and yield loss as a result of disease attack, which has an adverse effect on the farmers' revenue. In FGD, this position was highlighted.

An older male respondent in the Ntezi council ward of the Ishielu Local Government Area, who was about 65 years old

He complained of the issue of pests and diseases in their sweet potato farms, pointing out how they eat the leaves of plants and also go to the root of the plant to damage it and slow down the growth of the plant which affects the root and reduces their harvest. He stated that this is mainly observed if they experience dry spell or if rain did not fall for some times during the period the sweet potato is on the field. (FGD,2019).

In a similar response, another discussant from Amagu unuhu council ward of Abakaliki Local Government Area

Complained that the threat of herds of cattle damaging their sweet potato farmlands while grazing as well as pests and diseases like rodents and squirrels eating their sweet potatoes were also mentioned. They claimed that due to the actions of Fulani nomads in the area, it creates a severe challenge to the production of sweet potatoes to the extent

that if the farm is left and not adequately cared to on time with regular inspection, it will be a total loss for the farmer for that year. (FGD,2019)

Similar to this, respondents ranked the high cost of agricultural labor as the third obstacle to the production and value addition of sweet potatoes, with a mean score of (2.76). Rural farmers struggle to maintain their farming system in light of the rising cost of farm labor. As a result, many farmers employ family members primarily for tasks like planting, applying fertilizer, and harvesting, while hired laborers handle the laborious work. Young people moving from rural to urban areas in search of white-collar jobs, leaving agricultural work to women and children, is another issue. Because of the significantly reduced workforce in rural areas and the high cost of labor, this has a detrimental impact on farmers' income.

With a mean of (2.75) ranked fourth, insufficient finance was another major barrier to the production of sweet potatoes, which in turn restricted the output of other value-adding activities. The respondents described this as a significant issue because access to financial resources is crucial for enhancing access to farm inputs like fertilizers, pesticides, tractors, and other processing equipment used in the farm as well as marketing costs like storage and transportation. The majority of farmers are also impoverished, which prevents them from obtaining the necessary collateral for loans or accessing credit facilities. An FGD substantiates this.

A 50 year old male discussant from Noyo alike council ward of Ikwo Local Government Area stated thus:

Insufficient funding to pay laborers to assist in farm operations like mound and ridge making is our main obstacle to producing sweet potatoes in this location. Purchase of processing equipment for value addition as well as the use of agriculture inputs such as fertilizer, herbicides, and insecticides (FGD, 2019).

This result corroborated the findings of Daramola *et al.*, (2008) and Oyediran (2013) that credit is an important input for expansion of agriculture.

With a mean score of (2.71), Lack of awareness about sweet potato processing technology was rated fifth. The study area restricted access to and use of suitable processing technology severely limits the potential advantages of the crop for farmers and consumers. The majority of farmers in the research area stated that they are unaware of the use of sweet potato flour in the creation of high quality value-added products such as biscuits, bread, cake, and chin-chin that can store for a longer period of time and can also fetch high market prices. They are accustomed to their modest methods of enhancing sweet potatoes that do not last for a long time, and they frequently employ those items in households.

They place more of a focus on the selling of fresh sweet potato roots than processed ones, which would have generated more revenue for them had they been aware of how to turn sweet potatoes into value-added goods.

The high cost of sweet potato processing technology, with a mean of 2.67 ranked sixth, was cited by the farmers as another significant restraint. Given that the majority of sweet potato farmers are small-scale, resource-constrained, and barely above-poverty farmers, it's possible that they can't afford to buy processing equipment like juice extractors, grinding machines, and gas cooker ovens for baking sweet potato snacks. This prevents value addition and has a negative impact on the amount of income the farmers are able to generate. When value is added to raw sweet potatoes, the farmers' income will rise from the sales of sweet potato products with added value, but when value is not added to sweet potatoes, the income will be restricted to the sale of the raw roots because the sweet potato farmers lack processing technology.

Transportation of sweet potato produce from rural to urban areas poses a lot of financial problems, according to the respondents, because sweet potato is a bulky crop in its raw state and transporters charge a lot, like ₦300 per bag of sweet potato sometimes after transporting their sweet potatoes to urban areas for sale. Expensive transport of sweet potatoes to markets is another constraint with mean 2.58 and ranked seventh place. Because of the high cost of transportation, farmers occasionally choose to sell their produce at a lower price in their local market to avoid the stress of making a long journey. However, at the end of the day, all of their suffering will fall into the hands of the transporters.

The respondents reported that when a plot of land is used for a long time without any type of soil fertility amendment practice, such as application of poultry manure, rice mill waste, animal dung, and compost manure, the nutrients in the soil will deplete and have an impact on the productivity of the crops. This constraint to sweet potato production has a mean (2.54) and is ranked 8th among other constraints. Due to this, sweet potato yields are significantly impacted, and farmers' incomes are negatively impacted as well. An FGD agreed with this position.

A 45 year old female discussant in Nkalagu council ward of Ishielu Local Government Area stated thus:

We plant sweet potatoes throughout the year because they are our main source of income. However, because we have been continuously cultivating the same plot of land, the soil has become depleted of nutrients, which can result in low yields during harvest. This has an impact on the price of our sweet potatoes because we make more money when we sell the larger roots and larger roots fill the bag more quickly than smaller roots. (FGD,2019).

Low farmers' expertise of adding value to sweet potatoes was ranked ninth with a mean of (2.53). Because farmers don't know how to add value to sweet potatoes, they are frequently sold fresh, which results in lower profits for farmers than they would have received had they known how to add value and used it.

Poor marketing data on the production of sweet potatoes, with a mean score of (2.30), was ranked tenth. Therefore, participants in the sweet potato business faced a hurdle due to a lack of market information. The use of electronic media has substantially risen in the area with the advent of mobile phones, short messaging services, email capabilities, and other such technologies. However, the use of these technologies to collect market data on sweet potato products has not been adopted by the farmers. Although it occasionally reduces sales volume, this is not a significant constraint in the research area.

Land tenure system issue was ranked 11th with a mean score of (2.22). Land tenure is a system of land ownership that, in the research region, might be hereditary, leasehold, individual ownership, or community ownership. According to the respondents, the land tenure system is not a significant issue in the research area because land there is privately owned and can even be inherited from departed parents. Except for a very small number of farmers, who had their properties removed by the government to build malls and foreign commercial shopping centres, migrant farmers can rent land to grow sweet potatoes. Because they must pay for the time they used the land for cultivation, persons who lease property see a reduction in their annual income. However, renting land for cultivation is not prohibitively expensive in rural areas, where some people offer their land for free.

Even though respondents previously stated that people preferred yam to sweet potatoes, the recent discovery of the many uses sweet potatoes are put to as well as their nutritional benefits, income-generating potentials, and short three-month maturity period has changed peoples negative attitude towards sweet potato production. The low consumer preference for sweet potatoes, with mean 2.04 ranked 12th, is another constraint to sweet potato production, but it is a minor one.

Respondents confirmed that too much attention on yam and cassava is observed in rural communities because of some social recognition given to a crop like yam, which all rural communities celebrate its festival from August to October every year. However, each crop now has its own advantage over the others. The mean (1.97) ranked 13th is a constraint to sweet potato production. The sweet potato has been found to have many advantages over other crops, including a quick maturation period,

nutritional benefits, the capacity to generate income, and advantages for food security, especially when other crops are still in the field and have not yet reached maturity. based on the results of current research, particularly with the development of orange-fleshed sweet potato varieties, which are rich in beta carotene, a precursor to vitamin A. It can help pregnant women and children aged 6 months to 6 years who are vitamin A deficient.

Insufficient extension visit with the same mean (1.97), this restriction was ranked on par with giving other root and tuber crops too much attention. They were both 13th. Extension visits are very important for technology adoption, but this has clarified why most farmers in the study area were unaware of some sweet potato value addition technologies because the extension workers that should be disseminating these technologies and training farmers on value addition technologies are not sufficient.

Last but not least, non-availability of planting materials is placed 15th with a mean of 1.57. The majority of sweet potato farmers have a method of keeping and maintaining their sweet potato nursery for the next year's planting, therefore according to the respondents, this constraint is not a significant one and is not widely seen in the study area. Some farmers plant near water sources in the Fadama region, and during planting season, they will travel there to harvest vines for planting.

Conclusion

It has been determined that sweet potatoes are one of the most significant food and vegetable crops in the world, and they are crucial in the fight against vitamin and other nutritional deficiencies. According to the findings of the study, sweet potato farmers in the area were experienced, married, economically active, and small-scale operators. The vast majority of survey participants have some kind of formal education. They had relatively big households and were literate, which complemented the farm labor services required during the height of farming season. The perishable nature of sweet potatoes with a mean (2.84), pests and diseases (2.82), high cost of farm labor (2.76), insufficient funding (2.75), and lack of knowledge about sweet potato processing technologies were the major restraints influencing the sweet potato value chain in the research area. The production, processing, marketing, and value addition of sweet potatoes in the research area were negatively impacted by these restrictions.

It was suggested that farmers of sweet potatoes should receive effective and efficient extension training on improved processing techniques, as well as the provision of subsidized farm inputs like agro-chemicals like fertilizer, insecticides, and pesticides to farmers so they can buy them and increase their yield.

Table 1: Socio-economic characteristics of respondents

Variable	Frequency N= 382	Percentages (100)	Mean
Gender			
Male	176	46.07	
Female	206	53.93	
Age			
18-30	20	5.24	43.1
31-40	118	30.89	
41-50	180	47.12	
51-60	58	15.18	
60&above	6	1.57	
Marital Status			
Single	32	8.38	
Married	298	78.1	
Divorced	8	2.09	
Widowed	44	11.52	
Household size			
1-5	136	35.60	7
6-10	194	50.79	
11-15	46	12.04	
16-20	6	1.57	
Level of Education			
No formal education	94	24.61	
Primary education	86	22.51	
Secondary education	126	32.98	
Tertiary education	76	19.90	
Farm size			
Less than one hectare	78	20.42	2.8ha
1-3ha	180	47.12	
4-6ha	102	26.70	
7 ha & above	22	5.76	
Annual Income			
Less than ₦100,000	40	10.47	
₦101,000-₦200,000	58	15.18	
₦201,000-₦300,000	204	53.40	
₦301,000-₦400,000	80	20.94	

Source: Field Survey, 2019**Table 2: Constraints to Sweet potato value chain (N=382)**

Constraints	Mean	Rank
Perishability	2.84	1 st
Pest & Diseases problem	2.82	2 nd
High cost of farm labour	2.76	3 rd
Inadequate Finance	2.75	4 th
Lack of Awareness on sweet potato processing technologies	2.71	5 th
High cost of sweet potato processing equipment	2.67	6 th
Expensive transport of sweet potato to market	2.58	7 th
Decline in soil fertility	2.54	8 th
Low farmers knowledge on sweet potato value addition	2.53	9 th
Inadequate Marketing information on sweet potato production	2.30	10 th
Problem of land tenure	2.22	11 th
Low consumers preference for sweet potato	2.04	12 th
Too much attention on other root and tuber	1.97	13 th
Inadequate extension visit	1.97	13 th
Non availability of planting material	1.57	15 th

Source: Field Survey 2019

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