ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 3
March 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Afr. J. Food Agric. Nutr. Dev. 2023; 23(3):22624-22649 https://doi.org/10.18697/ajfand.118.22290

PARTIAL INTERMEDIARY VALUE-CHAIN COORDINATION AND ITS EFFECTS ON PRODUCTIVITY OF SWEET POTATO IN TANZANIA

Mmasa JJ[1]*

Joel Johnson Mmasa

*Corresponding author email: joelmmasa@gmail.com

[1]Department of Economics, The University of Dodoma,
P.O. Box 395, Dodoma, Tanzania

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 3
March 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

ABSTRACT

This study investigates the effect of partial intermediary coordination on Tanzania sweet potato productivity. A cross-sectional research design was used, and a sample of 100 small-scale farmers from Kilosa and Gairo Districts were surveyed using both purposive and simple random sampling techniques. Data analysis tools included the Statistical Package for Social Sciences, Microsoft Excel and Ethnographic Content Analysis. Three key value chain actors primary, secondary, and tertiary were identified by the study, along with their roles and linkages. The majority of farmers identified three main factors that affected crop productivity in the research area: Lack of improved cultivars, restricted access to cash, and small parcels cultivated. Coordination between the horizontal and vertical chain is critical for productivity and efficiency. The study also discovered that weak institutional frameworks exist among key participants in value chain nodes. Farmers and buyers conducted the majority of their business on the spot, and all agreements were unwritten. Meanwhile, only 6% of respondents reported that extension officers had notified them of market price offers and demands from profitable markets. Growers are unable to use innovative production techniques that could lead to economies of scale in shared services and collaborative ventures because of current production practices. It was noticed that rather than raising production, the existing intermediate corporations have contributed to lowering transaction costs. Despite these challenges, there is a lot of potentials for the sweet potato crop to transform rural livelihoods and turn into a valuable commodity. Governance needs to be supported by policies that improve market information flow and necessary infrastructures. While intermediate organizations are essential for improving market connections and lowering transaction costs for dispersed smallholders, it is critical for increasing productivity at the primary production level. Last but not least, the local government should put into effect a strategy designed to promote a climate suitable to the crop.

Key words: Partial, Productivity, Coordination, Sweet potatoes, Value-Chain, Smallholders, Actors, Farmers

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

INTRODUCTION

The agricultural sector forms the backbone of Tanzania's economy. It contributes 30% to Gross Domestic Product (GDP), employs 66% of Tanzanians in agricultural activities and 70% of Tanzanian industries depend on agriculture materials [1]. It is important to invest and spend on agriculture to achieve a growth of six percent per annum and reduce rural poverty by 2025 and enhance food security and nutrition [2].The agriculture sector faced a lot of challenges, the major one being inadequate resource allocation in the sector budget and dependent on the rain-fed On the other hand, the Tanzania government put more effort onto expansion and improvement of irrigation infrastructure, utilization of modern agriculture input and mechanization to improve the sector [2]. Despite that, the agricultural sector has experienced fluctuation trends in budget allocation from the national budget, from 5.6% in FY 2003/4 to 4.7% in FY 2017/18 affecting agricultural growth [3]. Literature shows that the more the public spending on the agricultural sector, the more the improvement in the performance of agricultural growth [4]. As described by the 2012 National Census, 67.1% of Tanzania's total population (43.6 million) lived in rural areas and were laboring in agriculture equal to 29.2 million people and nearly 5.8 million households.

According to Food and Agriculture Organization FAO (2021) statistics, world sweet potato production was 89.4 million tonnes, the majority of which came from China, with a production of 55.7 million tonnes (Fig. 1) [5].

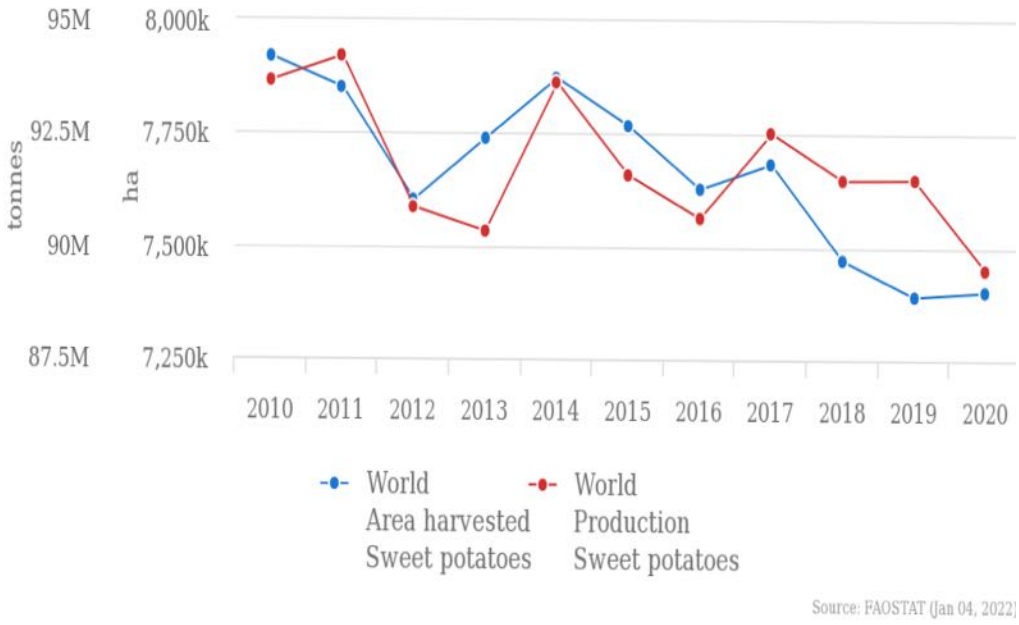

Figure 1: World Production of Sweet potatoes and Area Harvested (2010 – 2020)
Source: https://www.fao.org/faostat/en/#data/QCL

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 3 March 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

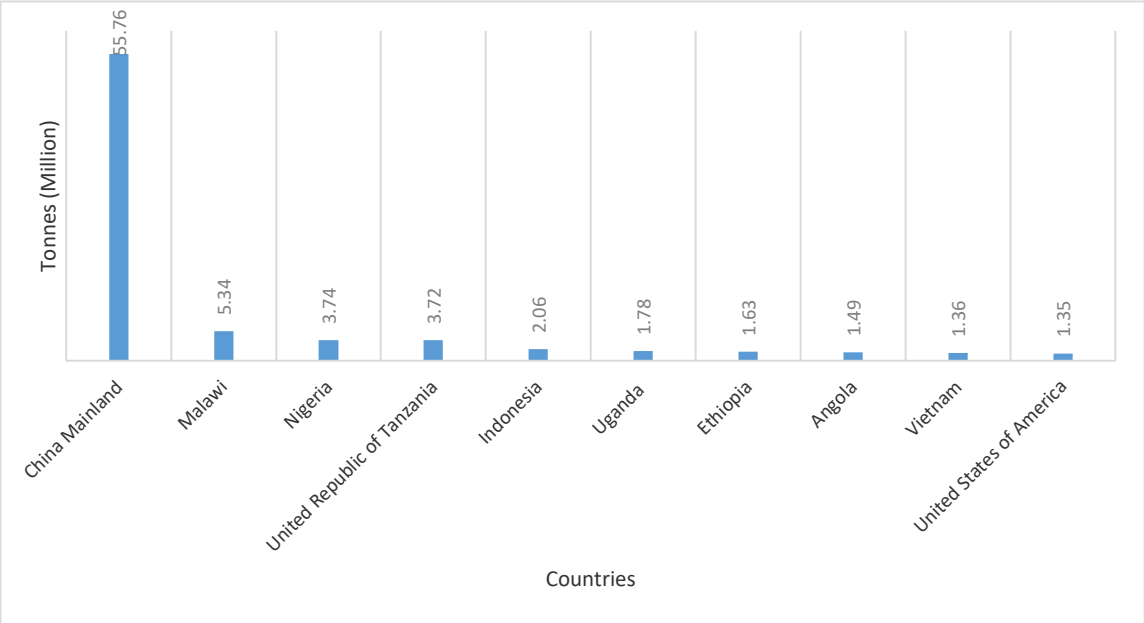

Figure 2: Production of Top Ten Producers of Sweet Potato (Tonnes) from 2010 -2020
Source: https://www.fao.org/faostat/en/#data/QCL

The majority of the remaining sweet potatoes produced in Asia are utilized for human consumption, either as fresh or processed foods [5]. About half of them are used as animal feed. After wheat, rice, maize, Irish potatoes, barley, and cassava, sweet potatoes are the seventh most important food crop in the world due to their flexibility and malleability, since they are a large source of carbohydrates and *beta-carotene*. [5]. Moreover, the production share of sweet potatoes by region shows Asia and Africa had the biggest share in their region (Fig. 3). Africa's top producers of sweet potatoes are Malawi (5.3 million tonnes), Nigeria (3.7 million tonnes) followed by Tanzania (3.7 million tonnes).

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 3 March 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

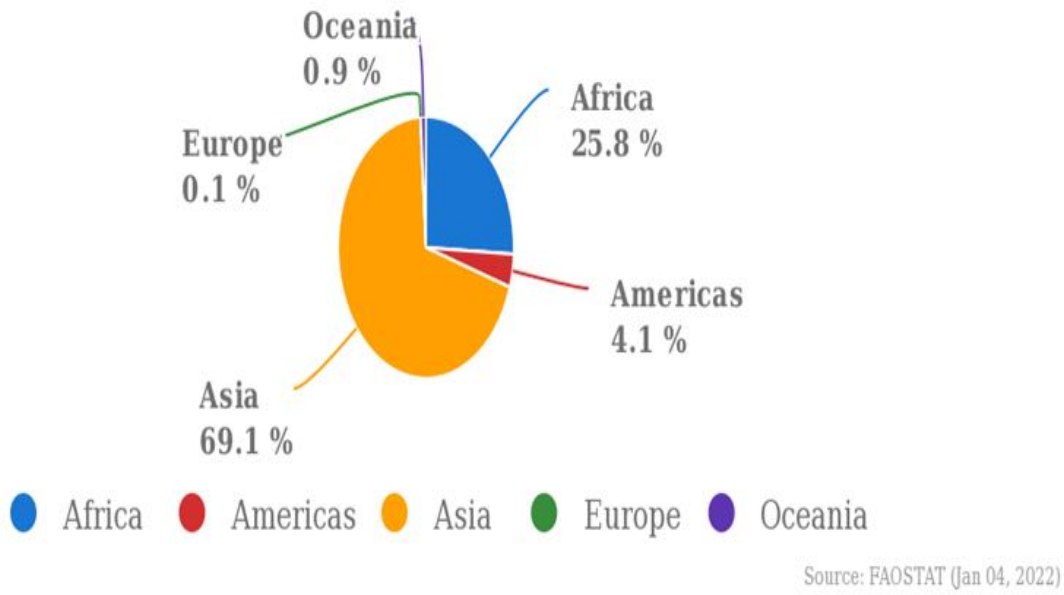

Figure 3: Production Share of Sweet Potato by Region
Source: https://www.fao.org/faostat/en/#data/QCL

Women make up almost 50 percent of the agricultural labour force in sub-Saharan Africa, furthermore, In Tanzania there are over 15 million smallholder farmers in the country, more than seven million of whom are women [6]. Agriculture in Tanzania is controlled by peasants, who are cultivating an average farm size ranging from 0.9 to 3.0 hectares each with partial access to up-to-date technology, machinery, and inputs [7]. These farmers are easily pushed into poverty by factors such as weather fluctuations (drought or floods), biotic stress, and other external shocks notably food price fluctuations. These lead to insufficient returns as compared to production costs. The sector continues to record a smaller growth rate of an average 3% and surprisingly declined to 2.3% in 2015 compared to 3.4% in 2014 [8]. Furthermore, in 2012 the Government of Tanzania adopted the Big Results Now (BRN) approach to improve government service delivery, implementation of key national priorities projects, and effective monitoring and evaluation to achieve big results within two years. Agriculture is among six sectors selected under the BRN program where the focus in the next two years is on three crops namely; sugar, rice and maize. However, despite the high growth potential within selected crops, there is a danger of overlooking marginalized crops such as sweet potatoes which are widely grown in some agro-ecological zones and can contribute to income and food security. This study aims at showing the importance of other marginalized crops such as sweet potato within the national development strategies that are widely grown in some agro-ecological zones. Data from the

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

2010 to 2020 growing seasons in Tanzania reveal that the amount of sweet potato harvested and produced alternated between increasing and declining. However, in the 2013 production season, the area harvested was large compared to other seasons. Likewise, production surged to 5.4MT in the 2017 season due to good climatic conditions then declined in the 2018 season and rose a bit higher in the 2019 season (Fig. 4).

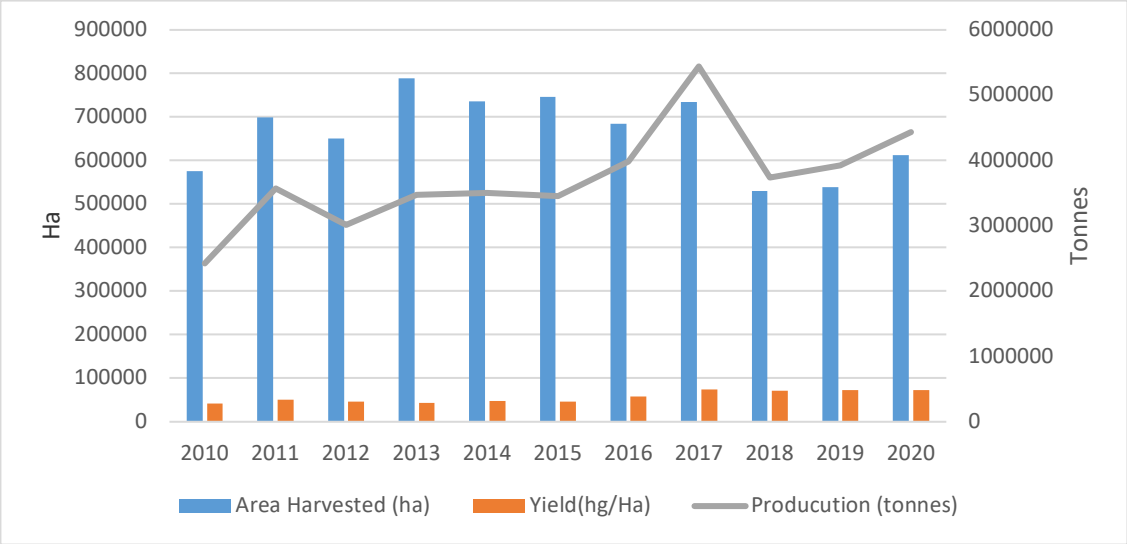

Figure 4: Area Harvested, Yield and Production in Tanzania 2010 – 2020
Source: https://www.fao.org/faostat/en/#data/QCL

Sweet potato is among the top five food crops produced in Tanzania. The crop is grown by more than 600,000 smallholder farmers in rural areas for household food consumption and the surplus is marketed. There is limited private sector involvement in Tanzania's sweet potato industry. Actors are poorly informed and lack effective value-chain coordination. The result is the absence of an organized critical mass of commercial activity, and weak representation of the sweet potato private sector in key discussions and decisions relating to policy, regulations and development issues. Data show production concentrates in the lake and Eastern Zones. Around 95% of the sweet potato production is by subsistence smallholders and production concentrates in Lake and Eastern Zone [7].

The empirical evidence shows that few researches have been conducted to assess the sweet potato actors' coordination and value-chain in Tanzania specifically in Kilosa and Gairo districts. Based on previous studies as mentioned above, it can be seen that, sweet potato farming has not attracted serious concern from the government. Although there are both successful and unsuccessful cases in sweet

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

potato farming, it can be hypothesized that sweet potato farming arrangement has a positive effect on benefits for smallholder farmers.

LITERATURE REVIEW

Porter Theory of Competitive Advantage and Value Chain Analysis

Porter's five forces model is a very useful tool for analysing the competitiveness of a firm's environment. It sets a framework for understanding the influence of the industry's external environment that the firm is operating and explains the sustainability of profits against bargaining powers and direct and indirect competitions in the market place [8].

Studies by Pervan *et al.* [8] and Yunna and Yisheng [9] have confirmed that Porter's five forces model is valuable. The original theory of relative advantages focused on the comparative benefits of different countries or areas. Land, location, labor, natural resources, and the size of the local population were all considered. However, this is not always the case since the rise of some of the most developed industrialized nations has demonstrated that the aforementioned criteria have little impact on their rate of development. For instance, Japan had a disadvantage in terms of access to other areas, a surplus of space, and the availability of raw materials. However, Japanese businesses have thrived and developed into some of the best in the world, for example in understanding the factors affecting profitability in a specific industry [8]. Again, Japan also has a disadvantage in terms of the population size available, a situation that could not stop Japan from being a leader in business. Also, economic hardship can really fuel growth in a nation. It has been seen both in cases of Japan and Germany. Both these nations were under severe economic trouble after World War II, but still they grew to be major industrial countries in the world [9].

The motivation behind such organizational behavior, in particular, can be understood in light of "The Theory of Competitive Advantage," which contends that there are other crucial elements that govern the administration of the business. According to renowned Harvard business school professor Michael Porter [11], the aforementioned hereditary characteristics are not really necessary for sustained industrial expansion. However, it is dependent on groups of connected businesses, vendors, sectors, and institutions that form in certain places and are referred to as "clusters" [11]. These groups are regional hubs for connected businesses, specialist suppliers, service providers, and related organizations in a given industry.

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

They create in places with a critical mass of resources and expertise, making them a focal point in a particular economic division of labor, with a clear sustained competitive advantage over rival locations, or perhaps with global sovereignty in that area. According to Porter, clusters can boost competition in three different ways: by boosting member companies' efficiency, promoting field originality, and fostering the emergence of new sectors. Porter's five forces are what decide any industry's or organization's competitive edge. These five factors assist managers in concentrating on the industry's dominant competitive forces and potential risks to their firms. This theory was used to determine profitability and firms' efficiency in the nodes because it looks at the factors like prices, costs, the required investment of firms in an industry and the elements of return on investment. Likewise, the five forces determine the market attractiveness in terms of profitability through analysing the competitive intensity by looking at potential opportunities and threats.

Porter's 5 Forces and SWOT (Strengths, Weaknesses, Opportunities, & Threats) analysis are both tools used to analyze and make strategic decisions. Companies, analysts, and investors in sweet potato farming can use Porter's 5 Forces to analyze the competitive environment within an industry. SWOT is mainly looks more deeply within an organisation to analyze its internal potential. This model analyses the external environment, assess their internal strength and weaknesses concerning the business environment, and how well it can respond to external forces to define the strategy and aid in the implementation of the farming strategy. The collective strength of the five forces determines the profitability of an industry, while opportunities may help to define a target market or identify new product opportunities [10]. Therefore, sweet potato growers through their strategies, can influence the five forces and change an industry's attractiveness for better or worse [11]. However, Porter's five forces model does not consider other factors such as the implications of government policies and legislation, ethics, and patent are the major sources of entry barrier.

RESEARCH METHODOLOGY

Study settings

The study was conducted in Gairo and Kilosa districts where there is huge production and significant number of growers of sweet potatoes in Morogoro region.

https://doi.org/10.18697/ajfand.118.22290

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Study design

The researcher used a cross-sectional study design to come up with reliable and specific findings whereby data were collected at a single point without repetition [20]. This design was adopted due to the fact that it could can consume minimal time and therefore fit within the researcher's limited resources.

Sampling procedure

Gairo and Kilosa districts in particular were purposefully selected based on the aforementioned reasons. The sample was obtained using a multistage sampling technique. The technique was chosen because it takes into consideration the representation of divisions, wards and villages scattered over a wide geographical area. From each division, two wards were purposively chosen from the respective sampling frame, and the list in each selected ward, two villages were purposively selected to get a total of four (4) villages namely Kyegea, Mtumbatu (These were selected from Kilosa district),Ibuti and Gairo villages (These were selected from Gairo district). Therefore, the targeted study population was 44,408 people from two wards out of a total population of 631,186 [13].

Data collection techniques

The data used in the study were drawn from a survey of 100 household heads in Kilosa and Gairo districts in May 2019 and 2020. This study employed three types of data collection techniques. These were in-depth interviews with key informants, focus group discussions and documentary review. Data were collected by the author and trained enumerators.

Sampling techniques

The study adopted both purposive sampling techniques and systematic random sampling. Purposive sampling was used to select Districts and Wards, while systematic sampling was used to draw households to participate in the study; households were selected by skipping every 5th household in the village roaster. The researcher conducted individual interviews with the randomly selected household heads using semi-structured questionnaires. The purposive sampling technique was used to select key informants such as officials from Gairo and Kilosa districts Council. Mentioned individuals were selected by virtue of their position because they were familiar with the crop.

Determination of Sample Size

Slovin's formula was used to obtain a sample size to be included in this study:

$$n = \frac{N}{1 + Ne^2}$$

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Where
n= Sample size
N= Total population
e = Marginal error (confidence level)
Total population was selected from 631,186 people and confidence level of 90% [13].
Computation of sample size = 631,186 / (1+ 631,186 * $0.1^{2)}$ = 100
NB: It was assumed that each household participated in sweet potato farming

Twenty value-chain actors namely, officials, traders, processors and consumers from Gairo and Kilosa districts Council were selected purposively. Hence, in total, 100 respondents and twenty (20) key informants were included in this research

Data analysis
Quantitative data were analyzed using Statistical Package for Social Sciences (SPSS) and Microsoft excel program, while qualitative data were subjected to content analysis. The results were presented in narrative form accompanied by tables, graphs and histograms and any other relevant illustrations.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents
The key characteristics of the farmers' households are presented in this section. Simple summaries about samples and the measures are provided. The key characteristics of the heads included sex, age, education, marital status, occupation, agricultural training, farming experience and education levels (Table 1). The study examined the sex of the respondents to establish their participation in contributing to sweet potato production towards improving household income. The study contacted both males and females, it was found that the majority of the respondents (76%) were female and the rest (24%) were male. This demonstrates that women were more involved in sweet potato production than men. When corn yields fail, women in the study area take up the production of sweet potatoes to ensure household food security, while males concentrate on maize or cotton [14].

The mean age of household heads was 45 years with a range of 18 to above 45. According to the survey, 80% of the respondents who were questioned were between the ages of 31 and 45. This suggests that the study focused mostly on the active age, which will affect production.

The study looked at the respondents' educational backgrounds. According to the study, the majority of respondents (60%) had completed their primary school, and

30% had completed their O-level secondary education, as shown in Table 1. Ten percent (10%) of household heads reported not going to school at all.

Marital status of the respondents was asked to establish if it had any influence on sweet potato production and marketing. The study found the majority (85%) of the respondents were married, as presented in Table 1. Moreover, the study identified that other respondents (5%) were single and the rest (6%) and (4%) were divorced and widowed respectively. This implies that married respondents participate more in agriculture for the aim of taking care of their families.

According to Table 1 below, 31% of households had between four and five individuals, while 49% had more than five. Other factors kept constant, it is expected that a large-sized household would typically consume more food than a small-sized one. Less than five-person households were smaller than the six-person household average across the country. With the current level of income, a further increase in household size will worsen the situation for households' access to food [15].

Sweet Potato Value Chains Governance/Actors Relationships

A number of institutions and roles were involved in the analysis of the sweet potato value chain. It had producers at its core and both backward and forward assimilations. Primary actors (producers/processors, brokers, and purchasers), secondary actors (inputs suppliers, researchers), and current actors are some of the important players in Tanzania's sweet potato marketing. Their responsibilities and roles are as stated.

According to the data, there was no organization or procedure for keeping track of participation in activities along the sweet potato value chain, including production, handling, processing, and marketing. This was discovered during conversations with key players, such as district employees working in the sector and civil society organizations (CSOs and NGOs).

The actors are less familiar with the actions and processes that take place along the sweet potato value chain. Due to the government authorities' lack of accurate information on stakeholders' actions about this potential crop for generating revenue and food security, there is a lack of effective strategies at the district level to collaborate with stakeholders in extending the agricultural value chain. The information regarding seasonal output, markets, and prices was not well received by the actors throughout the chain, despite the widespread use of mobile-phones

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

services in the districts. Dealers or farmers received only a portion of the bids and demands for market pricing.

Sweet potato Actors

Primary Actors

The study found two categories of sweet potato growers with the first category as: subsistence farmers growing old-fashioned seed varieties and the secondly the emerging group of farmers growing improved varieties famous known as orange type. Commonly, various farmers still work with outdated varieties, especially polista, sinia, simama,vumilia, mavuno jitihada, and mataya because they are less disposed to decomposition and are more known to the users who are consumers.

Production of sweet potatoes, harvesting, handling, treating, packaging, bulk sales, and retail are the key duties of producers. Sweet potatoes were the primary alternative crop in Gairo and Kilosa and districts where maize is the main food crop before the sunflower and sesame crops attract the majority of farmers. Primary actors included rural hawkers, small traders, retailers, wholesalers, small-scale processors and consumers. It was further known that most of the buyers were from Morogoro, Tanga, Dar-Es-Salaam and Dodoma. There is also an interesting story that sometimes farmers may sell the grown crop in the field and the one who buy it harvest and re-sale for profit the situation which is known as a "*kupiga bingo*" means getting quick money, This also do happen when the farmer had no capacity to harvest. Literally refers to like winning lottery competition or challenge**.**

Additionally, common farmers propagate sweet potato cultivars during December and January (72%) (Fig.5). It was discovered that producers were employing outdated technology, such as the high number of farmers who were using hand hoes and regional seeds.

Producers: Usually producers of sweet potato sell part of their processed sweet potato to traders or fellow farmers with food shortages within the villages or nearby villages. The amount sold varies by amount harvested and food requirement of household (quantities of cereals). They normally sell processed sweet potato in auction each sunday during season and off season the year depending on the household's cash needs. They sell individually in various forms including fresh sweet potato (unpeeled roots) for consumption, dried sweet potato per tin or sack ("*Michembe" and "Matobolwa")* and processed into floor. Usually producers have access to marketing information on prices by direct visit to auction or hearing from their fellow friends. Bargain is mostly on an individual basis. They do not make any pre-arrangement with vendors or traders in selling their sweet potatoes. Also, very

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

interesting story, Producers play a dual role as a processors also, you can't separate characteristics and functions of the two actors

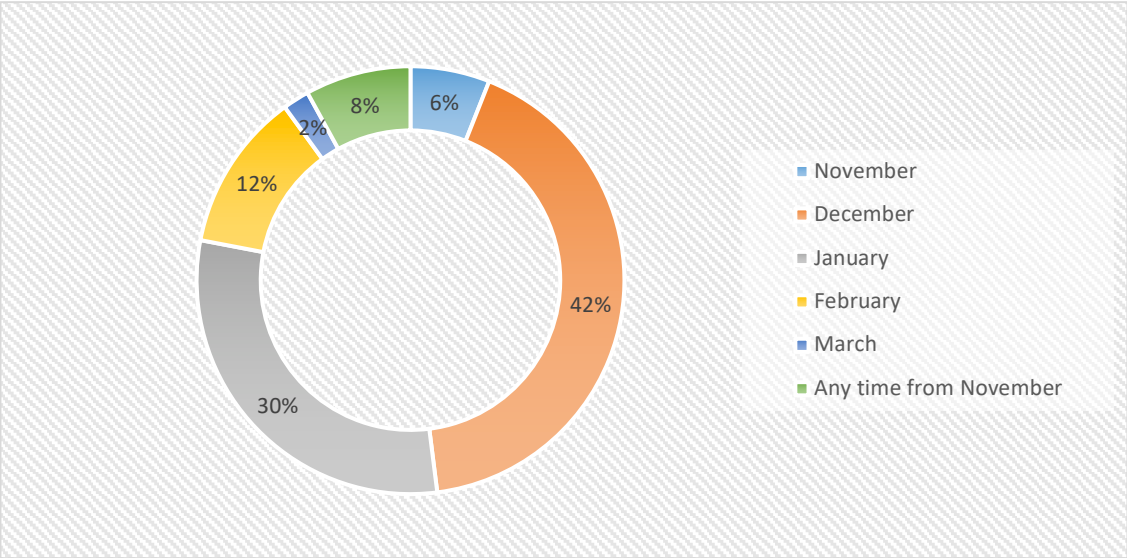

Figure 5: Sweet potato Planting Months

Secondary Actors

Actors included local seed suppliers, extension service and financial service providers. The seed industry is not well coordinated and this tends to undermine production. The agricultural extension personnel is mediators between research and farmers. According to survey findings, 91% of growers who were sampled did not have access to extension services for growing sweet potatoes. Only 6% of respondents claimed to have gotten extension services from extension workers; the remaining 3% said they got them from other places, like NGOs (Fig 6). This demonstrates that most farmers have never appreciated the value of the extension services provided by village extension officers. As a result, more work needs to be done by the government to make it easier for extension workers to connect with farmers. There was inadequate number of extension officers at village level in both districts. Furthermore, it was found that in other villages, one ward extension officer served the entire ward but with no transport means or other working gears like motorcycles, computers or even writing papers. The problem was due to lack of understanding of the district human resources to ensure each village had one extension officer as per government requirements and fill the gap. There aren't enough microfinance institutions along the sweet potato value chain, maybe due to unrealized potential and a lack of understanding among farmers and service providers about how the crop can be processed into a variety of items beyond the locally produced commodities.

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 3
March 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

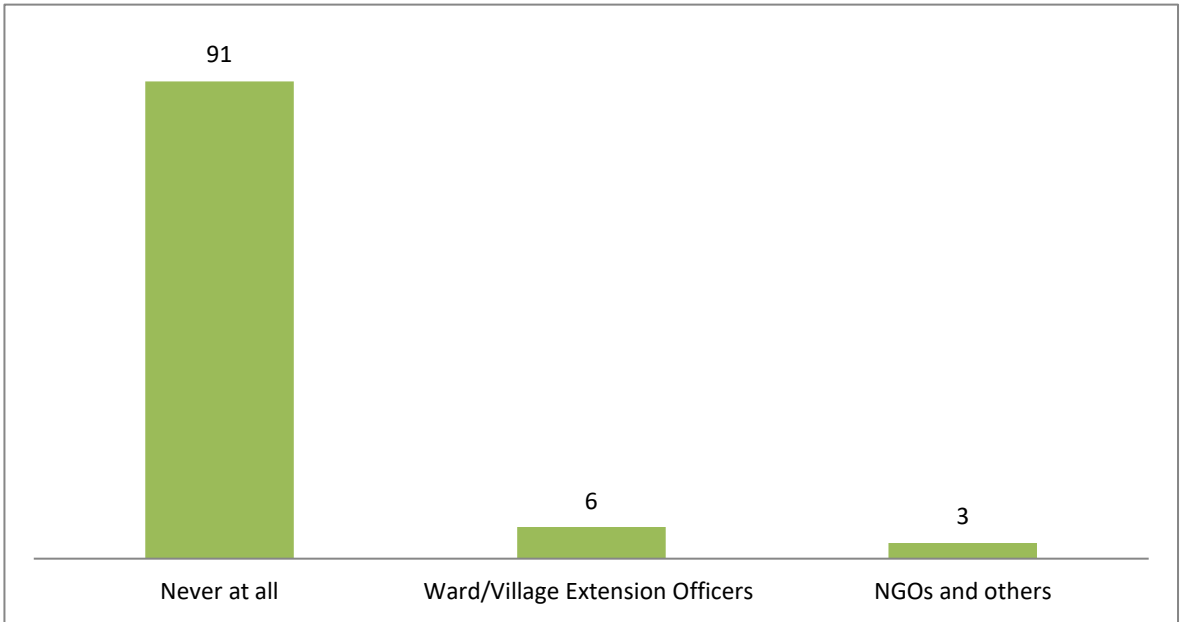

Figure 6: Sources of Farmers' Extension Services

Contemporary Actors

In order to strengthen and improve the agriculture sector, the private sector through Public Private Partnership (PPP) has to take part in the whole process of increasing agricultural productivity. There is a need of private sector to collaborate with extension agents as well as take part in some research activities. It was found that few NGOs engage in sweet potato business. One international organization, Potato International Center CIP) engages some villages in Gairo and Kilosa and introduces new cultivars for increasing productivity.

Sweet Potato Products Produced and Consumed

The survey also revealed that skinned and dried sweet potato leaves were commonly produced and consumed in the study area, as a side dish. The primary consumers of sweet potatoes were found to be the growers themselves. This demonstrates that any surplus was taken to the market. Asia is the biggest producer of sweet potatoes, followed by Africa (Refer to Fig 3). However, nearly half of the sweet potato produced in Asia is used for animal feed, with the remainder primarily used for human consumption, either as fresh or processed products. Likewise, the majority of sweet potato consumption worldwide is in Europe, whereas *per capita* consumption is lowest in Africa and Latin America although rising there [5].

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Parcel Size

The majority of growers have one to three sweet potato production plots, with parcel sizes ranging from 0.25 acres to one acre, as shown by Figure 7, which is a result of farm fragmentation. This demonstrates that the land size devoted to the crop is very small despite the prominence of the crop. This is done in fragmented plots [21]. The layout has an impact on crop productivity.

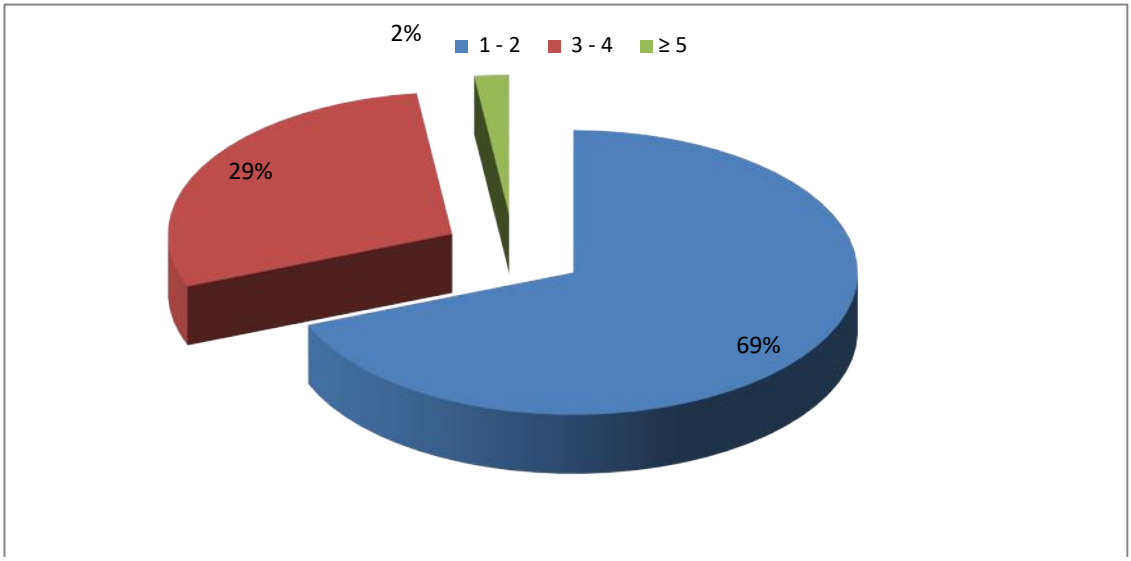

Figure 7: Percentage Distribution of Number of Sweet Potato Parcels Owned

Marketing Channels of Sweet Potato

All of the parties participating in the sweet potato supply chain in the research area are represented by the marketing channels in Figure 6. The sub-sector map illustrates the current flow of sweet potato goods in Tanzania from farms to a variety of end-markets and consumers. According to the statistics, the nation's supply chains can be divided into four main networks, as shown below.

i. ***The first channel is from producer direct to consumer***

The first of these is what may be described as "outdated" market channel headed by low-income consumers. Producers in this channel receive their seeds from a variety of sources.

The majority of goods are eventually transferred from local merchants and urban wholesalers to low-income consumers via retail channels (outdoor markets and street vendors). The path where customers buy things directly from manufacturers or from local markets is also the shortest. The channel was widespread but not particularly strong. According to data, 100–150 bags (100 lb) were sold per week along this route.

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

ii. Second channel: producers to retailers, where producers sell products in bulk to retail traders

Although small and medium-scale processors in lake zones are anticipated to quickly grow into substantial buyers of sweet potatoes, this distinct channel focuses on the expanding need for small-scale processors (small-scale in lake zone). The processor(s) mostly rely on obtaining the older sweet potato varieties from farmers or brokers who can sell the sweet potatoes in factories if prices are greater. Customers frequently use this route to buy goods from a variety of retailers, including neighborhood markets and open-air "*mnada*" marketplaces.

iii. Third channel: producers/processors to middlemen/village vendors

The third channel is driven by urban consumers. These customers are more enticing and emphasize the benefits of upgraded varieties. Orange-fleshed "karoti" and "ejumla," which are mostly grown by a small number of expert farmers, are among the top kinds in great demand, according to this survey. But the urban market continues to be dominated by conventional cultivars.

iv. Fourth and Fifth Channel: Export led channel

The fourth channel is driven by export consumers. These customers are growing accustomed to and appreciative of the advantages of better cultivars. Farmers can be guided to target this market niche because this channel is dormant. With the exception of bringing all activities under the direction of a single firm at the retail level, the channel is substantially the same as the third. This allows the company to maintain quality control and build a reputation (brand) for its products. Mid-size farms started on their own that sell superior varieties to urban customers are the main drivers behind this channel. According to economic theory, it was found that farmer profit margins shrank as the number of market channels (market intermediaries) increased.

.

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 3
March 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

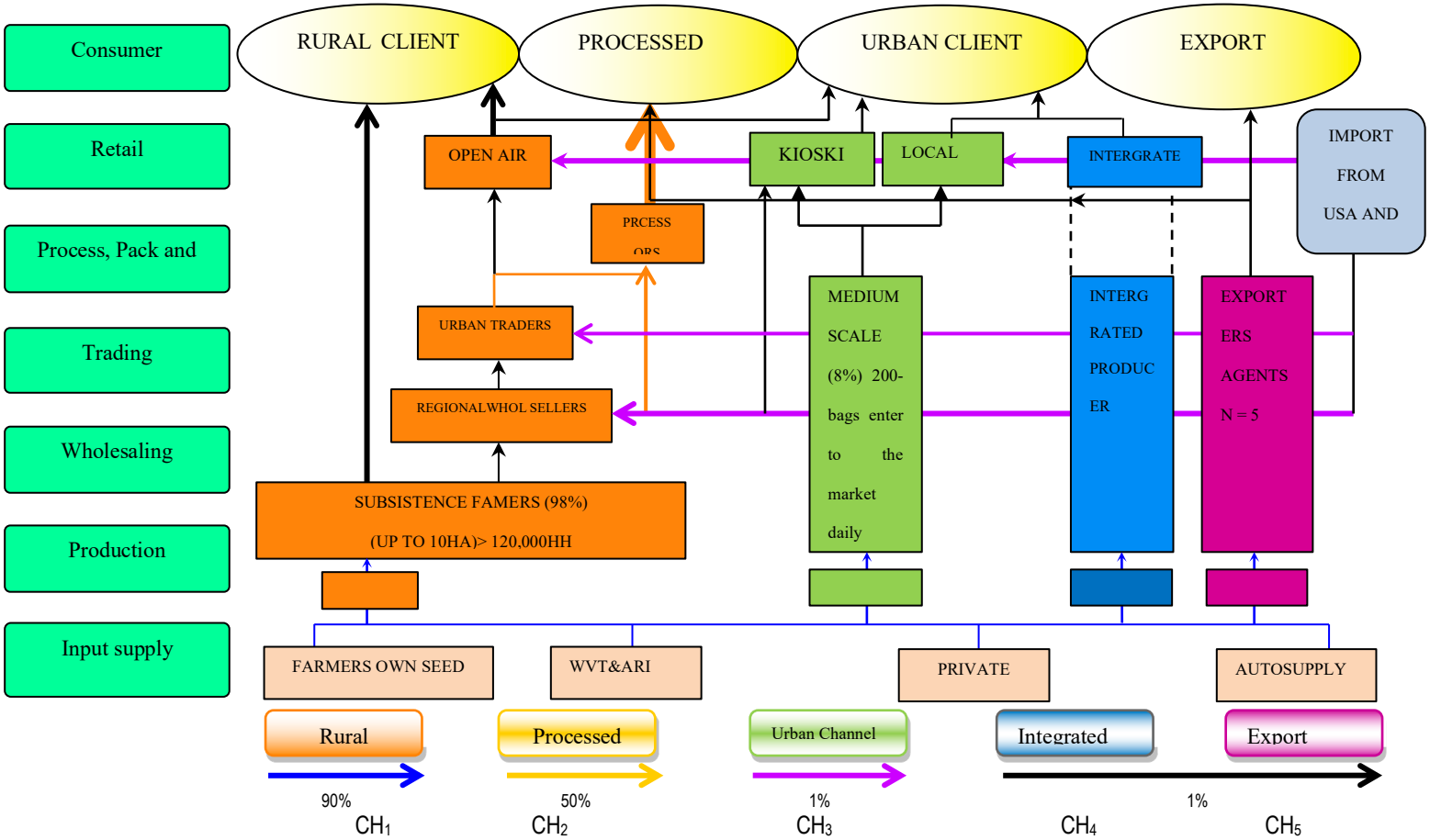

Figure 8: Sweet Potato Sub – Sector Map

Source: Modified from SNV Tanzania. Fresh Fruits Sub sector study Final report July, 2005

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Organization and Coordination of the Value Chain

The analysis discovered that there were no pre-set relationships among the actors at various levels of the value chain. The study found that there is no marketing contract arrangement along value chain. The study conducted FGDs, the FGDs comprising representatives from the Gairo and Kilosa districts and a small number of processors also discussed the lack of communication between growers and extension agency representatives regarding sweet potato production. The district officials explained that measures were being taken to resolve problems with roots and tubers.

During an interview, one respondent (RP1) said:
"The Government extension should work very closely with growers to be equipped with skills especially the adoption of orange sweet potato verities and access to market".

Additionally, it was found that there was no management for monitoring participation in activities along the sweet potato value chain, such as production, handling, processing, and marketing. Discussions with government authorities revealed this. They had little understanding of the district's religious and non-governmental organizations' activities and value chain for sweet potatoes.

Another respondent (RP2) commented as follows:
"We recommend developing institutional framework at national level for effective coordination and protection of sector."

Horizontal coordination

There were no organizations created at any level to serve the interests of growers and processors of sweet potatoes. At every stage of the value chain, actors' horizontal coordination was poor or nonexistent. To have a voice in commercials for sweet potatoes, associations are primarily needed.

Sadly, there were no associations at the district or regional levels, despite the fact that regions frequently communicated with one another. No organization devoted to sweet potatoes, or to roots and tubers in general, existed that might serve as a national forum for discussion in the sweet potato industry. The organization would have promoted improvements in the sweet potato industry policy.

Vertical coordination

It is interesting to note that most of the exchanges between farmers and purchasers were impulsive.

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Along the sweet potato value chain, the vertical coordination connected producers with wholesalers and small dealers. Both forward and backward linkages are present in the chain. Farmers who are connected to input providers use forward linkage, where they sell their produce directly at a village market. The sector's limited backward vertical integration makes it difficult for producers to access reliable, high-quality seed. Further research revealed that certain. One excellent instance of backward amalgamation was seen and discovered in certain homes linked to NGOs to obtain high-quality seeds. This shows that, as the study on value chains revealed, donor assistance is essential for fostering production and so alleviating poverty 16]. None of the producers or processors had well-known, long-standing merchants where their products were sold, similar to backward vertical amalgamation. There was no money set aside in advance by any of the traders to buy sweet potatoes that would be delivered to the market hubs. The study discovered that all of the sampled producers in the research locations unintentionally crossed paths with purchasers. To avoid taking direct responsibility in the event of a dispute, most Tanzanian buyers preferred loose contracts.

Institutional Review of Sweet Potato Farming

There is widespread consensus at all levels of the government structure that the expansion of the agricultural sector is a key tool for reducing poverty in agriculture reliant nations like Tanzania. The existence of macro policies and programs like the Agriculture Sector Development Strategy (ASDS), which is abbreviated as "MKUKUTA" in Kiswahili, and the National Strategy for Growth and Reduction of Poverty (NSGRP), has been useful in demonstrating this (ASDS). Two policy apparatuses; Agricultural Policy 2013, a separate policy recently developed for the livestock sub-sector, and Agricultural Marketing Policy (AMP) also support these initiatives (2007), after the Agricultural Sector Development Program ASDP became functioning.

The Agricultural Sector Leading Ministries (ASLMs) must work to develop a distinct crops sub-sector policy, with a focus on root and tubers, in order to be in line with the implementation of ASDP II in its third Agricultural Marketing Policy 2007 (AMP). The most recent policy paper for the sector was finished in the second year of ASDP I. The policy has not yet been implemented, and tests are still being conducted to persuade and humanize the stakeholders about its consequences for advancing the marketing of the farm sector.

The Institutional Analysis/Review (IA) focuses primarily on the ways in which the Tanzanian sweet potato industry's value chain and all of its participants are ready

https://doi.org/10.18697/ajfand.118.22290

to support (or not support) effective outcomes. Poorly developed environments (support) and a lack of tools for implementation, such as the inability of governmental organizations to coordinate and carry out sweet potato marketing, were present.

The impact of political, economic, technological, social, and ecological elements, as well as the fact that the district authorities lack the resources to properly administer the ordinances and norms, all contribute to the overall environment of the sweet potato value chain. Increased expenses for agricultural output development, such as high transportation costs, increased costs for farm inputs, and increased costs for maintaining agricultural equipment, have all been caused by the nation's inadequate infrastructure. Particularly in rural areas, the road systems are in poor shape, and throughout the majority of the rainy seasons, village roads are impassable. Likewise, the production of sweet potatoes in the research area was governed by a lack of institutional organization (legal and policy setting). Sweet potato farming is governed by the ASDP and DADP plans that promote crop development by the establishment of regulation and capacity building to actors.

Challenges Facing Production and Marketing of Sweet Potato

Producer challenges

Players were asked to classify the most perilous issue affecting the chain of manufacturing and marketing for sweet potatoes. The most significant issue facing the sector was the persistent absence of high-quality cultivars (61%); other issues included a lack of funding (7%), unpredictable weather (20%), and pest/insect attacks (12%) (Figure 7).

Sweet potatoes and other root crops have always been at the margins of agriculture strategies and resources since cereals and cash crops for export have traditionally taken center stage. If the potato industry is to prosper, policymakers must address this mismatch by offering more assistance and pursuing significant levels of public and private investment. Breeding programs, infrastructure upgrades, and commercialization projects all work to strengthen the value chain would be included in such investment.

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 3 March 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

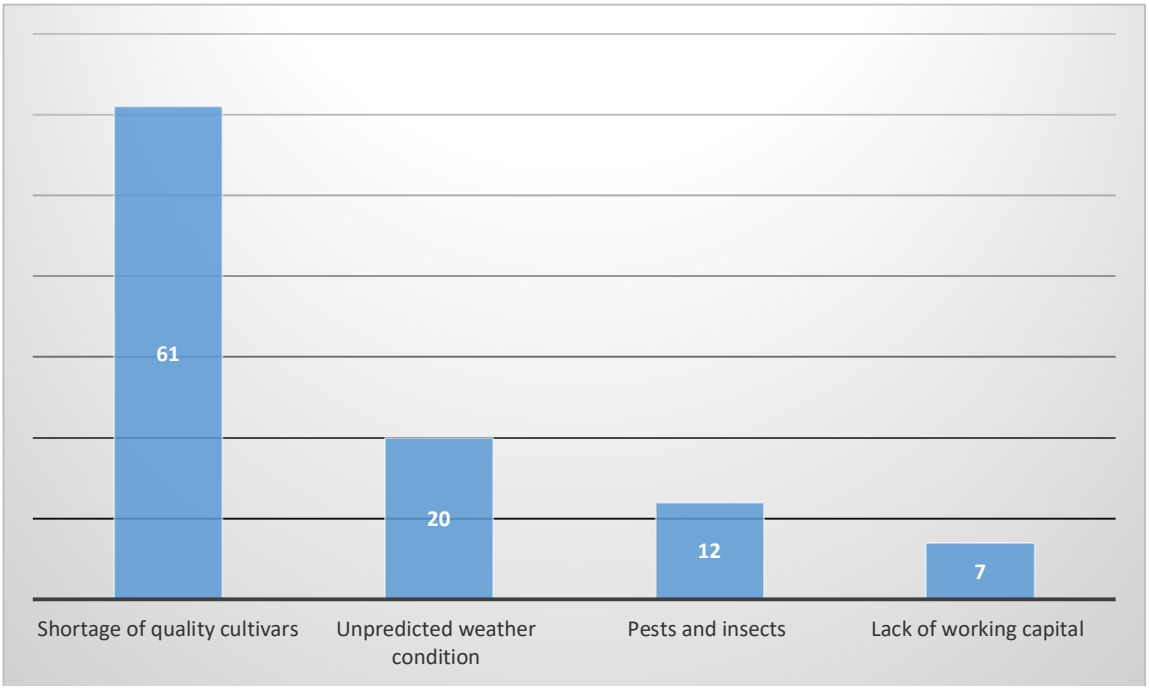

Figure 9: Percentage Distribution of Respondents and Production Challenges

Marketing challenges

It is well known that Tanzania has numerous constraints on both small- and micro-scale food manufacturing. These include subpar machinery, meager processing aids, scant advertising, and a lack of consumer demand for processed fruits, vegetables, and root and tuber products, as well as inadequate packaging materials. These results are comparable to those from a research on Tanzania's agro-processing business by Makombe, who noted that marketing of root and tuber products was hindered by a lack of consumers [17]. Anon [18] and Kaplinsky and Morris [19] cited a lack of rigorous consumer demands, a lack of high-quality raw materials, an inconsistent and inadequate supply, a lack of finance, and an undynamic market as the major difficulties faced by small-scale food processing enterprises in the country. Additional obstacles include high production costs, a lack of cold chains (essential for some products), insufficient electrification, and the high price of potable water. The inaccessibility of packing supplies (identified by 36% of the sampled processors as a barrier) and the seasonality of agricultural production, which contributed to the unreliability of raw materials (42%), were the two most often stated obstacle. Lack of processing abilities and tools was another factor (22%).

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 23 No. 3
March 2023
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

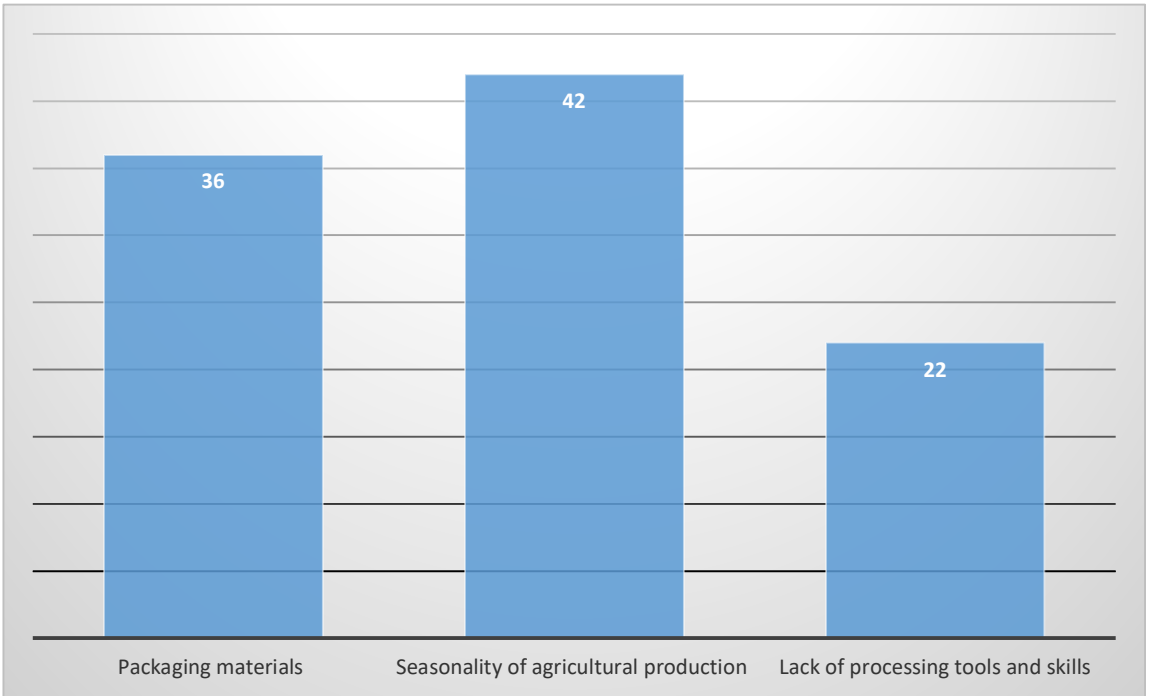

Figure 10: Percentage Distribution of Respondents and Marketing Challenges

The value chain for sweet potatoes is intricate and poorly connected. Due to a lack of trust, communication, and structural disaggregation, vertical and horizontal relationships are weak. Nevertheless, a major barrier to productivity and efficiency may be the absence of horizontal coordination. The agricultural and rural development literature in developing countries acknowledges the significance of producer organizations in promoting the reciprocal benefits of smallholders, particularly access to markets and credit. Organizations involved in agricultural and rural development tend to be grassroots organizations that combine economic and social functions to varying degrees, making them hybrid in nature. Key operational and investment decisions are made easier by hybrid organizations in markets where a whole hierarchy runs the danger of rigidity and diminished producer incentives.

CONCLUSION

Overall, the sweet potato value chain in Tanzania is characterized by uncoordinated and unregulated actors. The subsector is characterized by low-value addition techniques and informal market system. The products are sold in raw form hence low returns to small-scale farmers. In essence, value-added activities were constrained by insufficient support services. Particularly, the development of the crop is favored by a lack of improved seed, financial accessibility, inadequate processing methods, subpar extension services, and a

lack of specialized policy. Due to periodic structural changes in the economic environment, such as slow or no market development, increased foreign competition, more choice, and better value, better food safety and legislation, and consumer worries about various environmental issues, coordination has become crucial. Generally, subsector is characterized by weak and inactive vertical and horizontal coordination.

The study suggests that prospects for value chain growth in the subsector will expand the market for the crop, which will in turn encourage more output and better prices for smallholder farmers in Tanzania's various growing regions. In order to give farmers consistent and accurate pricing information, it is necessary to promote the provision of adequate price information through the improvement of market information services. Last but not least, institutional strengthening, improved value chain information, and clearer business-based links between producers and processors might significantly improve value chain function in addition to the technical and market-based advancements.

CONFLICT OF INTEREST

The authors declare that there was no conflict of interest.

ACKNOWLEDGEMENTS

This study received financial support from Tanzania Commission for Science and Technology (COSTECH).and University of Dodoma (UDOM).

ajfand SCHOLARLY, PEER REVIEWED AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT Volume 23 No. 3 March 2023 PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST ISSN 1684 5374

Table 1: Percentage Distribution of Social Economic Characteristics of Stallholders Farmers

Characteristics	Attributes	Frequency	Percent
Sex of the respondents	Male	76	76.0
	Female	24	24.0
Age group of the respondents	18 – 30	14	14.0
	31 – 45	80	80.0
	45+	6	6.0
Level of education	Primary education	60	60.0
	O-Level secondary education	30	30.0
	Had not attained any level	10	10.0
Marital status	Single	5	5.0
	Married	85	85.0
	Divorced	6	6.0
	Widowed	4	4.0
Family size	0-3	20	20.0
	4-5	31	31.0
	above 5	49	49.0
	Total	100	100.0

Source: Survey data, (2020)

REFERENCES

1. **United Republic of Tanzania.** National Budget Speech – 2018/19 fiscal year.

2. **United Republic of Tanzania.** National Budget Speech – 2020/21 fiscal year.

3. **ANSAF.** Post-Budget Statement The Public Agriculture Financing in Tanzania: Challenges in Development Expenditure Post-Budget Statement.2018.

4. **Adofu I, Abula M and J Agama** The effects of government budgetary allocation to agricultural output in Nigeria. *Sky Journal of Agricultural Research,* 2012. **1(1):** 1–5.

5. **FAO.** FAOSTAT Food and Agriculture Organization, Rome, Italy (2021). www.http://faostat.fao.org/default.aspx *Accessed on 4/1/2021.*

6. **Nyomora A, Kanyeka Z and A Nduguru** Supporting Tanzania's Cocoa Farmers. Research Report, No. 3. REPOA, Dar es Salaam, Tanzania. 43pp. 2012.

7. **Mmasa JJ and M Mlambiti** Factors that Influences Consumption of Processed Sweet Potato Products in Tanzania. *Asian Journal of Agricultural Extension, Economics & Sociology.* 2015; **(1):** 1-10, Article no. AJAEES.2015.001 ISSN: 2320–7027.2015.

8. **Pervan M, Curak M and TP Kramaric** The Influence of Industry Characteristics and Dynamic Capabilities on Firms' Profitability. *International Journal of Financial Studies*. 2017; **6(4).** https://doi.org/10.3390/ijfs6010004

9. **Yunna W and Y Yisheng** The Competition Situation Analysis of Shale Gas Industry in China: Applying Porter's five forces and Scenario Model. Renewable and Sustainable Energy Reviews. 2014; **40:** 798–805. https://doi.org/10.1016/j.rser.2014.08.015

10. **Strauss J and R Frost** E-Marketing (7th ed.). Pearson Education Limited. 2014.

11. **Porter ME** Competitive Advantage: Creating and Sustaining Superior Performance. 1985.

12. **Bailey KD** Methods of Social Research. (4th Ed.) The free Press Collier Macmillan Publisher, London. 478pp. 1994.

13. **Tanzania National Bureau of Statistics.** Tanzania population and housing census 2002. http://www.nbs.go.tz/tnada/index.php/catalog *Accessed on 18/8/2020*.

14. **Mmasa JJ** Market Potential for Processed Sweet Potato Products in Tanzania. Thesis for Award of PhD Degree at Sokoine University Agriculture.2014.

15. **United Republic of Tanzania.** National Sample Census of Agriculture. Ministry of Agriculture, Food Security and Cooperatives, Dar es Salaam, Tanzania. 2003a. 371pp.2003.

16. **Humphrey J and L Navas-Alemán** Value Chains, Donor Interventions and Poverty Reduction. A review of donor practice. Research Report, No. 63. IDS Sussex, Brighton. 65pp.2010.

17. **Makombe IA** Women Entrepreneurship Development and Empowerment in Tanzania: The case of UNIDO/SIDO-Supported Women Micro Entrepreneurs in the Food Processing Sectors. Unpublished PhD Thesis, Submitted at University of South Africa. 2006.

18. **Anon.** Storing Sweet Potato Made Simple. Dissemination Leaflet. Natural Resources Institute, Tanzania Food and Nutrition Centre and Lake Zone Agricultural Research and Development Institute. 2pp.2003.

19. **Kaplinsky R and MA Morris** Handbook for Value Chains Research. Macmillan Publisher, London. 74pp. 2001.

20. **Kothari CR** Research Methodology: Methods and Techniques (2nd revised edition), *New Age International Publication*. 2014.

21. **Daniel M, Deininger K and H Nagarajan** 'Does land fragmentation reduce efficiency: Evidence from India'. Paper prepared for presentation at the Agricultural and Applied Economics Association 2010 AAEA, CAES and WAEA Joint Annual Meeting, Denver, Colorado, July 25 – 27, 2010.