

Factors that Influences Consumption of Processed Sweet Potato Products in Tanzania

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Authors' contribution

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2015/8975

Editor(s):

- (1) Angel Paniagua Mazorra, Centre for Human and Social Sciences, Spanish Council for Scientific Research, Spain.
(2) Jamal Alrusheidat, Assistant and Consultant to Director general for Extension Education Director of Extension Education Department, National Centre for Agricultural Research and Extension (NCARE), Amman, Jordan.

Reviewers:

- (1) Anonymous, Makerere University, Uganda.
(2) Anonymous, Makerere University, Uganda.
(3) Anonymous, University of KwaZulu-Natal, South Africa.

Complete Peer review History: <http://www.sciencedomain.org/review-history.php?iid=658&id=25&aid=6002>

Original Research Article

Received 8th January 2014
Accepted 9th April 2014
Published 8th September 2014

ABSTRACT

The general objective of this study was to describe a socio-economic factor that influences consumption of processed sweet potato products. The study was cross sectional in design and was conducted in Shinyanga and Mwanza regions. The study employed individual interviews, focused group discussions, review of relevant practical documents and discussions from a total of 50 surveyed households. The data collected was summarized using Statistical Package of Social Science (SPSS) windows versions 18.0, excel and content analysis. The survey revealed that two factors mostly influences one to consume processed sweet potato were attractive packaging (51.0%) and nutritional value (34.7%). Other factors mentioned included; taste (95.0%), freshness (80.8%), shelf life (85.8%), texture (57.5%), economy (price) (57.5%), Nutritional factor (72.5%) and color (50.8%).

Keywords: Sweet potato; value chain; processed; consumption.

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1. INTRODUCTION

1.1 Background Information

Agriculture is the backbone of Tanzania's economy [1,2]. It provides employment to more than three quarters of its population, it accounts for 75% of its exports, and contributes almost 27.8% of Tanzania's Gross Domestic Product (GDP) [3]. Traditionally, the Tanzanian economy is heavily dependent on agriculture, which contributes significant share to the GDP and generates significant amount of the nation's foreign exchange earnings [4]. However, according to [4] recently mining, tourism and services have been playing an increasingly active role. Approximately 3.5 million farm families cultivate about 4.5 million hectares of arable land. Crop yields are only 20% to 40% of their potential. However, fall in prices of traditional export crops reflected in a reduced contribution of export earnings by the agriculture sector from 60% in 1990s to 14.3 % in the year 2007.

Agriculture produces raw materials for the agro-processing industries in the country, the sector provides raw materials to food processes various agro food processing plant like (grain mills, plants which make fruit juices and jams etc.), sugar factories, cashew nut factories, coffee hulling plants and coffee roasting and processing factories, textile mills, paper mills, furniture workshops, breweries, tobacco factories etc. In addition to processing agricultural products to add value to them and to make them more readily usable, these factories provide employment to a substantial number of people [5].

The sector is characterized by female intensive, meaning that women comprise majority of the labour force in agriculture (54%) [6]. Moreover Nyomora [6] stated that there are over 15 million smallholder farmers in the country, more than seven million of whom are women. Mostly cultivate between one and three hectares, with limited access to modern technology, machinery and inputs. Most of the farmers work on subsistence basis and can be pushed easily onto poverty by weather fluctuations (drought or floods), biotic stress and other external shocks notably food price fluctuations. Other challenges include poor access to information, innovations, value added initiatives, improved varieties and good quality seeds. These had caused stagnant

growth of agriculture sector in the last decades (growth stood at 4% per year since 2006) [7].

1.1.1 Sweet potato production

According to United Nation's Food and Agriculture Organization (FAO) [8,9] reported that sweet potato (*Ipomeabatatas* (L.) Lam) is a very important crop in the developing world and a traditional, but less important crop in some parts of the developed world. Furthermore, it was revealed that 115 countries produced 106 569 572 tons of sweet potato in 2010. Majority of which came from Asia, with a production of 81 175 660 tons which is 82.3% of global production [10]. China alone produced 80 to 85 % of the total sweet potato production in the world while the remaining countries in Asia have the next highest production and then, followed by Africa and Latin America [11]. Furthermore, 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. Because of its versatility and adaptability, sweet potato ranks as the world's seventh most important food crop after wheat, rice, maize, potato, barley, and cassava, as it constitutes a substantial source of carbohydrate and carotene [8,9,12].

Utilization of the crop is remarkably narrow in East Africa, the crop is most often consumed boiled or roasted in fresh form. In Tanzania vines are used as side food "*matembele*". Likewise in central Kenya vines are used to feed livestock particularly in areas where small-scale dairying in zero grazing management systems is well developed. They are also being used as starter feed and partial milk replacer for young calves [13]. The limited range of ways and availability of adapted processing technologies in which sweet potato is utilized in the region seriously undermine the potential benefits of the crop to farmers and consumers and other chain actors.

1.1.2 Current situation

In Tanzania sweet potatoes average yield is approximately 5.5 - 6 metric tons per hectare on dry weight basis. However the low yield in Tanzania as compared to more than 6 -8 tonnes per hectare in Zimbabwe [14]. Likewise, in Uganda, the orange-fleshed varieties yield up to 20 tonnes per hectare (80 bags per acre) [10]. The highest yield reported in research institutes in Tanzania is 27t/ha; 40-70t/ha is from Nigeria. Low production in the country may be

caused by many factors including susceptibility to pests and diseases, declining soil fertility, moisture stress, low level of crop husbandry management and poor accessibility to markets [15].

According to [16] in Tanzania sweet potato is processed into two main local products called “*Michembe*” (the roots are withered, cut into slices and dried) and “*Matobolwa*” (the root are boiled, sliced and dried) these products can last for 5 – 8 months. There are other products that have been prepared in Tanzania including cakes, *chapattis*, *doughnuts*, *kalimati*, flour, porridge and crisp. Literature on the use of root and tubers like a processed sweet potatoes product is scanty [17]. These products look promising in broadening market potential for wider transect of the Tanzanian community especially in per-urban and urban areas where traditional food is now becoming popular. However, there is need for food technologists to improve processing technology, quality and sensory attributes to improve their acceptability. Furthermore, food attributes like sugar contents, colour, filling, appearance and taste should be taken into considerations.

1.1.3 Sweet potato export potential in Tanzania

There is clearly high demand from Australia, Netherlands, United Kingdom, France, Belgium and Zimbabwe and their preparedness to pay higher prices for high quality sweet potato products. Still Tanzania needs to compete with other countries like Ghana, United States of America, China, Netherlands, Spain, Viet Nam and Egypt who are the major sweet potato exporters [18]. Example By 2009, the EU had doubled its volume of imports from the US to 33 224 MTs valued at \$24.8 million [10].

However the foreign demand could be much higher than supply that this is more of a longer-term issue for discussion. Therefore, it is not surprising that Tanzania sweet potato farmers and the country itself are not currently preparing themselves to tap into this market. Tanzania has been exporting small quantities of sweet potato an average of net weight of 21 577 kg of fresh or dried, chilled or frozen from year 2003 to 2013 but with Free On Board (FOB) value of TZS 7 346 As discussed earlier challenges mention previous in this chapter must be addressed [19]. Moreover, many growers and processors are not sufficiently aware of the export requirements and

its implications for their sweet potato business. To sum up Tanzanian opportunities are clear-cut but most producers and processors have still a long way to match the markets demands. Exporters required to obtain a valid trading/business license from the city/town council where the business will be conducted. Some products require specific license/permit from the Government departments/institutions or a controlling body legally empowered to do so, exporters therefore have to contact the following, for this case of sweet potato products one need to contact Ministry of Agriculture for Food Security (MAFS) (staple) products.

Sweet potato among the root and tuber crops, it is the only one that had a positive per capita annual rate of increase in production [20]. The crop has a high yield potential that may be realized within a relatively short growing season and adaptability to a wide ecological range the crop grows from 48°N to 40°S and up to an altitude of 3000 above sea level. Presently, it does not find much use as food in most parts of Africa except in Nigeria, Uganda, Ethiopia, Rwanda and Zaire, which accounted for higher percent of African sweet potato production in 2012.

Cognizant, promotion of root and tuber crops in most African countries is threatened by low prices of the crops and their products with the rising cost of labour and transportation, rural farmers can hardly sustain their farming systems considering the insufficient returns from their harvest [20]. It is, therefore, advantageous to diversify the use of root crops beyond those of the traditional food industry in African countries.

1.2 Objectives of the Study

To investigate and provide understanding of the social factors influences demand of various processed sweet potato products in the study area.

1.3 Research Questions

What and how the socio-economic factors are influences consumption and purchasing of various processed sweet potato products?

2. METHODOLOGY

2.1 Location of Shinyanga District

Shinyanga District is one of the eight districts in Shinyanga Region. The District lies between

latitudes 3° 20' and 3° 95' south of the Equator and longitudes 31° 30' and 33° 30' east of Greenwich Meridian. The District shares boundaries with Kishapu and Shinyanga Municipal in the East, Kahama and Geita in the West, Kwimba and Mwanza in the North, and Nzega District in the South [21].

2.2 Agricultural Potential

Agriculture sector contributes about 15% to 20% of the council's internal revenue and provide employment to 70% of the total population [22]. The major food crops grown in District include maize, sorghum, paddy bulrush millet, sweet potatoes, legumes and cassava while cash crops are cotton, paddy and chickpeas [21]. The District depend on sweet potato as a reserve

food when other crops fails. Similarly the crop serves as a source of income for the farmers.

2.3 Population of Shinyanga-District

According to the 2012 National Census 334 417 [7]. The majority engage in sweet potato production for their survival.

2.4 Location of Mwanza City

Mwanza City is located on the southern shores of Lake Victoria in Northwest Tanzania. It covers an area of 1325 km² of which 425 is dry land and 900 km² is covered by water. Of the 425 km² of dry land, approximately 86.8 Km² is urbanized while the remaining area consists of forest land, valleys, cultivated plains, grassy and undulating rocky hill areas [22] (Fig. 1-below).

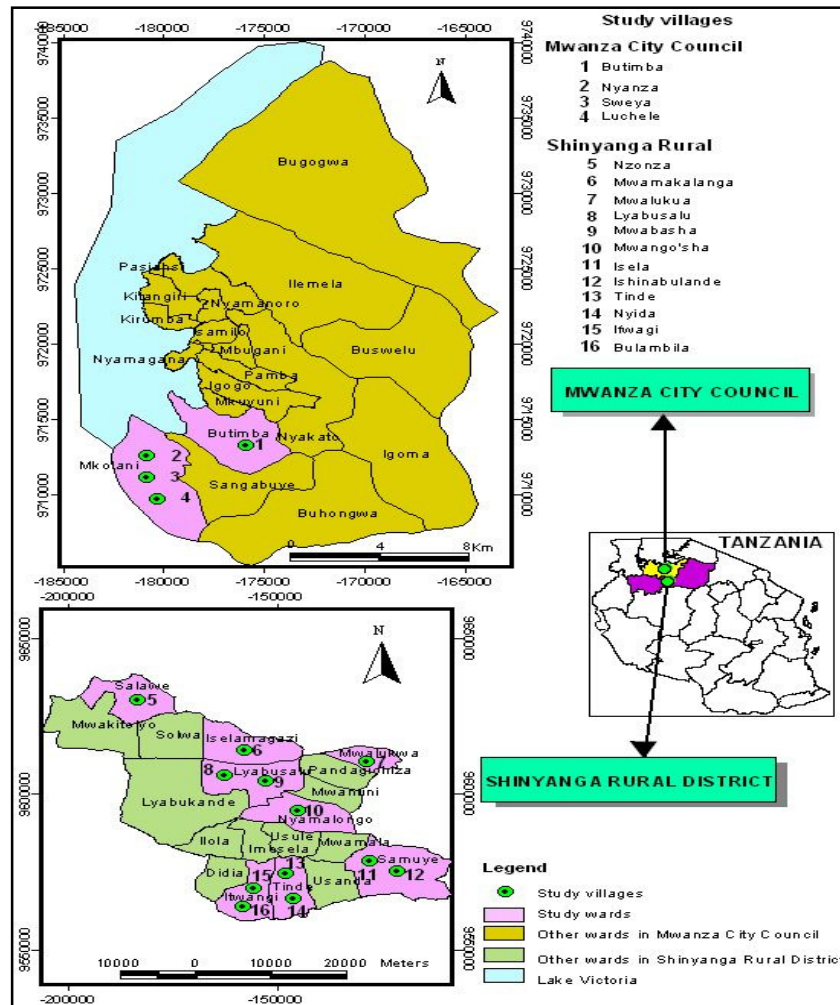


Fig. 1. Map of the study area

2.5 Population

According to the 2012 National Census, Mwanza City has a population of 706 453 (Nyamagana Municipal 363 452 (177Female) and Ilemela Municipal 343 001 (178 283Female) people [7]. The population density is 134 people per sq. km, being the second largest city in the country after Dar- Es- Salaam. The city was chosen based on the high population hence products will fetch a good market. Moreover, this study therefore focused in Lake Zone of Tanzania, because of high production potential, climate, population and potentiality of local processing is done as compared to other regions in the country.

2.6 Sampling Techniques, Data Collection and Analysis

Sweet potato produced within and around Shinyanga District, Mwanza reach consumers mainly through direct producer to consumer sales or via retail outlets such as local market place, shops and kiosks. Participants selected were regular buyers of sweet potatoes and were either the auction buyers or market place buyers. Then researcher interviews them at the shopping centers. Systematic random sampling technique was adopted. The technique is frequently chosen by researchers for its simplicity and its periodic quality. The researcher first randomly picks the first item or subject from the population. Then, the researcher selected each n^{th} subject from the list. The procedure involved in systematic random sampling was easy and was done manually. The results were representative of the population unless certain characteristics of the population are repeated for every n^{th} individual, which is highly unlikely. The process of obtaining the systematic sample is much like an arithmetic progression. The first stage involved systematic random sampling that form the list researchers pick first item randomly to select respondents. Researchers set inclusion criteria which were; income, numbers household members, sex, marital status and age of the head of household. The decision to target these three groups was based on discussions held with Government official during focus group discussion. Therefore the consumers were selected by using systematic random sampling [23,24,25,26]. Hence 50 principal members/head of households visited the market were selected. A structured and semi-structured interview was administered to consumers. Qualitative and quantitative data analysis methods were involved. That is, the study used description of the facts, to show the

relationships of variables. The study used tables, graphs and charts for the descriptive information in order to make them easily understandable.

3. RESULTS AND DISCUSSION

3.1 Introduction

This section presents the results and brief discussion of the study as described in this section;

3.2 Consumers Reasons on the Consumption of Local Processed Food

Main products derived from sweet potato and consumed in the study were “*Michembe*” and “*Matobolwa*” [16]. Moreover these products are simple in making and require minimum cost in preparation as compared to preparation of flour or crisp. Furthermore, quality is an important factor of processed food and its importance is multifaceted. This is because not only consumers’ demands for high quality products but there are food standards with provide specific and legally binding requirements for certain processed food. Laws and regulations normally state that product must be of good quality and safe.

Cognisant, household income determines the purchasing power such that the higher the purchasing power the more the products purchased (Note that this may not be the case for inferior good). Variations were observed in income levels among the sampled households in the study areas in terms of hectares cultivated because majority of respondents were low income earners. These variations may partly be due to the differences in the amount of disposable income received by the households from the main sources of households’ income. Likewise in Fig. 2 shows that majority of producers own one to four parcels for sweet potato production 25.5%, 18.5%, 21.7%, and 20.1% respectively. Similarly, parcel size varies from 0.25 acre to 1 acre. This shows that although the crop is of vital important but the size and number of parcels cultivated is still small.

Personal observations and experience shows that levels of income and education have influenced the perception of products [27]. Other study by [28] argued that customer perceived value in Tanzania differ significantly from one processed food producer to another. Consumers are also willing to pay high for a product from a

certain producers even if the functional quality of the product does not support the price paid. This situation helps the processor to create the market or consumer segmentation. Satisfied customers are always reluctant to look for information from alternative suppliers.

3.3 Factors Influencing Consumer Purchase of Processed Food

Experience suggests that it is not necessarily that when an individual purchase a product will ultimately consume it. In contemporary society many factors such as influence of family members or market force such Television and radio advertisements can lead one to purchase a product. Hence in this survey it was sought to identify the factors influencing consumers' purchase of processed food. Table 1 below consumers mentioned attractive packaging (51%) and brand loyalty (12.1%) were the major factor for decision to purchase processed food products; other factors included advertisements, availability, price and shop loyalty as factors behind their decision to purchase processed food. It was further observed that only a few of processors have managed to develop some means for advertise their products. This is done through leaflets and contact cards. However, 90% of the surveyed consumers were not aware on the various products processed from sweet potato rather than eating in the morning as breakfast.

3.4 Consumption of Processed Sweet Potato

The mean consumption of processed sweet potato products was 184.71kg, the Max was 1600kg. The crop usually sustains most of the households with fewer household size and low food demand hence they have something to consume during the whole year and the crop plays an essential role in food security, especially in those regions prone to drought and with poor soils like Shinyanga and Kagera in Tanzania [29,30] (Table 2).

Table 1. Factors influencing consumer purchase of processed food

Factors	Percentage
Advertisements	10.5
Availability	10.8
Price	10
Shop loyalty	5.6
Attractive packaging	51.0
Brand loyalty	12.1

Other cost from farm clearing to transportation are as shown in Table 2. The crop rapidly is becoming a valuable source of cash income, as potatoes are increasingly used by food processing sector to meet the increasing demand of the fast food, snack and convenience food industries [9]. The increased demand for processed products is itself a result of growing urban populations, rising incomes, diversification of diets and the substantial less time required.

This data appealed that the produce is not able to sustain food need even for consumption purposes to lift the farmer to the next harvesting season because consumption is higher than what is harvested, hence it is common that majority of household becomes insufficiency in food. A household with food insufficiency offer their labour for other food or work for income as a coping mechanism; a situation that makes them becomes more vulnerable. However, poor and better-off farm households engage in off-farm commercial activities to reduce farming-related risks [31].

Table 2. Maximum, minimum and mean values

Variables	Data
Farm clearing	
Maximum	4128
Minimum	2
Mean	557.19
Cost of ridge preparation (TZS)	
Maximum	60000
Minimum	5000
Mean	23133.3
Seed costs	
Maximum	4000
Minimum	100000
Mean	18383.1
Cost of weeding(TZS)	
Maximum	70000
Minimum	5000
Mean	1443.44
Cost of harvesting (TZS)	
Maximum	50000
Minimum	6000
Mean	24709.68
Cost of transportation (TZS)	
Maximum	5000
Minimum	1000
Mean	1398.91
Quantity consumed (Kg)	
Maximum	1600
Minimum	1
Mean	184.71

3.5 Volume, costs of production, volume sold, price per unit, revenue and margins

As discussed earlier in this paper, processors were doing processing at small scale levels due to several factors. Flour was the main processed products that processor produce in at least larger quantity. Table 3 shows that processors bought 10 – 50 bags (50Kg each) of raw materials for processing. Similarly the sell an average of 1 to 25 packs of (0.5kg to 2kg) at TZS 3000 to 5500 per kg. Moreover, processor accrued TZS 50 000.00 to 2 250 000.00 per annum from the sales of flour leave alone other products which are very minimal (Table 3).

3.6 Rationale of Adding Value to Sweet Potato

As described earlier in this paper the crop is bulky and perishable hence value addition is necessary in order the country to enjoy from the crop. Farmers are normally used to be cheated by middle-men/hawkers. Sweet potato prices had drastically dropped due to a sweet potatoes glut in the market. The only solution to help farmers earn more was by adding value to the sweet potatoes. Farmers can have added value by making sweet potato powder (flour) that is used to bake biscuits, bread, cakes, cookies and sweet potato porridge [32].

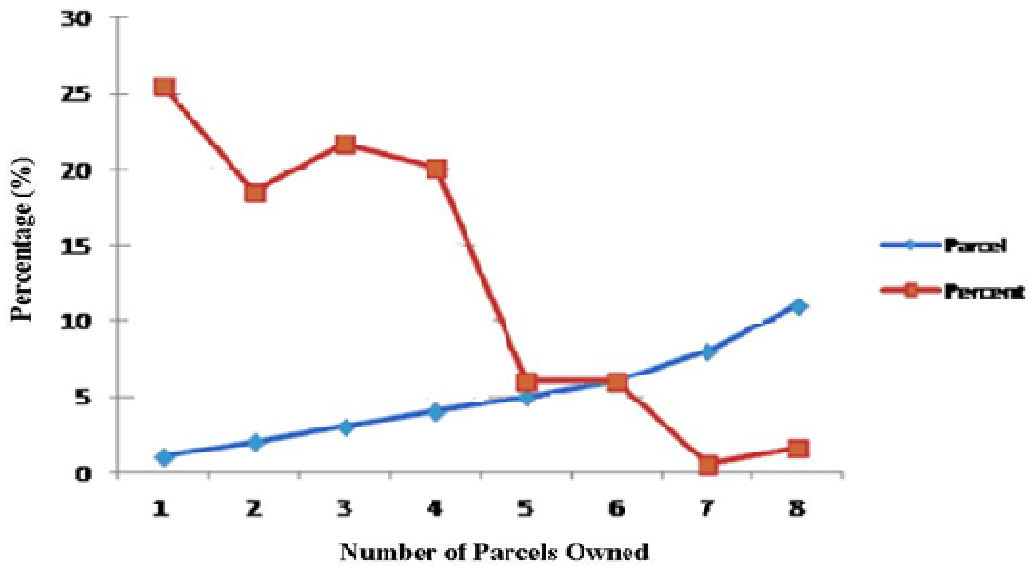


Fig. 2. Percentage distribution of number of sweet potato parcels owned

Table 3. Descriptive statistics for the volume, cost, price and margin of producing flour from sweet potato

Variable	Min	Max	Mean
Volume of Flour produced in 2012/13(Kg)	10	50	24.56
Cost of production (Tsh)	20 000	30 000	25 312.50
Volume sold in targeted market(Kg)	1	25	2.33
Price per unit sold(Tsh)	3 000	5 500	6122.22
Revenue accrued from sales of flour(Tsh)	300 000	750 000	612 222.22
Total Cost incurred in production of flour(Tsh)	100 000	875 000	512 222.22
Gross profit-flour (Tsh)	50 000	400 000	156 111.11

4. CONCLUSION

Although the study is confined to sweet potato sub-sector, it is believed that many of the issues examined in this study may be applicable to other roots and tubers crops and other parts of the country producing food crops. The sweet potato chain has a potential of becoming a business venture for the farmers however there is still a lot of work that need to be done to improve the marketing system from a traditional marketing system to value chain approach. The actors in the chain have not yet developed a relationship that will strengthen their chain. The chain is fragile and key players/actors are neither organized nor coordinated.

Sweet potato value addition in Tanzania still lagging behind even though the research carried out showed that sweet potato can be developed into various products. This idea of sweet potato processing seems to be more interesting, however, if mass production of sweet potato products is to be done, acceptance of these products on the market should be considered as the most important factor. Besides being a business enterprise sweet potato has a potential of solving the food security problems prevailing in Tanzania if production is done to its maximum potential level with enough inputs available. Commercial processing of sweet potatoes into baking flour can stimulate production of the crop, increase incomes, improve food and nutrition security and create employment opportunities, thereby helping to alleviate poverty in rural areas. This commercial processing can increase rural incomes through marketing of the raw material when the processing enterprise creates a local demand for sweet potatoes. Results of this study showed a possibility of producing other products from sweet potato other than “*Matobolwa*” and “*Michembe*” these could be flour and crisps that can be sold in the market in peri-urban and urban towns.

5. RECOMMENDATION

- The production of new processed products is of paramount important to develop newer uses/consumers of sweet potato in Tanzania.
- There should be quality standards governing sweet potato production and marketing in the local council crop production regulations

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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