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Consumer's Willingness to Pay for Selected Processed Orange Fleshed Sweet Potatoes (OFSP) in Morogoro Municipal Council Tanzania

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Abstract

Sweet potato is among neglected and underutilized staple crop in Tanzania. Despite being vitamin A rich, yet most of Tanzanians prefers other crops than sweet potatoes. In order to promote consumption of vitamin A rich sweet potato in Tanzania, value addition is critically needed. Therefore, this study was designed to determine willingness of consumers to pay for selected processed Orange Fleshed Sweet Potatoes in Morogoro region. The study used a cross sectional research design by involving 120 randomly selected consumers. Primary data were collected using self-administered questionnaires. Collected data were cleaned, coded and analysed with an aid of Statistical Package for Social Science (SPSS version 25). The analysis of collected data was aided with means, frequencies and binary logistic regression. Results showed that mean willingness to pay of TZS 4106.26 per kg for OFSP flour, TZS 1568.67 and TZS 1592 per one-quarter kg for OFSP bread (30%) and OFSP bread (20%) respectively and TZS 973.84 per one-tenth kg for OFSP biscuits. Logistic Regression analysis established that bid/price, education level, income, nutrients and packaging as the factors influencing significantly consumers' WTP for the OFSP products at $P < 0.05$ level of significance. Household size was found to influence WTP for OFSP flour and OFSP bread (30%) at $P < 0.05$ level of significance. Age and sex of respondents were also found to influence WTP for OFSP biscuits and OFSP flour at the same level of significance respectively. The study concluded with regards to consumers' willingness to pay for products made by OFSP, indicates great opportunity to be exploited on value addition. Therefore, there is a need to promote the identified opportunity to domestic and foreign

investors so as to enhance investment on value addition to OFSP.

Keywords

Willingness, Willingness to Pay, Orange Fleshed Sweet Potato

1. Introduction

Agriculture is the largest employer of labour in Africa, it is responsible for over half of export earnings and this means it has the potential to play a major role in the continent's development (Adekunle et al., 2012; Mdoe et al., 2022). The World Bank and the United Nations are among those who have pointed out that the agricultural sector can have the biggest impact on reducing rural poverty (Nkomo et al., 2014; Umeh et al., 2024) due to the labour force which is employed in the agricultural sector. Furthermore, Gakige et al. (2020) argued that Africa has the land and space for farm production to grow significantly, which counts in its favor. All these provide an opportunity for continent to develop because almost all resources necessary for development are available.

Population growth in Africa is occurring more rapidly than other regions of the world (Girard et al., 2021) and this means the agricultural products and food demand in general is also increasing. The increase in per capita incomes, higher urbanization and the growing numbers of women in the workforce stimulate greater demand for high-value commodities, processed products and ready-prepared foods (Low et al., 2020). Since agribusiness sector is an important catalyst for the development of efficient value chains, a contributor to improved product quality and safety and a provider of services that allow food to flow from production to consumption (Gabor et al., 2013; Nankumbi et al., 2023) then, as the rural inhabitants who are connected to infrastructure adopt more urbanized lifestyles, food consumption is becoming both more varied and more similar around the world (Annette et al., 2023).

Tanzania as one of the developing countries, its economy is still and will for a long time depend on agriculture. According to Mburu et al. (2020), agriculture in Tanzania is contributing to about 24.1 percent of GDP, 30 percent of export earnings and employs about 75 percent of the total labour force. Agriculture is still dominated by small-scale subsistence farmers and the major staple foods are maize, paddy rice and cassava while sorghum, wheat, millet and sweet potatoes are categorized as other staples (Mdoe et al., 2022). Tanzania ranks fifth in the world in terms of sweet potato (Ipomoea batatas Lam.) production and among the African countries, only Uganda and Nigeria produce more (Jones et al., 2012; Kagimbo et al., 2018). Tanzania is the second largest producer of sweet potato in East Africa with a total production of 1,322,000 MT of sweet potatoes (Kavoo et al., 2022).

Sweet potato is the third most important root and tuber crop after cassava and

Irish potato, and the crop is marketed and consumed in both rural and urban areas (Nhanala & Yencho, 2021). The crop is grown almost in all agro-ecological zones because of its hardy nature and broad adaptability, hence providing a sustainable food supply when other crops fail (Shumbusha et al., 2020). Sweet potato is the most important in the Lake Zone of Tanzania with a production of 330,600 tons/year, Southern Highlands Zone 271,000 tons/year, Eastern Zone 107,400 tons/year and Southern Zone 37,400 tons/year (Richard et al., 2023). As agriculture becomes more market-oriented, sweet potato is one of the several crops that farmers can produce to obtain cash income in addition to subsistence food security (Kibiki et al., 2020). However, for a long time in eastern and southern Africa, white fleshed sweet potato (WFSP) varieties that contain negligible amount of Vitamin A has been produced and consumed (Richard et al., 2023).

Research has been done to come up with orange fleshed sweet potato (OFSP) with high Vitamin A which reduces significantly the health problem which has been caused by vitamin A deficiency (VAD) in human body (Nankumbi et al., 2023). The adoption of orange fleshed sweet potato in Sub-Saharan Africa is expanding slowly and as stakeholders continue to provide education on opportunities available (States, 2021). However, expansion of adoption has to go hand in hand with the increased demand of OFSP consumption and one of the approaches for increasing consumption of the agricultural products including OFSP is through value addition (Nabay et al., 2020).

Majority of crops in Tanzania are marketed in their raw forms, losing opportunities for higher earnings and generating employment (Mmasa, 2013; Fortunatus et al., 2021). The main constraints facing the agro processing industry include high operational costs mainly because of high prices of imported fuel and spare parts, unavailability of appropriate processing machines and spare parts and limited knowledge in operation of the machines (Abong et al., 2021). All these in one way or another leads many farmers to sell their produce unprocessed leading to low prices. Agro processing has a tremendous potential for increasing income through value addition and increasing shelf-life of the processed products (Bao & Fweja, 2020). Thus, the establishment of Solartunda agro processing incubator at Sokoine University of Agriculture provides both opportunities for researchers and smallholders farmers to do research and learn respectively on value addition of agricultural products in order to meet the consumer satisfaction. However, there is dearth of information as to what extent consumers are willing to pay for products made by Solartunda. Therefore this study purposively aimed at understanding WTP for the OFSP products could play a very big role towards future demand prediction and thus increase the consumption of the nutritious crop.

1.1. Theoretical Framework

The study was guided by the consumer theory. In this theory, the rational consumer always seeks to maximize the utility under a given budget. Hence, the

choices of the products made by the consumer were based on the attached attributes to the product of which would make the consumer to get maximum satisfaction when consuming the product. Olynk et al. (2010) argued that random utility theory assumes that economic agents seek to maximize their expected utility, subject to the given choice set. Utility maximization is the objective of the decision process and leads to observed choice in the sense that the consumer chooses the alternative for which utility is maximal (Baltas & Doyle, 2001). Consumer preferences or choices on product depend on different characteristics. Since the analyst cannot observe all the factors affecting preference as they will lead to consumer acceptability and willingness to pay for a product, then those factors are treated as random variables. The relation $U_{ij} = V_{ij} + e_{ij}$ presents the utility function and is assumed to be composed of a deterministic component V_{ij} and a random component e_{ij}. The deterministic component can be measured, as this component is related to the alternatives in the choice set.

1.2. Empirical Review

1.2.1. Consumption and Value Addition of Orange Flesh Sweet Potato (OFSP)

Sweet potato is considered as neglected and underutilized staple crop in Sub-Saharan Africa (Cheboi et al., 2024; Low & Thiele, 2020; Okello et al., 2018). Despite being an important source of carbohydrate and vitamins yet, consumption rate is low. A study by Fortunatus et al. (2021) conducted in Tanzania, on quality assessment of Ugali blended with orange-fleshed sweet potato to alleviate vitamin A deficiency; indicated that adding value of OFSP by mixing up with maize flour in making Ugali is highly preferred by consumers. This mean that since consumption rate of OFSP solely is low, then it increase when combined with other staple crops like maize. This align with Cheboi et al. (2024) on a study conducted in Kenya, on consumer awareness, utilization, and acceptance of Orange-Fleshed Sweet Potato (Ipomoea Batatas (L.) Lam) value-added food products in Elgeyo Marakwet County. Results showed that consumption of OFSP in raw form such as boiled roots is low. This is due to low taste and preference. But, value addition of OFSP to chips, breads, pancakes, buns, yoghurt and others increase consumption rate. These results aligns with studies by Wafula et al. (2022) on a study titled proximate composition and vitamin a contribution of bio-fortified orange fleshed sweet potato value added products; Okello et al., (2021) on a study titled Quality and psychosocial factors influencing purchase of orange-fleshed sweet potato bread in Kenya; Owade et al. (2018) on a study titled Current Research in Nutrition and Food Science Production, Utilization and Nutritional benefits of Orange Fleshed Sweet potato (OFSP) Puree Bread: A Review.

Also a study conducted in Uganda by Mwanga et al. (2021) on development of a food product profile for boiled and steamed sweet potato in Uganda for effective breeding. Results showed that majority of consumers preferred processed OFSP than boiled sweet potato. This showed respondents in Uganda highly preferred value added OFSP products than traditional consumed sweet potato as also re-

ported by Tinyiro et al. (2018). Similarly, a study conducted in Nigeria, by Fetuga et al. (2013) on a study titled A survey of traditional processing of sweet potato flour for amala, consumption pattern of sweet potato amala and awareness of orange-fleshed sweet potato (OFSP) in South West Nigeria. Results of the study showed that respondents preferred flour made by orange fleshed sweet potato (OFSP). Therefore empirical shows that consumption rate of orange fleshed sweet potato (OFSP) remains low since consumers prefer processed products than raw potatoes. Hence, value addition to orange fleshed sweet potato (OFSP) is an attempt to promote consumption.

1.2.2. Willingness to Consume and Pay for Products Made of Orange Flesh Sweet Potato (OFSP)

Willingness to Consume and pay for products made by orange fleshed sweet potato indicates market potentials. The common products made of OFSP are breads, flour, biscuits and buns. Empirical shows there is high consumption rate of products made by orange fleshed sweet potato (OFSP). A study by Wangithi et al. (2023) on a study Consumer willingness to pay a premium for orange-fleshed sweet potato puree products: a gender-responsive evidence from Becker-DeGroot-Marschak experimental auction among low- and middle-income consumers in selected regions of Nairobi, Kenya. Study results showed that consumers were willing to pay a premium for products made by Orange Fleshed Sweet Potato (OFSP) such as buns, pancakes (Chapati) and breads. A study by Owuor et al. (2024) on assessment of consumers' preference for orange-fleshed sweet potato puree chapati: a case of rural and urban consumers in Kenya; showed that consumers were fully willing to consume and pay for chapatti (Pancakes) made of orange fleshed sweet potatoes. But, a study conducted in Rwanda by Bocher et al. (2019) on Investigating consumer preferences and willingness to pay for Orange-fleshed Sweet potato (OFSP) juice. Reported that consumers in Rwanda were willing to consume and pay for juice which is fully made by orange fleshed sweet potatoes (OFSP). This means that whenever sweet potato is added value increase consumers' willingness to consume and pay for the products. Literatures provide evidence that value addition is a better way to promote consumption of orange fleshed sweet potato. Therefore, it is also important to understand the consumers' willingness to consume and pay for products made by Solartunda in Morogoro Municipal council where this processor is located.

2. Methodology

2.1. Data and Collection Method

The study used primary data collected from 120 respondents through self-administered questionnaires. Collected data were cleaned coded and analysed by Statistical Package for Social Science (SPSS version 25). The study used descriptive statistics like means, frequencies, and logistic regression model to determine factors influencing willingness to pay for products made from Orange Fleshed Sweet Potatoes (OFSP).

2.2. Study Areas

The study was conducted in twelve (12) wards of Morogoro Municipal Council. These wards were selected since are adjacent to the location where Solartunda is located (Figure 1).

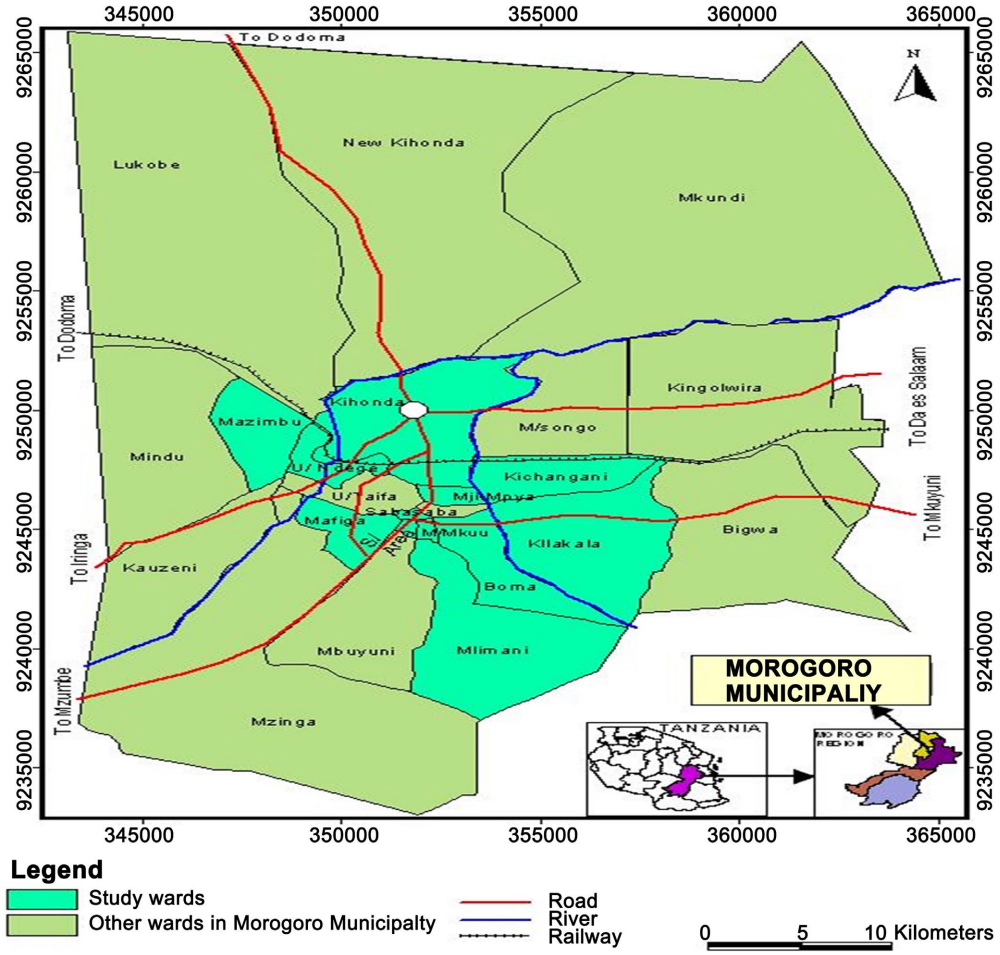

Figure 1. Morogoro municipal council's map showing study areas.

2.3. Analytical Framework

Based upon random utility theory, the utility that an individual I assign to some alternatives can be described as $U_{ij} = V_{ij} + e_{ij}$ where U_{ij} is unobservable, but true utility of alternative i. V_{ij} is observable component of utility, where in this case the stated amount in monetary terms by respondent to be paid to a specific product presented to him/her was treated as 1 and 0 for otherwise and e_{ij} is a random component or part of the utility which cannot be observed by the researcher and includes unobserved attributes, unobserved peculiarities of individual tastes and measurement errors (Klein et al., 2009). The following is the specific model employed binary logistic regression to analyze the indicated variables. The binary logistic regression analysis results provided the alpha (α) and rho (ρ) coefficients which was used to estimate the mean WTP using the relation in Equation (9).

$$V_{ij} = \alpha + \beta_1 \text{Price}_{ij} + \beta_2 \text{Packaging}_{ij} + \beta_3 \text{BrandName}_{ij} + \beta_4 \text{Colour}_{ij} + \beta_5 \text{Nutritional}_{ij} + \beta_6 \text{Flavour}_{ij} + \beta_7 \text{Texture}_{ij} + \varepsilon_{ij} \quad (1)$$

where $i = 1, 2, \cdots, 120$; and $j = 1, 2, 3$. Thus the index function which shows linearity in the price or bid B becomes

$$V = \alpha - \rho B \quad (2)$$

Hence, the probability density function for accepting the bid is expressed as

$$P(\text{WTP} = B) = e^v / 1 + e^v \quad (3)$$

While the probability density function for not accepting the bid is expressed as

$$G(B) = (\text{WTP} < B) = 1/1 + e^v \quad (4)$$

In the double-bounded contingent valuation, four outcomes or probabilities were expected after consumer has been presented with bids or price. The outcomes were yes-yes (yy), yes-no (yn), no-yes (ny) and no-no (nn) and consumer who accepts to pay B, WTP becomes greater than B and its probability is given as:

$$P(\text{WTP} > B) = \Pi^y(B) = 1 - G(B) \quad (5)$$

Thus, the four probabilities becomes as follows:

$$\Pi^{yy}(B_0, B_1) = Pr(\text{Max.WTP} \geq B_1) = 1 - G(B_1) \quad (6)$$

$$\Pi^{yn}(B_0, B_1) = Pr(B_0 \leq \text{Max.WTP} < B_1) = G(B_1) - G(B_0) \quad (7)$$

$$\Pi^{ny}(B_0, B_i) = Pr(B_i \leq \text{Max.WTP} < B_0) = G(B_0) - G(B_i) \quad (8)$$

By combining these probabilities from the four outcomes, the log-likelihood function becomes:

$$\ln(L) = \Sigma \left\{ d^{yy} \ln(\Pi^{yy}) + d^{yn} \ln(\Pi^{yn}) + d^{ny} \ln(\Pi^{ny}) + d^{nn} \ln(\Pi^{nn}) \right\}.$$

where d^{yy}, d^{yn}, d^{ny} and d^{nn} are binary variables with 1 = Occurrence of a particular outcome and 0 otherwise. Thus Mean WTP has been estimated using the following relation:

$$\text{Mean WTP} = \alpha / \rho \quad (9)$$

where α = Coefficient of intercept term and ρ = bid price.

2.4. Regression Analysis

A Logistic Regression model was used in testing factors assumed to influence willingness to pay for selected processed OFSP products among the interviewed respondents. The binary logistic regression was used to estimate the model that:

$$\text{WTP}(1,0) = \beta_0 + \beta_1 \text{Bid}_{ij} + \beta_2 \text{Age}_{ij} + \beta_3 \text{Sex}_{ij} + \beta_4 \text{Hhsize}_{ij} + \beta_5 \text{Education}_{ij} + \beta_6 \text{Income}_{ij} + \beta_7 \text{MaritalStatus}_{ij} + \beta_8 \text{Nutrients}_{ij} + \beta_9 \text{Packaging}_{ij} + \varepsilon_{ij}.$$

The description of the hypothesized variables with the expected signs is as shown in Table 1.

Table 1. Model variables and expected signs.

Variables	Measurement	Expected sign
WTP	1 = Willing to pay, 0 = Otherwise	
Bid/Price	Bid price stated by respondents (TZS)	+
Age	Years	+/−
Gender (sex)	1 = Male, 2 = Female	+/−
Household size	Number of household members	−
Education level	1 = Informal education, 2 = Primary education, 3 = O-Level, 4 = A-Level, 5 = Diploma, 6 = Higher education, 7 = Others	+
Income	1 = <100,000, 2 = 200,000 - 199,999, 3 = 200,000 - 399,999, 4 = 400,000 - 1,000,000	+
Marital Status	1 = Married, 2 = Single, 3 = Divorced, 4 = Widowed	+
Vitamin Knowledge	1 = Vitamin A, 2 = Don't know	+
Packaging	1 = Prefer packaging, 2 = Don't prefer packaging	+/−

3. Results and Discussions

3.1. Sweet Potato and Processed OFSP Consumption Behavior in the Last 12 Months

Study results showed that 93.3% of respondents agreed to have consumed sweet potato in the last twelve months while 6.7% of the respondents did not consume sweet potato in the same period. Since the high percentage of the respondents agreed to have consumed sweet potatoes, then it was an indication that the study targeted the right respondents. This could be an opportunity for orange sweet potato to be incorporated into their diets in order to reduce the prevalence of vitamin A deficiency significantly. However, 14.2% of the respondents had consumed processed OFSP products mainly roasted sweet potato while 85.8% of the respondents had not consumed the processed OFSP products within the same period (Figure 2).

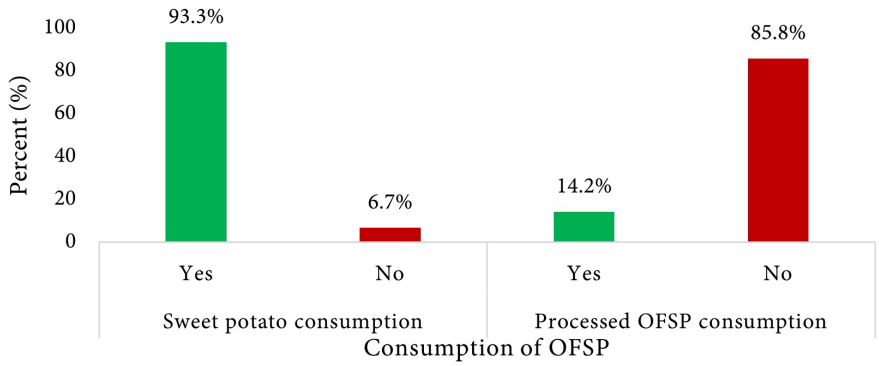

Figure 2. Sweet potato and processed OFSP consumption behavior in the last 12 months.

3.2. Products and Ingredients of Solartunda Processed OFSP

The OFSP flour is purely made from OFSP while the OFSP breads has different

composition: one has 30% of OFSP flour and the other has 20% of the OFSP flour with 70% and 80% of wheat flour respectively. Further OFSP biscuits has a composition of 30% of OFSP flour and 70% of wheat flour. Furthermore, the 4.2 kg of raw form of OFSP are required to produce 1 kg of OFSP flour. However, the price of 1 kg of raw OFSP is being bought at TZS350 while the transportation cost is TZS125 per 1kg of raw OFSP. Hence this shows that price per kg of raw OFSP is TZS475. From this information, the price of 4.2 kg of raw OFSP becomes TZS 1995. Since 1kg of OFSP flour is being sold at TZS 4000, then this indicates that it makes sense to produce OFSP flour rather than selling the raw form of OFSP.

Again, OFSP bread and OFSP biscuit, the composites are 70% wheat and either 20% or 30% of OFSP flour in bread and 30% of OFSP flour in OFSP biscuit. This means in average 0.35 kg and 0.15 kg of wheat and OFSP flour respectively are required to prepare 0.5 kg of OFSP bread while 0.07 kg of wheat and 0.03 kg of OFSP flour respectively are required to prepare 0.1 kg of OFSP biscuits. Hence, computations indicate that TZS 299.25 and TZS 187.5 are the price of raw OFSP and wheat flour respectively required to produce 0.5 kg of OFSP bread. Therefore, 0.5 kg of OFSP bread is valued TZS486.75 before being processed into OFSP bread.

Since the OFSP bread is being sold at TZS 1000, hence it makes sense to process the OFSP into OFSP bread. In case of OFSP biscuits, 0.126 kg of raw OFSP which is equivalent to the price of TZS 59.85 is required to be mixed with 0.07 kg of wheat amounted to TZS 87.50. Then this shows that 0.1 kg of OFSP biscuits before being processed could have been sold at TZS 147.35. This is still showing that it makes sense to process OFSP into OFSP biscuits as the processed OFSP biscuits are sold at TZS 1000 although the respondents showed the WTP in monetary value of TZS 973.84 (Table 2).

Table 2. Computation of processed OFSP products' ingredients.

OFSP product	Raw OFSP required	Price of raw OFSP per Kg	Transport cost of Raw OFSP per Kg	Total cost needed to produce 1 Kg of OFSP (B)	B + 10% of B	Market price of OFSP flour
Flour	4.2 Kg (1470)*	TZS 350	TZS 125	TZS 1995	TZS 2194.5	TZS 4000
OFSP product	**Raw OFSP in Kg required**	**OFSP flour in Kg**	**Wheat flour In Kg**	**OFSP flour In Kg**	**OFSP bread In Kg**	**OFSP biscuit In Kg**
Bread	0.855 (299.25)*	0.15	0.35 (187.5)*	None	0.5 (486.75)*	None
Biscuits	0.126 (59.85)*	0.03	0.07 (87.5)*	None	None	0.1 (147.35)*

Note: *The values in blackest are in Tanzania Shillings (TZS) and indicate the monetary value for the value in Kg written before the blackest.

3.3. Consumers' Satisfaction on Packaging of Processed OFSP Products

The view of the respondents on the way processed OFSP products presented to them were packaged was assessed in order to know whether there is a need for

improvement. Table 3 shows that 98.3% of the respondents were satisfied by the way the OFSP products were packaged while 1.7% of the respondents were not satisfied with the way the products were packaged. The reasons given by those who were not satisfied with package was that "similar products in the market place are better packaged than the way products presented to them were packaged". Hence in general the results show the majority of the respondents complied with the way the OFSP products presented to them had been packaged. The implication of these results is that the agro processing industry engaging in producing the three products should continue with the way those products are packaged.

Table 3. Consumers' satisfaction on packaging of processed OFSP products.

Response	Frequency	Percentage
Yes	118	98.3
No	2	1.7
Total	**120**	**100.0**

3.4. The WTP of OFSP Flour, OFSP Bread and OFSP Biscuits

The study results indicated that 95% of respondents (Table 4) who were asked "could they purchase the OFSP flour if had to be made available in the market place?", answered "Yes" while 5% of respondents answered "No". Hence, these results show that majority of the respondents could buy the OFSP flour if it is made available in the market place. It was also found that 99.2% of the respondents who were asked "could they purchase the OFSP bread (30%) if had to be made available in the market place?" answered "Yes" while 0.8% answered "No". Thus, these results signify that the majority of the respondents can buy the OFSP bread (30%) if could be made available in the marketplace. Additionally results show that 98.3% of the respondents who were asked "could they purchase the OFSP bread (20%) if had to be made available in the marketplace?" answered "Yes" while 1.7% answered "No" on the same question. Thus, these results imply that majority of the respondents can buy the OFSP bread (20%) if could be made available in the marketplace. Moreover, 95.8% of the respondents who were asked "could they purchase the OFSP biscuits if had to be made available in the market place?" answered "Yes" while 4.2% of respondents answered "No". Results shows that the majority of the respondents can buy the OFSP biscuits if could be made

Table 4. The WTP of OFSP flour, OFSP bread and OFSP biscuits.

Product Name	Response	%	Response	%
OFSP flour	Yes	95.0	No	5.0
OFSP bread (30%)	Yes	99.2	No	0.8
OFSP bread (20%)	Yes	98.3	No	1.7
OFSP biscuit	Yes	95.8	No	4.2

available in the market place. Generally, these results showed the respondents' WTP for the presented products is high and its implication is that the agro processing industry engaging in these products development should utilize that available opportunity by promoting the products, increasing production and ensure the consumers' satisfaction.

3.5. Consumer's Willingness to Pay for OFSP Processed Products

The information of WTP in monetary value from each respondent and to each OFSP product presented to the respondent was collected and the binary logistic regression was used to analyze Equation (1) in order to get the value of alpha (α) and rho (ρ). However, the market price attached by Solartunda processing unit which is operating under the School of Agricultural Economics and Business Studies (SAEBS) at Sokoine University of Agriculture was TZS 4000 per kg for OFSP flour, TZS 1000 per one-quarter kg for OFSP breads and TZS 1000 per one-tenth kg for OFSP biscuits as it was based on the production cost per unit and they were used as a reference in determining respondent's WTP in monetary value.

Basing on study findings, the mean WTP in monetary value for the four products was calculated and found to be TZS 4106.26 per kg, TZS 1568.67 per one-quarter kg, TZS 1592 per one-quarter kg and of TZS 973.84 per one-tenth kg as shown in Table 5. For the OFSP flour and OFSP breads the monetary value is little bit higher than the market price while in case of OFSP biscuits the WTP in monetary value is TZS 973.84 per one-tenth kg which is little bit low compared to its market price. The implication of these results is that respondents had a positive WTP to the products and this means the products will be purchased if are to be supplied in the market. This positive WTP for the OFSP flour and OFSP breads becomes consistent with previous studies in other countries done by Cerda et al. (2012) and Wangithi et al. (2023). However, mean WTP in monetary value for OFSP biscuits was calculated and found to be TZS 973.84 per one-tenth kg and since that value is less than the market price of TZS 1000, then it implies that if the product is to be available on the marketplace, it will not be purchased at the price of TZS 1000 instead it will be purchased at the price of TZS 973.84. Therefore, producer should think to reduce the production costs or any other costs such as logistics costs so that it can be sold at that price of TZS 973.84 while still providing the normal profit to the producer.

Table 5. Mean WTP in monetary value.

Parameters	OFSP flour	OFSP bread (30%)	OFSP bread (20%)	OFSP biscuits
Alpha (α)	−266.907	−243.144	−256.312	−172.37
Rho (ρ)	0.065	0.155	0.161	0.177
Mean WTP = α/ρ	**4106.26***	**1568.67***	**1592***	**973.84***

Note: *The value is in Tanzania Shillings (TZS).

3.6. Factors Influencing WTP for Processed OFSP Products

The study analysed factors assumed to influence WTP for three products namely, OFSP flour, OFSP bread (30%) and OFSP biscuits. Factors assumed to be influencing the WTP for the selected processed OFSP products include price, age of the respondent, sex of respondent, household size, education level of the respondent, income of the respondent, marital status of the respondent, color of the product, flavor of the product, taste of the product, knowledge on nutrition possessed by the product and packaging of the product.

3.6.1. Factors Influencing WTP for OFSP Flour

Results from binary logistic regression analysis (**Table 6**) shows that bid/price, household size, education level, income, nutrients knowledge and packaging are the factors which were found to significantly influence consumer WTP for OFSP flour in the study area ($P < 0.05$). However, bid/price was found to influence consumer's WTP negatively and it was consistence with the study by Adepoju and Oyewole (2013); Anyam et al. (2013), which imply that as the price of OFSP flour increases less is likely to be purchased. The same study by Adepoju and Oyewole (2013) indicated significance of education level of household head, income level of household head, nutrients knowledge and packaging of the product to influence households' WTP which is also consistently with this study. The age of the respondent was not significantly influencing consumer WTP for OFSP flour which is consistent with the study by Emunu et al. (2012) and marital status were not significantly influencing consumer WTP for OFSP flour. The general implication on OFSP flour might be a good product if targeted to smaller households with relatively more income as the price increments seems to affect WTP. Similarly, a study conducted in Kenya by Wangithi et al. (2023) low and middle income earners have higher willingness to pat for OFSP processed products than high income earners.

3.6.2. Factors Influencing WTP for OFSP Bread

Results from binary logistic regression analysis results for OFSP bread (30%). The bid/price, household size, education level, income level, nutrients knowledge and packaging of the products are significant factors influencing consumer WTP for OFSP products. These results imply that increase in price and household size have negative impact on the consumer WTP for the OFSP bread (30%) while other factors like education, raise of income, possessed knowledge on the nutrients of the product as well as the good packaging are motivating consumers to purchase the products. However age, sex and marital status from the results imply that the OFSP breads will be purchased regardless of consumer age, sex and marital status. But in this study, only the age of the respondents, sex of respondents and marital status were not significant in influencing consumer WTP for OFSP bread (30%) as shown on **Table 6** in line with (Wangithi et al., 2023).

3.6.3. Factors Influencing WTP for OFSP Biscuits

Results (**Table 6**) indicate the logistic regression analysis results for OFSP biscuits.

The bid/price, age of respondents, education level, income level, nutrients knowledge and packaging are factors that influence significantly consumers' WTP for OFSP biscuits in the study area. Although the income level is significant still its coefficient is negative. Since the coefficient for income variable was expected to be positive and because the coefficient is negative, then its implication is that as the consumers' income rises less of OFSP biscuits will be purchased. This compliments the consumer theory for inferior good. The description of consumer theory on inferior good is that as the income level rises; less of the inferior good is purchased. But the same theory describes that as the income level rises; more good is purchased if that good is a normal good. Thus apart from the concern noted on the survey from respondents about the small amount the OFSP biscuits' compared to other substitute packed biscuits available in the market, the negative coefficient could imply that OFSP biscuit is inferior to the consumer. Other factors such as sex of respondents, household size and marital status of the respondents were insignificant in influencing consumers' WTP for the OFSP biscuits. The implication of these results to the processor or factory is to increase a little bit quantity of the OFSP biscuits or low a price of the OFSP biscuits so that value of money is experienced by the consumer when purchasing the product. The study findings are consisted with the study done by Agyekum et al. (2014) on WTP for Faecal Compost by Farmers in Southern Ghana whose results showed that price, packaging as well as farmer's socio-demographic characteristics, such as monthly household income, household size and age also significantly influenced farmers' willingness to pay.

Table 6. Logistics regression analysis results for OFSP flour (n = 120).

Independent Variables	OFSP flour	OFSP bread	OFSP biscuits
	B	B	B
Price of a product	0.5060**	0.660**	0.770**
Age of a consumer	−0.004	0.113	0.981**
Sex of consumer	0.942	0.006	0.041
House hold size	−0.913**	−0.814**	−0.009
Education level	0.837**	0.432**	0.735**
Income per month	1.824**	0.864**	−0.58**
Marital status	0.18	0.003	0.408
Knowledge on vitamin of a product	0.450**	0.916**	1.973**
Packaging	0.980**	0.768**	0.654**
Constant	−2.593	−1.747	−1.712

**$P < 0.05$ or 5%.

4. Conclusion and Recommendations

4.1. Conclusion

The study results show that average costs used to make OFSP processed products, are equivalent to the similar products made of other by products. The price intended

to be set by product producers was almost the same for two products but was less for one product. Also, the intended prices of producers were also the same to prices charged by same products in other areas. The majority of consumers showed a high willingness to pay for OFSP processed products indicating high market opportunity. However, the study took into account one among four market mix. Since packaging is an important measure to promote market penetration, then results most of consumers were satisfied with package used by Solartunda to pack its products. But some of respondents were not satisfied by pointing the need to differentiate the products with substitutes. However, consumers showed a high willingness to pay for OFSP products which indicate high market opportunity. On the other hand, results from regression analysis portrayed factors that producers have to take into account when making OFSP processed products. Considering these factors may help to guarantee the market penetrations of OFSP processed products.

4.2. Recommendations

Based on study findings, it is then recommended that:

1) Improvement on ingredients by adding up more flavors and teste of OFSP processed products. This may help to improve consumer's satisfaction after using these products.

2) Mass production of three products by Solartunda agro-processing unit and distributed in the market place. However, the large production and distribution of OFSP products should go hand in hand with the promotion of the products in order to increase the consumer demand and awareness for the availability of the products in the market place.

3) Improvement on product packages by innovatively differentiating OFSP processed products with their substitutes. This may help to clearly differentiate the product from its substitutes.

4) Taking in to account prices that consumers are willing to pay in setting up market prices for OFSP processed products. Considering how much consumers are willing to pay for the product may help enhance intentions to purchase the products and be able to pay.

5) Product producers should consider the factors found to influence significantly the consumers' WTP. By considering factors which have been found to be significantly influence consumers WTP, may help producers to produce products which cope with values considered important by consumers. Therefore, may help to meet consumers preference and ultimately enhance market penetrations for OFSP products.

Conflicts of Interest

The study declares no conflict of interests.

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