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Entrepreneurial Skills Needed by Senior Secondary Agricultural Science Students in Processing of Cassava Roots for Self Reliance in Enugu State

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Abstract

The study focused on the entrepreneurial skills needed in the processing of cassava roots (tubers) for self-reliance by senior secondary agricultural science students. The study was carried out in Enugu State of Nigeria using a descriptive survey research method. One research question and one null hypothesis guided the study to achieve the purpose of the study. The null hypothesis was tested at 0.05 level of significance at the appropriate degree of freedom. The population of the study consisted of 380 respondents. There were no sampling because the population was manageable. Structured questionnaire was used for data collection made up of 44 items. The instrument was validated by three experts and Cronbach Alpha statistics was used to determine the internal consistency of the instrument and a coefficient of 0.71 was obtained. A total of 380 questionnaire were distributed and 362 were retrieved and analysed using weighted mean and standard deviation to answer the research questions and analysis of variance was used to test the null hypothesis. The findings of the study revealed among others that senior secondary agricultural science students need entrepreneurial skills such as peeling the cassava roots; washing; grating; press drying; sieving the dried dough; frying and spreading out to cool air to dry further in processing cassava roots into garri in Enugu state. The null hypothesis tested showed that the items in null hypothesis 1 were rejected. Based on these findings it was recommended that teachers of agricultural science should use more of demonstration and practical skills in delivering their lessons; regular field trips and excursion to established cassava enterprises should be organised for the students.

Introduction

Cassava plant is a perennial woody shrub that may be up to four meters high with edible roots. It belongs to the Genus Manihot of the natural order *Euphorbiaceae*. According to Anikwe, Onyia, Ngwu and Mba (2005), cassava probably originated from South America and was introduced into central Africa during the last part of the 16th century. Location and nature of soil do not affect the production of cassava. This is why there are many cultivars in each locality where cassava is grown. The cultivars are distinguished on the leave shape, size, plant height, flower, colour, tuber shapes, and earliness to maturity, yield and hydrocyanic content.

Cassava is the most important root crop grown in the tropics because of its adaptability to traditional farming and food systems, relative ease of cultivation and processing, year-round availability, low input requirement and relative high yield of food energy per calorie of labour input. International Institute for Tropical Agriculture (IITA, 2014), added that cassava is a major source of carbohydrate in tropical Africa as it serves as a stable food for human consumption, animal feed and starch industry. Cassava tubers deteriorates rapidly because the tubers form coumaric acids which are released about 15 minutes after harvesting causing the entire tubers to blacken 2-3 days after harvesting which makes the roots inedible. Therefore, cassava tubers should be processed immediately after harvesting to avoid tuber losses. Cassava roots (tubers) can be processed into chips, cassava pellets, industrial sweeteners, cassava fufu, alcohol etc.

Olaitan, Amusa, and Nwobu (2009), defines processing as the transformation of the raw product into other forms in which it can be stored or marketed. Ojo and Olatunji (2012), saw it as the conversion of agricultural produce to finished products that can be stored for longer period and have increased market value. In the context of this study, processing involves changing cassava roots (tubers) into various products (forms) so as to improve the palatability of cassava products, give them longer shelf life,and reduce their hydrogen cyanide (HCN) content.

Processing of cassava root demand specialised skills and proper organization, not only for the reason of profit making but also for the perishable nature of its products. Skills is defined as expertise, practice and proficiency displayed in the performance of a task (Miffilin, 2009). Skill does not depend solely upon a person's fundamental and innate capacities but must be developed through training, practice and experience. One of such skills needed in processing of cassava is the entrepreneurial skill.

Entrepreneurial skills according to Hisrich and Micheal (2002) is the ability to create something new with value by devoting the necessary time and effort, assuming the accompanying financial and social risks and receiving the resulting rewards of monetary and personal satisfaction and independence. Entrepreneurship involves the ability to set up a business enterprise as different from being employed. This ability according to Obi and Omeje (2010), involves the acquisition of skills, ideas, managerial competencies necessary for self-employment to propel and sustain wealth creation. With reference to this study entrepreneurial skill in processing of cassava roots is the ability of converting cassava roots into different products for generation of income for self-reliance.

Self-reliance is the ability of one to do or decide things by himself rather than depending on other people for help. For an individual to be self- reliant, he must have acquired and developed the right habits, attitudes and saleable skills with which he can explore his environment as well as means of surviving in the face of unemployment (Leghara and Mba, 2009). To be self-reliant in cassava processing involves the identification of entrepreneurial skills needed in processing of cassava roots into various productssuch as peeling, chipping, crushing, milling, slicing, or grating, dehydrating, fermenting, cooking, boiling or steaming.

In Enugu State which is the study area, processing of cassava roots into various products have helped in meeting the food demands of both human and animal alike. As a result, it has made processing of cassava products suitable for self-reliance by senior secondary agricultural science students. Senior

secondary agricultural science students are people who are very interested in studying agriculture at the senior secondary school and has enrolled in agricultural science. These group of students have passed the Basic Certificate Examination (BCE) in junior secondary school and are offering agricultural science as a vocational subject in the senior secondary level.

Agricultural science education according to Alawa, Abanyam, and Okeme (2010), is a programme of instruction systematically organised for learners to acquire knowledge, skills, and attitudes in various aspects of agriculture. It is the teachers of agricultural science that are charged with the responsibility of imparting agricultural knowledge skills and attitudes to students in the senior secondary schools. A teacher of agricultural science is one trained in both knowledge and skills as well as methodology of imparting these skills to the students in agricultural science. It is expected that these teachers will equip the students with adequate skills in agricultural science especially in processing cassava roots (tubers) into various products. For these teachers to improve their knowledge in agricultural science especially in cassava processing, they need the assistance of agricultural extension workers.

Agricultural extension workers are trained personnel employed by the government with the aim of disseminating new research information on the improved techniques of farming to farmers, helping them to improve on their farming skills and general welfare, as well as the development of leadership qualities in them (Ugwuoke and Ejifor, 2010). In Enugu State, agricultural extension workers would be of great help in identifying the entrepreneurial skills needed in processing cassava roots (tubers) into various products by senior secondary agricultural science students for self-reliance.

For senior secondary agricultural science students in Enugu State to possess entrepreneurial skills in various activities involved in processing of cassava roots (tubers), what they need to know and be able to do in order to become self-reliant after graduation from school need to be identified. This is because it is expected that senior secondary agricultural science students should acquire enough skills in processing of cassava roots (tubers) into various

products as contained in their curriculum to take up this enterprise in cassava production after graduation from school. Unfortunately, the teaching method mostly used in senior secondary school agriculture lay much emphasis on the theoretical aspect of processing cassava roots (tubers) and deprive the students of the practical knowledge that is needed in skill acquisition. This has contributed to most of these students roaming about the streets aimlessly, idling their time, planning and carrying out one crime or the other such as stealing, robbery, drug addiction and peddling while some migrate to the urban areas in search of good paid jobs that are not readily available. Incidentally if these youths were adequately trained to acquire skills especially entrepreneurial skills in processing of cassava roots (tubers) into various products, they will become self-reliant as quickly as possible after graduation from school.

The major purpose of the study was to identify entrepreneurial skills needed by senior secondary agricultural science students for self-reliance in processing of cassava roots (tubers) into various products in Enugu State.

Research Questions

The following research question guided the study:

1. What are the entrepreneurial skills needed by senior secondary agricultural science students for self-reliance in processing cassava roots (tubers) into various products in Enugu State

Hypothesis

The following null hypothesis was tested at 0.05 level of significance

H_{o1}: A significant difference do not exist in the mean ratings of the responses of extensions workers from Awgu, Enugu, and Nsukka agricultural zones of Enugu State regarding the entrepreneurial skills needed by senior secondary agricultural science students for self-reliance in processing of cassava roots (tubers) in Enugu State.

Research Method

The descriptive survey research was used to carry out this study. A survey research design is that in which generalizations are made over the entire population from an ample of a sample population (Uzoagulu, 2011). The

design was used because the researcher made use of questionnaire to collect data from the agricultural extension workers and teachers with degree teaching agricultural science in senior secondary schools on entrepreneurial skills needed in processing and cassava roots (tubers) into various products in Enugu State.

The study was conducted in Enugu State. Enugu State is made up of six agricultural zones namely Agbani, Awgu, Enugu, Enugu-Ezike, Obollo-Afor, and Udi. Enugu State is mostly grassland with scattered forests. The core of the state's economy is agriculture.

The population for the study comprised 380 respondents made up of 286 teachers of agricultural science with degree in senior secondary schools in Enugu State and 94 agricultural extension workers in the six agricultural zones in Enugu State. The entire population was used for the study because the population size was manageable, therefore no sampling was made.(Source: Statistics Unit Post Primary Schools Management Board, Enugu, 2016 and Statistics Unit Enugu State Agricultural Development Programme Office, Enugu, 2016).

A self-structured questionnaire item was used as instrument for data collection. The questionnaire contained a total of 44 structured entrepreneurial skill items generated from an extensive review of literature and information from cassava farmers in cassava production enterprises. Each entrepreneurial skill item had a four-point response scale of, Very Highly Needed (VHN)-4, Highly Needed (HN)-3, Moderately Needed (MN)-2, Not Needed (NN)-1.

The instrument was subjected to face validation by three experts from the Department of Technology and Vocational Education, ESUT. They validated the instrument to ensure the appropriateness of the measuring instrument and that the instrument was structured to address the purpose of the study. The comments of the validators were used to modify the final instrument used for data collection.

The reliability of the instrument was determined by using Cronbach Alpha reliability method to determine the internal consistency of the instrument. The coefficient reliability was 0.71.

A total of 380 copies of the questionnaire was distributed to the respondents with the help of three trained research assistants. These assistants were given orientation to assist the researcher in administering the instruments to the respondents. A total of three hundred and sixty-two copies (362) were properly filled and returned. The return rate was 95.26%. It was this 362 properly filled copies that was used for data analysis.

The data was analysed using weighted mean with standard deviation to answer the research questions. The analysis of variance were used to test the null hypothesis of no significant difference at probability level of 0.05. The analysis of variance was used to determine whether location of the agricultural extension workers affected their responses. The mean, standard deviation, and analysis of variance were presented on the same table for each research question. The decision was based using real limits of the mean thus:

Very Highly Needed (VHN) – 3.50-4.00

Highly Needed (HN) – 2.50-3.49

Moderately Needed (MN) – 1.50-2.49

Not Needed (NN) – 1.00-1.49

The null hypothesis was rejected if the F-calculated was less than the critical F-ratio, but accepted if the F-calculated exceeds the critical F-ratio.

Results

The results obtained from the data analysed were presented in tables below according to the research question and hypothesis that guided the study.

Research Question 1

What are the entrepreneurial skills needed by senior secondary agricultural science students for self-reliance in processing cassava roots (tubers) into various products in Enugu State?

Null Hypothesis 1

A significant difference do not exist in the mean ratings of the responses of extension workers from Awgu, Enugu and Nsukka agricultural zones of Enugu State regarding the entrepreneurial skills

needed by senior secondary agricultural science students for self-reliance in processing cassava roots (tubers) in Enugu State.

To answer this research question and null hypothesis, the results are presented in table one below:

Table 1: Mean ratings and analysis of variance of agriculture science teachers with degree and agricultural extension workers regarding the entrepreneurial skills needed by senior secondary agricultural science students for self-reliance in processing cassava roots-(tubers) in Enugu state.

SN	Entrepreneurial Skills Needed in Processing of Cassava	**Number of Respondents N = 362** N	X	SD	**Decision**	Agwu Zone N=13 X_1	SD	Nsukka Zone N=26 X_2	SD	Enugu Zone N=11 X_3	SD	F-Cal	F-tab	Decision
	Garri Processing													
1	Peel harvested cassava with knives or mechanical peelers	362	3.72	0.50	VHN	4.00	0.00	3.27	0.45	3.64	0.92	8.19	3.18	S
2	Wash the peeled cassava and pack in baskets to allow water to drain	362	3.71	0.53	VHN	4.00	0.00	3.46	0.51	3.36	0.50	8.28	3.18	S
3	Use mechanical graters (grating machine) to grate cassava root into pulp	362	3.56	0.63	VHN	4.00	0.00	3.42	0.50	3.45	0.69	6.59	3.18	S
4	Mix the pulp with red oil or leave it white	362	3.49	0.65	HN	3.00	0.00	3.46	0.51	3.36	0.67	3.99	3.18	S
5	Pack the grated cassava pulp into bags	362	3.51	0.69	VHN	4.00	0.00	2.42	0.50	3.55	0.52	7.58	3.18	S
6	Dewater the pulp by pressing using hydraulic presser or tying the bag with a rope and beams of wood	362	3.53	0.70	HN	4.00	0.00	3.50	0.51	3.36	0.67	6.29	3.18	S
7	Ferment for 2 - 3 days	362	3.40	0.80	HN	2.00	0.00	3.42	0.50	3.36	0.67	41.06	3.18	S
8	Sieve the dried cassava cake to remove the fibrous materials using coarse sieves	362	3.58	0.63	VHN	4.00	0.00	3.58	0.50	3.82	0.40	4.82	3.18	S
9	Fry (toast) the sieved cassava cake on metal trays or shallow pots fixed over fire place	362	3.55	0.70	VHN	4.00	0.00	3.50	0.51	3.82	.40	6.83	3.18	S
10	Toast or fry until grits/granules are crisp and dry	362	3.60	0.60	VHN	4.00	0.00	3.46	0.51	3.64	0.50	6.56	3.18	S
11	Cool the fried cassava grits/granules by spreading out on the floor or mat and pack the cooled garri into bags or rubber containers ready to be marketed	362	3.60	0.61	VHN	4.00	0.00	3.58	0.50	3.73	0.47	4.28	3.18	S
	Processing cassava roots into Fufu (Akpu)	362	3.68	0.53	VHN	4.00	0.00	3.42	0.50	3.82	0.40	9.53	3.18	S
12	Steep the washed cassava roots (peeled or unpeeled) into a pot, drum or rubber containers filled with water													
13	Allow the cassava roots in water for 3 - 5 days so as to ferment	362	3.64	0.56	VHN	4.00	0.00	3.54	0.51	3.64	0.50	4.89	3.18	S
14	Sieve the fermented roots with coarse sieve in water	362	3.69	0.53	VHN	4.00	0.00	3.61	0.50	3.55	0.52	4.28	3.18	S

15	Allow the semi-solid meal to sediment	362	3.62	0.58	VHN	4.00	0.00	3.23	0.43	3.55	0.69	12.97	3.18	S
16	Pack the sedimented semi-solid meal in clean bags	362	3.64	0.53	VHN	4.00	0.00	3.35	0.49	3.55	0.52	10.12	3.18	S
17	Squeeze tightly to expel excess water	362	3.66	0.58	VHN	4.00	0.00	3.58	0.50	3.73	0.47	4.28	3.18	S
18	Root the fresh fufu into large balls and market	362	3.53	0.68	VHN	4.00	0.00	3.62	0.50	3.64	0.67	3.03	3.18	S
19	Cook and pound the resulting white mass (fufu)	362	3.45	0.72	HN	4.00	0.00	3.50	0.50	3.64	0.50	5.65	3.18	S
	Processing cassava roots into chips or "Abacha"	362	3.61	0.59	VHN									
20	Boil the peeled or unpeeled cassava roots for 20 - 30 minutes					4.00	0.00	3.31	0.47	3.91	0.30	19.44	3.18	S
21	Allow to cool and slice the boiled cassava roots into small flat pieces using special grater or knife	362	3.60	0.59	VHN	4.00	0.00	3.42	0.50	3.55	0.52	7.58	3.18	S
22	Soak the sliced cassava roots for 12 - 14 hours	362	3.64	0.58	VHN	4.00	0.00	0.58	3.58	3.45	0.69	3.86	3.18	S
23	Wash for several times until it is clean	362	3.71	0.50	VHN	4.00	0.00	3.50	0.58	3.73	0.47	4.84	3.18	S
24	Spread chips under the sun to dry using wooven tray or mats	362	3.86	0.34	VHN	4.00	0.00	3.46	0.51	3.36	3.50	8.28	3.18	S
	Processing cassava roots into Starch													
25	Cut the cassava roots into pieces and put into pots or open drum of water to ferment for 2 - 3 days	362	3.60	0.55	VHN	3.00	0.00	3.35	0.49	3.45	0.52	4.01	3.18	S
26	Remove the partly fermented cassava roots in a basket to allow water to drain	362	3.63	0.55	VHN	4.00	0.00	3.42	0.58	3.55	0.69	5.26	3.18	S
27	Spread the partly fermented cassava roots in trays and sun dry	362	3.56	0.61	VHN	4.00	0.00	3.42	0.58	3.64	0.50	6.23	3.18	S
28	Dry to moisture content of 8 - 10%	362	3.62	0.57	VHN	4.00	0.00	3.50	0.58	3.64	0.50	4.63	3.18	S
29	Cool and pack them in bags and keep in a warm-dry place	362	3.54	0.63	VHN	4.00	0.00	3.46	0.51	3.45	0.52	7.19	3.18	S
30	Grind mechanically with milling machine	362	3.56	0.62	VHN	4.00	0.00	3.50	0.51	3.64	0.50	5.65	3.18	S
31	Sieve to collect smooth fine powdered cassava starch	362	3.52	0.68	VHN	4.00	0.00	3.35	0.56	3.73	0.47	9.18	3.18	S

32	Grate the cassava roots into fine pulp	362	3.52	0.62	VHN	4.00	0.00	3.46	0.51	3.71	0.47	7.01	3.18	S
33	Slurry is sieved to remove the fibrous materials	362	3.51	0.63	VHN	4.00	0.00	3.31	0.55	3.64	0.50	9.87	3.18	S
34	Allow the liquid starch milk to sediment	362	3.55	0.61	VHN	4.00	0.00	3.50	0.51	3.73	0.47	5.95	3.18	S
35	Wash the removed starch for three times and sediment	362	3.57	0.62	VHN	4.00	0.00	3.46	0.58	3.18	0.87	6.31	3.18	S
36	Sun dry and mill to produce cassava powder	362	3.56	0.59	VHN	4.00	0.00	3.65	0.49	3.73	0.47	3.07	3.18	NS
	Processing cassava roots into Alibo													
37	Peel the fresh cassava roots and soak in water for 2 - 3 days to ferment	362	3.62	0.59	VHN	4.00	0.00	3.38	0.50	3.55	0.52	8.73	3.18	S
38	Remove and put in a basket to drain and spread in trays and dry under the sun	362	3.54	0.61	VHN	4.00	0.00	3.54	0.51	3.45	0.52	5.96	3.18	S
39	Dry to moisture content of 8 - 10%	362	3.55	0.60	VHN	4.00	0.00	3.77	0.43	3.64	0.50	2.75	3.18	NS
40	Cut the peeled cassava roots into thin slabs	362	3.52	0.65	VHN	4.00	0.00	3.65	0.49	3.18	0.87	6.95	3.18	S
41	Dry the slabs in the sun	362	3.54	0.66	VHN	4.00	0.00	3.61	0.50	3.63	0.67	3.03	3.18	NS
42	Store the dried slabs	362	3.49	0.60	HN	4.00	0.00	3.23	0.43	3.36	0.67	13.49	3.18	S
43	When needed grind mechanically in a mortar	362	3.54	0.60	VHN	4.00	0.00	3.58	0.50	3.45	0.69	4.56	3.18	S
44	Stir the resulting flour in boiling water over a fire and a solid mass is formed	362	3.29	0.73	HN	4.00	0.00	3.54	0.51	3.45	0.52	**5.96**	**3.18**	**S**
	Grand Cluster Value	**362**	**3.57**	**0.60**	**VHN**	**3.90**	**0.00**	**3.47**	**0.65**	**3.57**	0.58	7.48	3.18	S

Note: VHN= Very Highly Needed; HN= Highly Needed; X= Mean; SD= Standard Deviation; S= Significant; NS= Not Significant

Table 1 shows that out of a total of 44 entrepreneurial skills that are needed for processing of cassava, 39 of them (items 1, 2, 3, 5, 6, 8 -18, 20 - 41, and 43) were identified by the respondents as being very highly needed (VHN) by senior secondary agricultural science students for self-reliance in processing of cassava in Enugu State. The remaining five skills, represented by items 4, 7, 19, 42 and 44 were identified as being highly needed by senior agricultural science students. A grand mean of 3.57, with standard deviation of 0.60, was obtained for 44 items, thereby showing that the itemised entrepreneurial skills are generally, very highly needed (VHN) by senior agricultural science students in Enugu State for self-reliance in processing cassava roots (tubers).

Further, **table 1** also shows that the calculated F-value, at .05 level of significance and 2 degree of freedom (between groups) and 47 degree of freedom (within group) for forty items ranges from 4.01 - 41.06 while the critical F-value is 3.18. The null hypothesis is therefore, rejected since the calculated value of F is greater than the critical F-Value. This decision implies that significant difference actually exists in forty items in the mean ratings of agricultural extension workers from Awgu, Enugu and Nsukka agricultural zones of Enugu State on the entrepreneurial skills needed by senior secondary agricultural science students for self-reliance in processing of cassava product. However, three (3) items showed no significant difference. The f-value calculated ranged from 2.75 - 3.07, f-value is 3.18. Therefore the null hypothesis of no significant difference is not rejected for these item.

Discussion of Findings

From the result of the study, it was found out that forty-four (44) enumerated entrepreneurial skills in processing of cassava roots into various products for self-reliance by senior secondary agricultural science students were generally perceived by agricultural science teachers and extension workers to be very highly needed by senior secondary agricultural science students in Enugu State. These findings are in agreement with Nwosu, (2008), who opined that to process cassava roots into garri, the following steps should be followed: peel the cassava roots; wash the peeled cassava roots; grate and pack in bags; press-dry the grated dough to squeeze out the water;

sieve the dried dough; add oil (optional) and fry; spread out doors to cool down and dry further; package in bags ready for market.

These findings are also in line with Onwueme, (1979) who identified the steps in processing of cassava roots into cassava fufu (Akpu) as: peel the cassava roots with knife; wash the peeled roots; steep the washed roots into a container and allow to stay for about five days until they are soft; sieve the fermented roots and allow to sediment; pack solid suspension in clean cloth bags; squeeze lightly to expel the excess water; package for sale or consumption.

Also, the finding agreed with the steps involved in processing cassava roots into chips or abacha by Nweke, (1994). These steps are: peel the cassava roots; boil the peeled roots for twenty to thirty minutes; slice the boiled roots into small felt pieces using a special grater; soak one night in water and then wash several times until it is clean, eat as wet chips or dry chips. The findings are also in line with the findings of Enwere, (1998) who outlined the steps involved in starch processing as: peel the cassava roots; wash the peeled and grate to obtain a fine pulp which is slurred in excess water; allow the liquid starch to sediment and then wash three times; allow to sediment again; dry and mill to produce cassava starch powder.

The null hypothesis tested showed that a significant difference existed in the mean ratings of agricultural extension workers from Awgu, Enugu, and Nsukka agricultural zones of Enugu State on forty (40) entrepreneurial skills needed by senior secondary agricultural science students for self-reliance in processing cassava roots. The disparity maybe in line with the opinion of Olatunji, (2004) that in garri processing, variety of cassava, location, period and method of preparation play an important role in determining the quality and level of acceptability of the product. This implies that the skills in processing the cassava roots may differ from one location to the other. However, four (4) items showed no significant difference in the mean ratings of the respondents. The reason for no significant difference maybe that their profession have not affected their mean responses.

Conclusion/Recommendations

Entrepreneurial skills is a practical thing; it is learned. Learners must be exposed to new ideas over a period of time and in a variety of ways before they begin to respond to them. Incorporating the identified entrepreneurial skills into the curriculum for senor secondary schools agricultural science program could provide the step by step entrepreneurial skill-oriented activities required to stimulate and direct students interest towards self-reliance in cassava production which will help alleviate poverty and improve sustainability in food production.

This study has therefore identified various entrepreneurial skills in which cassava roots could be processed and marketed which could make senior secondary students to be self-reliant. It was therefore recommended that:

1. Teachers of agricultural science should use appropriate instructional method such as the use of practical/laboratory, field and demonstrations in delivering cassava processing skills.
2. The government should provide schools with adequate facilities and equipment for processing cassava tubers.
3. Regularly field trips and excursions should be organised for agricultural science students to already established entrepreneurs and agricultural departments to widen their horizons by having the opportunity to see all these cassava processing skills been practiced.

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