



Agribusiness Concerns in large Scale Processing and Marketing of Melon in South-Eastern, Nigeria

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Abstract

Agribusiness is the buying and selling of Agricultural products or providing services such as in processing of crops or haulage of agricultural product from one place to another for the purpose of making money. In the area of the study, the use of technology is being intensified in the processing and marketing of Agricultural products such as melon. The acceptability by consumers of the processed agricultural products through technology is raising some concerns. The study aimed at determining strategies that could be utilized to reduce the concerns of consumers on the processed agricultural products through technology in order to make technological innovation effective and rewarding economically. To achieve the purpose of the study, two research questions were developed and answered by the study. Cross sectional survey research design was adopted for the study. The sample for the study was 317 consisting of 116 registered women melon processors, 102 marketers and 98 extension agent. A 26 item well structured questionnaire was developed from literature reviewed together with focused group discussion were used for data collection. The data collected were analyzed using exploratory factor analysis To group the identified strategies, principal component analysis with varimax rotation was adopted with factor loading of 0.40. Therefore, factor loading of less than 0.40 or variables that load in more than one factor were discarded. Only variables with factor loadings of 0.40 and above at 10% overlapping variance (Ashley, et.al 2006) were used in naming the factor strategies in this study to identify strategies for improving the processing and marketing of melon in South-Eastern, Nigeria. The study found out that (1). The concerns about the use of technology were real in the area of area of the study, the flavour of melon seed processed mechanically can be enhanced in South-East Nigeria through mechanical, maintenance and hygienic factors while that of neatness of melon seed processed mechanically can be enhanced in South -East Nigeria through hygiene, biological and handling/distributive factors. It was therefore recommended that Agricultural Extension Agents should utilized the identified skills with their corresponding factor loading in melon processing to make women melon processors improve in their processing of melon.

Key Words: Agribusiness Concerns, Large Scale, Processing, Marketing, Melon.



Introduction

Melon (egusi) *Citrullus lanatus* is one of the leguminous crop planted mainly in southeastern part of Nigeria. Ojiel, Oluba, Oguniowo, Adebisi, Dangbe and Orole (2007) explained that melon (egusi) originated from West Africa and a member of the cucurbitaceae family. There are two major varieties of melon favored in West Africa. The round brown seeded melon and the oval white seeded melon. Melon is a creeping annual herb, has hairy stems, forked tendrils and three lobed hairy leaves. Onyeike, Brande, Adam, Jamard and Azms (2012) stated that melon is a good source of amino acids such as arginine, vitamin B1, B2, niacin, tryptophan, and methionine and minerals such as zinc, iron, potassium, phosphorus, sulphur, manganese, calcium, lead chloride and magnesium. Also the author further stated that the seed of melon contains 50 and 30% oil and protein respectively. Melon fruits are collected when ripe and are processed from the pod to obtain the seed for sale or use.

Processing in melon is the removal of seed from melon fruit using manual processes. Kushwaha et al in Jackson, Adamade, Azogu and Oni (2013) and Adebisi (2004) stated that melon fruit are depodded, fermented, washed. Depodding and fermentation are carried out simultaneously as the pods are left on the field to rot for three to four days, after the pods are rotten and soft, the washing stage is then initiated. This was followed by the drying of the seeds using the open air drying system. The ambient temperature at the period of drying ranged from 30 to 32^oC (mean 31^oC) while the relative humidity fluctuated



between 65 – 68% (mean 67%). The dried seeds were then collected and sorted to remove bad and damaged seeds. Further processing for consumption take place at the market level, and this is accomplished through manual or mechanical procedures. This process is called decoustication.

Based on the expansion in the growing of melon and need for people, the manual processing (shelling) of melon seed on large scale now become inefficient, cumbersome and low income fielding to obtain the required supply of energy by present youth. Therefore mechanical processing becomes a suitable alternative.

The mechanical processing (shelling) melon is fast and can produce very large amount of melon seed (cotyledon) from the seed for the market, but experience reviewed that the market demand of mechanically processed melon by consumers was disappointing. The acceptability by consumers of the mechanical processed (shelled) melon is raising a lot of concerns. The concerns about the use of technology were real in the area of the study, flavor of the processed (shelled) melon were highly affected and the neatness of the processed melon were not guarantee. Mohammed in Shittu and Ndrika (2012) stated that most of the machines developed for shelling melon are efficiency but high seed damage.

Therefore the manual processed melon was still a high favorite. Based on this observations, women farmers are withdrawing gradually from the production of melon on commercial basis because of the low income received and the high resource input in terms of human and mechanical efforts.



The concerns of this paper are as follows:

- i. High income for melon farmer at the market level which can provide acceptable and sustainable net profit.
- ii. The nutritional benefit from melon for individual growth and development which should be sustainable.

The interest of the researchers are how to improve mechanical processing (shelling) of melon fruit on large scale in order to obtain commensurate profit, retain and sustain the farmers on the job.

- iii. Improving the flavour of melon seed processed mechanically
- iv. Improving the neatness of the processed seed
- v. Packaging the mechanical processed (shell) seed for quality

Method

This study made use of cross-sectional survey design. In the view of Hall (2013) cross-sectional design deals with collection of data to make inferences about a population of interest (universe) at one point in time. The author further stated that Cross-sectional surveys is described as snapshots of the populations about which data are gather. Nworgu (1991) equally stated that questionnaire, interview, observation or panel could be used for collecting date in cross-sectional survey design. Cross-sectional design is suitable for this study since questionnaire are developed from the literature and focuses group discussion by the researchers and were utilized to collect data from melon processors, marketers and extension agents that were considered to be representative of the entire groups.



The study was carried out in South Eastern Nigeria made up of Abia, Anambra Ebony Enugu and Imo State. South Eastern state is naturally endowed with good soil, adequate rainfall, optimal temperature and sunshine for melon production and women in rural area of these zones are interested and involved in melon production as a vegetable crop. Therefore, the area is considered very suitable for carrying out this study.

The population for the study was four thousand eight hundred and fifty (4850) made up of 580 registered women melon processors, 510 marketers and 490 extension agents. (ENADEP 2014).

The sample for the study was 317 consisting of 116 registered women melon processors, 102 marketers and 98 extension agents. Proportionate 20% stratified random sampling technique was used to select the sampling for the study. According to Gall, Gall and Borg in Uzoagulu (2011), 20% of the population of up to 1,000 could be sampled for a study. Multi-stage sampling technique was used to select two out of five states that make up south eastern Nigeria. Simple random sampling technique was adopted in selecting one Agricultural zone in each of the state, thus Enugu and Awka agricultural zone. In each of the zones simple random sampling technique was employed. in selecting 58 registered women melon processor, (51) women marketers and 49 extension agents in each of the states respectively.

The instrument used for data collection was twenty-four structured questionnaire skill items generated from review of literature and focus group discussion and was divided into two sections based on strategies for improving



the flavor and neatness of melon seed processed mechanically respectively. The response scale for the items was based on the 4 point rating scale of Strongly agree, agree, disagree and strongly disagree with their corresponding value 4,3,2,1 respectively.

The instrument was face validated by three experts. Two from the department of food science and technology University of Nigeria, Nsukka and one from women melon processors from Enugu State. The experts were requested to restructure and correct items that were wrongly written and eliminate all those that were irrelevant. Cronbach Alpha method was used to determine the internal consistency of the instrument. The Cronbach Alpha reliability co-efficient (r) of 0.72 was obtained.

The instrument was administered by the researcher with the help of three research assistants. The data collected were analyzed using exploratory factor analysis to identify strategies for improving the processing and marketing of melon in South-Eastern, Nigeria. To group the identified strategies, principal component analysis with varimax rotation was adopted with factor loading of 0.40. Therefore, factor loading of less than 0.40 or variables that load in more than one factor were discarded. Only variables with factor loadings of 0.40 and above at 10% overlapping variance (Ashley, *et.al* 2006) were used in naming the factor strategies in this study. The naming of each factor is based on the set of variables or characteristics in the component the factor is composed of (Kessler, 2006). The principal component factor analysis model for achieving the objective was given as:



$$Y_1 = a_{11}X_1 + a_{12}X_2 + \dots + a_{1n}X_n$$

$$Y_2 = a_{21}X_1 + a_{22}X_2 + \dots + a_{2n}X_n$$

$$Y_3 = a_{31}X_1 + a_{32}X_2 + \dots + a_{3n}X_n$$

$$\dots = \dots$$

$$\dots = \dots$$

$$Y_n = a_{n1}X_1 + a_{n2}X_2 + \dots + a_{nn}X_n$$

Where:

$Y_1, Y_2 \dots Y_n$ = observed variables/strategies for improving the processing and marketing of melon.

$a_1 - a_n$ = factor loadings or correlation coefficients.

$X_1, X_2, \dots X_n$ = unobserved underlying factors strategies for enhancing the processing and marketing of melon.

Result

The results of the study were obtained from the research questions answered and are presented in tables 1 and 2 below.

Research question 1

What are the strategies for improving the flavour of melon seed processed mechanically?

Table 1: Varimax Rotated Factors/Strategies for Enhancing the Flavour of Melon Seed Processed Mechanically in South east Nigeria.

SN	Observed Strategies / Variables	Factor 1: Mechanical factor	Factor 2: Maintenance factor	Factor 3: Hygienic factor
1	Wash and dry the machine before use	0.385	0.468	0.228
2	Leave the machine to dry after washing or clean the machine thoroughly	0.227	0.120	0.107
3	Use correct engine oil that will not allow smoke contamination to the melon	0.441	0.355	0.283
4	Service the engine regularly to prevent bad odour from the melon	0.283	0.575	0.253



5	Use the engine for one major job only	-0.451	0.269	0.230
6	Sun-dry the melon seed properly to avoid the growth of mold	0.365	0.215	0.050
7	Use clean material for collecting the shell seed	-0.368	0.225	0.435
8	Regulate the speed of the machine when processing to prevent oil or gas linkage	0.676	0.215	0.250
9	Winnor under normal atmosphere condition and package in air tight containers	0.257	-0.051	0.766
10	Containers for packaging should be free of any unfavorable flavor	0.224	0.206	0.541
11	Package in an air tight containers correctly label	0.053	0.252	0.104
12	Store processed melon in a normal room temperature	0.175	0.266	0.589
13	Market processed melon in a clean environment	0.183	0.684	0.399

Note: Factor loading of **0.40** was used at 10% overlapping variance.
Variables with factor loadings of less than **0.40** were not used.

Table 1 presented the varimax-rotated principal component factor analysis of strategic factors for enhancing the flavour of melon seed processed mechanically in South east Nigeria. From the result presented in the Table, one (1) factors were extracted based on the responses of the respondents. Only variables with factor loadings of 0.40 and above at 10% overlapping variance (Ashley, *et.al* 2006) were used in naming the factors while variables with factor loading of less than 0.40 were discarded. The naming of each factor is based on the set of variables or characteristics the factor is composed of (Kessler, 2006). This was equally adopted in this study to group the variables into three major strategic factors as; Factor 1 (Mechanical factor); Factor 2 (Maintenance factor) and Factor 3 (Hygienic factor). Under factor 1 (Mechanical factor), the specific strategy variables that can be employed for enhancing the flavor of melon seed processed mechanically in south-east Nigeria include: using correct engine oil that will not allow smoke contamination to the melon (0.441), using the engine for



one major job only (-0.451) and regulating the speed of the machine when processing to prevent oil or gas linkage (0.676).

Under factor 2 (Maintenance factor), the identified strategy include: wash and dry the machine before use (0.468), servicing the engine regularly to prevent bad odour from the melon (0.575) and marketing processed melon in a clean environment (0.684) while the specific strategy variables for enhancing the flavor of melon seed processed mechanically under factor 3 (hygienic factor) include: using clean material for collecting the shell seed (0.435), winnowing under normal atmosphere condition and package in air tight containers (0.766), containers for packaging should be free of any unfavorable flavor (0.541) and store processed melon in a normal room temperature (0.589).

**Research Question 2**

What are the strategies for improving the neatness of the melon seed processed (shelled) mechanically.

Table 2: Varimax Rotated Factors/Strategies for Improving the Neatness of Melon Seed Processed Mechanically in South east Nigeria.

SN	Observed Strategies / Variables	Factor 1: Hygiene factor	Factor 2: Biological factor	Factor 3: Handling/distributive factor
1	Processed only riped pod of melon	0.750	0.290	0.206
2	Keep to the normal fermentation period to prevent over fermentation to avoid germination.	0.398	0.530	0.291
3	Keep to the washing period to avoid melon seed soaking water	0.367	0.192	0.567
4	Wash melon seed thoroughly with clean water	0.522	0.334	0.302
5	Sun-dry melon under normal atmospheric condition	0.370	0.373	-0.283
6	Test for moisture content before processing	0.225	0.429	0.186
7	Remove stones and dirty before sending for shelling	0.228	-0.361	0.103
8	Shell melon appropriately with the correct machine	0.140	0.497	0.253
9	Keep the grinding machine clean to avoid impurities in the processed melon	-0.472	0.369	-0.219
10	Winnow immediately and package in an air tight container for sale	0.118	0.232	0.423
11	Wash and sun-dry processing equipment and tools before and after processing melon	0.204	0.081	0.230
12	Observe personal hygiene such as wearing apron, covering head and washing hands before processing	0.522	0.237	0.176
13	Market processed melon in a clean environment	0.335	0.111	0.660

Note: Factor loading of **0.40** was used at 10% overlapping variance. Variables with factor loadings of less than **0.40** were not used.

The data presented in table 2 showed that the strategies for improving the neatness of melon seed processed mechanically in south east Nigeria are grouped into three factors as Factor 1 (Hygienic factor); Factor 2 (Biological factor) and Factor 3 (Handling/distributive factor). Under factor 1 (Hygienic



factor), the specific strategy variables that can be employed for enhancing the neatness of melon seed processed mechanically in south-east Nigeria include: processing only riped pod of melon (0.750), washing melon seed thoroughly with clean water (0.522), keeping the grinding machine clean to avoid impurities in the processed melon (-0.472) and observing personal hygiene such as wearing apron, covering head and washing hands before processing (0.522).

The identified strategy under factor 2 (Biological factor) include: keeping to the normal fermentation period to prevent over fermentation to avoid germination (0.530), testing for moisture content before processing (0.429) and shelling melon appropriately with the correct machine (0.497) while the specific strategy variables for enhancing the neatness of melon seed processed mechanically under factor 3 (Handling/distributive factor) include: keeping to the washing period to avoid melon seed soaking water (0.567), winnow immediately and package in an air tight container for sale (0.423) and market processed melon in a clean environment (0.660).

DISCUSSION OF RESULT

This study found that the flavour of melon seed processed mechanically can be enhanced in South east Nigeria through mechanical, maintenance and hygienic factors. The specific strategies under these identified factors include: using correct engine oil that will not allow smoke contamination to the melon, servicing the engine regularly to prevent bad odour from the melon, marketing processed melon in a clean environment, store processed melon in a normal room temperature and winnowing under normal atmosphere condition and



package in air tight containers among others. In addition, the study found that the neatness of melon seed processed mechanically can be enhanced in South east Nigeria through hygiene, biological and handling/distributive factors. The specific strategies under these identified factors include: processing only riped pod of melon, washing melon seed thoroughly with clean water, keeping the grinding machine clean to avoid impurities in the processed melon, observing personal hygiene such as wearing apron, keeping to the normal fermentation period to prevent over fermentation to avoid germination, and package in an air tight container for sale and market processed melon in a clean environment among others.

The findings of this study on the strategic factors for enhancing the flavor of melon seed processed mechanically agreed with the findings of Weimer (2007) on improving the flavour of cheese where the author found that mechanical, physical and chemical factors significantly influence the processing of cheese flavor. In addition, the study also found that milk, salt and other ingredients have positive flavour effects on processed cheese. The findings of this study also corroborated that of FAO (2009) on meat and meat products in human nutrition in developing countries. The findings of the study showed that mechanical refrigeration and hygiene practices are important in processing and improving the flavor of processed meat products. Chilled" meat is hygienic and usually stored at temperatures around 1°C to +4°C when it keeps well. Oscar and Parker (2007) found that provided that the meat is kept very cool (1°C to 0°C) and that slaughter and meat cutting are carried out under strict hygienic



conditions, modern packaging techniques including storage under carbon dioxide or nitrogen or in vacuum can extend this period to about 10 weeks. The findings of this study on the factors for enhancing the neatness of processed melon supported that of Mahmud (2004) on socioeconomic factors influencing meat value chain in Kano State where the author found that hygiene, neatness and distributive approach are determinants of acceptability of meat products.

Conclusion

In South Eastern Nigeria, the concerns about the use of technology were real, flavor of the processed (shelled) melon were highly affected and the neatness of the processed melon were not guarantee. Seed moisture content was found to be the main predictor of shelling efficiency while speed uniquely predicts percentage seed damage. Well processed melon can yield a lot of income to farmers.

Recommendation

It was therefore recommended that:

1. Agricultural extension agents should utilized the identified skills with their corresponding factor loading in melon processing to make women melon processors improve in their processing of melon.
2. The Government through Agricultural Development Programme (ADP) should utilize the findings of this study to organize awareness training programme to all the farmers to enable them improve their process and marketing strategies to other related crops



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