

---

## ASSESSMENT OF SMALL-SCALE FARMERS' EDUCATION NEEDS IN TOMATO PROCESSING AND MARKETING FOR SUSTAINABLE DEVELOPMENT IN TARABA STATE, NIGERIA

\*Azuaga, C.I., Muftau, T., & Ismail, U.

Department of Vocational and Technology Education, Faculty of Education, Taraba State University, Jalingo

\*Lead/Correspondence Author's email: azuachia2010@yahoo.com

### Abstract

This study assessed the small-scale farmers' education needs in tomato processing and marketing for profitability and sustainable development in Taraba State. Descriptive survey research design was adopted. A population of 438 respondents comprising 315 small-scale tomato farmers, 61 tomato marketers and 62 Agricultural Extension agents was used in the study. A 45-item questionnaire was used as instrument for data collection. The instrument was divided into two categories of needed and performance. The needed category had a 4-point response option of highly needed (4), averagely needed (3), slightly needed (2) and not needed (1). The performance category equally had a 4-point response options of high performance (4), average performance (3), low performance (2) and no performance (1). To determine the farmer education needs of small-scale tomato farmers, the mean ( $X_n$ ) of the needed category were determined for each item, the mean ( $X_p$ ) of the performance category were also determined for each item, the performance gap (PG) was determined by finding the difference between  $X_n$  and  $X_p$  for each item. That is,  $PG = X_n - X_p$ . Where the PG is negative (that is,  $X_n < X_p$ ) it indicates that Farmer Education is Not Needed (FENN) whereas, where PG is positive (that is,  $X_n \geq X_p$ ), it indicates that Farmer Education is Needed (FEN). Findings revealed that most items in Table 1 had negative PG (that is,  $X_n < X_p$ ) indicating that farmers were already practicing some of these procedures for making tomato powder, and as such, farmer education was not needed (FENN). It was recommended that small-scale tomato farmers should be exposed to farmer education approaches to improve their production potential.

**Keywords:** small-scale farmers, education, tomato processing, profitability, marketing

### Introduction

Tomato (*Solanum lycopersicum L*) is a fruit vegetable that belongs to the family *Solanaceae* and produces edible fruit. The fruit, when ripe and mature, is reddish with the seeds enclosed in the fruit. It is an important vegetable that is widely produced globally including Nigeria, because of its attractiveness, nutritional value and its suitability in making stew and sauce in homes and canteens. It can be eaten in different forms, including raw as fruit, as salad or processed in various forms such as paste or puree, which can be cooked to form an accompaniment in savoury dishes (Obayelu *et al.*, 2014). According to Ugonna *et al.* (2015) opined that tomato has a short duration to produce and gives a high yield.

In a report by Sahel Capital (2017) and Faostat (2014), Nigeria has the largest area harvested for fresh tomato in Africa with 541,800Ha. However, despite Nigeria's giant strides in tomato production, half of the freshly harvested tomato, according to Mira *et al* (2014), is lost before reaching the market, and the remaining 50% is subject to significant downward pressure on price due to common gluts in the markets and the perishable nature of the crop. Sahel research (2015) reported that, about 40 – 50% of tomato produced in Nigeria is lost due to poor handling and processing. Processing is the transformation of a commodity into various products for storage or transportation to other locations. Tomato processing according to CTA (2007) is the process of transforming tomato in various forms. Ugonna *et al.* (2015) stressed that, processing of agricultural products generally is also meant to achieve better marketing of such products both locally and internationally.

Haruna *et al.*, (2012) sees agricultural marketing as encompassing all processes that take place from when the farmer plans to meet specified demands and market prospects to when the producers finally get it to the consumers. Marketing therefore, involves the movement of goods from the point of production to the point of consumption. Tomato marketing is therefore, the process of moving freshly produced or processed tomato from where they are produced or processed to the final consumers. Proper marketing strategies can also guarantee profitability.

Profitability by small-scale tomato farmers can be attained through increased yields, reducing post-harvest losses thereby overcoming seasonal price fluctuations. Obayelu *et al.* (2014) reported that, tomato marketing is profitable since most costs incurred are variable. Furthermore, in a study conducted by Shehu and Mohammed (2017), it was discovered that, costs and returns analysis indicated that tomato marketing was profitable. When small-scale farmers attain profitability, sustainable development can then be achieved.

Sustainable development according to Salami (2013) is the development for today without compromising the gains of tomorrow. Wey-Agbayangi in Akpan and Charles (2013) defined sustainable development as the ability of a nation to continuously produce internally, a very significant proportion of basic needs to feed its teeming population. In this context, sustainable development is the ability of tomato farmers, marketers and processors to continuously produce, process and market significant quantity of tomato to feed its teeming population all year round and also making a living out of it.

There is therefore, the need for an assessment of the strategies that could enhance the processing and marketing of tomato among small-scale tomato farmers can never be over

---

emphasized and this can be done through farmer education. Farmer education according Ezeagu and Ezema in Wombo and Azuaga (2016) is the form of education concerned with the development of skills in the field of agriculture to enable the recipient to improve productivity. Donye and Ani (2014) see farmer education as all educational opportunities that are made available for adult farmers living in rural farming communities. In this context, farmer education is the process of exposing small-scale tomato farmers to the rudiments of processing and marketing of tomato for profitability. This will improve the production capacity of small-scale tomato farmers to ensure a year-round supply of tomatoes and tomato products.

The theoretical framework for this study was anchored on Albert Bandura's Social Cognitive Theory (SCT), which postulated that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behaviour. The Theory applies to this study because the theory gives credence to the level of a person's confidence in his or her ability to successfully perform a behaviour. Furthermore, Rogers' Diffusion of Innovation Theory explains how an idea or program diffuses to a given population. The theory applies to the current study because, at the end of the study, the identified strategies shall be transmitted to rural farmers to improve their practice of tomato processing and marketing.

### **Statement of the Problem**

Tomato is an important vegetable that is widely produced globally, with Nigeria ranked high on the list of tomato producers. It is widely cultivated because of its attractiveness, potential for household income, nutritional value and its numerous uses in household meals. Tomato is consumed in many forms as well as used in preparing stew.

However, despite Nigeria's gains in tomato production, most of the freshly harvested tomatoes are lost before reaching the market. The quantity that finally gets to the market is sold by farmers at a giveaway price due to higher supply. The reasons for this could be largely due to the perishable nature of the crop and the poor handling and processing capability of the farmers. Despite the encouraging performance in tomato production, small-scale farmers in Taraba State are still handicapped in the processing and marketing of tomato in a manner that profitability can be attained.

Tomato is grown in commercial quantities in Taraba State with particular reference to Jalingo, Lau and Gassol Local Government Areas. However, processing activities are highly limited for tomato in Taraba State, thereby resulting in high wastages. There is a need for the adoption of alternative means of generating income by rural farmers who are among the

country's most vulnerable population. A sustainable tomato processing and marketing operation which is focused on continuous production can increase incomes for the participating smallholder farmers, hence the need for this study.

### **Objectives of the Study**

This study is aimed at assessing the small-scale farmers' education needs in tomato processing and marketing for profitability and sustainable development in Taraba State, Nigeria. Specifically, this study sought to:

- i. assess the strategies involved in the processing of fresh tomatoes by small-scale farmers in Taraba State
- ii. examine the marketing strategies for adoption by small-scale tomato farmers in Taraba State
- iii. determine the approaches to farmer education of small-scale tomato farmers in Taraba State

### **Research Questions**

- i. What are the strategies involved in the processing of fresh tomatoes by small-scale farmers in Taraba State?
- ii. What are the marketing strategies for adoption by small-scale tomato farmers in Taraba State?
- iii. What are the approaches to farmer education of small-scale tomato farmers in Taraba State?

### **Methodology**

A descriptive survey research design was used for the study. The justification for the choice of this design was based on the fact that data were collected from a large number of respondents on the strategies in educating farmers on the processing and marketing of tomato by small-scale farmers in Taraba State.

The study was conducted in Taraba State. The State is situated in the North-East geopolitical zone of Nigeria. It is bounded by the Republic of Cameroon, Benue, Adamawa, Plateau, Nasarawa and Plateau States. The state lies within the Guinea savannah region with a tropical wet-dry climate and moderate annual rainfall. The state played host to one of the major two rivers in Nigeria, the River Benue. The presence of the River Benue has provided a vast floodplain and FADAMA area, which has supported the production of different vegetable

crops, including tomatoes. Three Local Government Areas of Jalingo, Lau and Gassol shall be used for the study because of their high potential for tomato production.

The target population of 438 respondents, comprising 315 small-scale tomato farmers, 61 tomato marketers and 62 Agricultural Extension Agents from Jalingo, Lau and Gassol Local Government Areas of Taraba State, shall be used for the study. The entire population shall be used for the study since it is not too large to manage.

The instrument that was used for data collection was a 45-item researcher-developed structured questionnaire. The instrument covered the strategies involved in processing and marketing in addition to approaches to farmer education of small-scale tomato farmers in Taraba State. The instrument was divided into two categories of **needed** and **performance**. The needed category had a 4-point response options of highly needed (4), averagely needed (3), slightly needed (2) and not needed (1). The performance category had a 4-point response option of high performance (4), average performance (3), low performance (2) and no performance (1).

The instrument for data collection was validated by three experts from the Departments of Vocational and Technology Education of Taraba State University, Jalingo. The validates carried out both content and face validity. All observations by the validates were used to improve the research instrument.

A trial test of the instrument was conducted in Adamawa State, after which the Cronbach Alpha Formula was used to determine the internal consistency of the validated instrument. A reliability coefficient of .89 was obtained for the entire instrument, indicating that the instrument was reliable to consistently generate the required data for the study.

The instrument for data collection was administered to the respondents by the researchers and three (3) research assistants. The research assistants were adequately trained on how to administer and retrieve the instrument from the respondents. Four hundred and thirty-eight (438) copies of the instrument were administered to the respondents, and a total of three hundred and ninety-one (391) were successfully retrieved and coded for data analysis.

Descriptive statistics of mean and standard deviation were used to answer the research questions. To determine the farmer education needs of small-scale tomato farmers in processing and marketing, the following steps were taken: the mean ( $X_n$ ) of the needed category were determined for each item, the mean ( $X_p$ ) of the performance category were also determined for each item, the performance gap (PG) was determined by finding the difference between  $X_n$  and  $X_p$  for each item. That is,  $PG = X_n - X_p$ . Where the PG is negative (that is,

$X_n < X_p$ ), it indicates that Farmer Education is Not Needed (FENN), whereas where PG is positive (that is,  $X_n \geq X_p$ ), it indicates that Farmer Education is Needed (FEN).

## Results

**Table 1: Mean and Standard Deviation of respondents on processing of fresh tomato by small-scale tomato farmers (N-391)**

S/N	Item	$X_n$	$SD_n$	$X_p$	$SD_p$	PG ( $X_n - X_p$ )	Remarks
<b>Procedure for making tomato powder</b>							
1	Select tomatoes that are ripe	2.66	0.60	3.83	0.51	-1.17	FENN
2	Wash the tomatoes with clean water	2.00	0.51	3.66	0.37	-1.66	FENN
3	Slice the tomatoes into pieces	3.05	0.42	3.92	0.48	-0.87	FENN
4	Sun-dry the sliced tomatoes	3.50	0.30	2.58	0.83	0.92	FEN
5	Mill the dried tomato slice	3.16	0.65	3.26	1.09	-0.10	FENN
6	Sieve the milled tomato powder	2.55	0.92	3.50	0.39	-0.95	FENN
7	Package the powder in polythene bags	3.26	0.37	3.76	0.45	-0.50	FENN
8	Seal the bags using sealing machine	3.33	0.43	3.50	0.30	-0.17	FENN
9	Put the manufacture and expiry dates	2.16	0.30	3.16	0.65	-1.00	FENN
10	Store in a dry place	2.51	0.77	2.55	0.92	-0.04	FENN
<b>Procedure for making tomato pulp</b>							
11	Select tomatoes that are ripe and fresh	3.50	0.59	3.50	0.39	0.00	FENN
12	Wash the tomatoes with clean water	3.33	0.73	3.76	0.45	-0.43	FENN
13	Boil the tomatoes until they are soft	3.16	0.49	3.50	0.30	-0.34	FENN
14	Remove the boiled tomatoes to separate it from the boiled water	3.67	0.35	3.16	0.65	0.51	FEN
15	Mash the boiled tomato using pestle	3.43	0.44	3.16	0.65	0.27	FEN
16	Sieve the tomato to separate pulp from the seeds and skin	3.58	0.81	2.55	0.92	1.03	FEN
17	Put the pulp in closed container	2.39	0.57	3.26	0.37	-0.87	FENN
18	Keep the pulp in a freezer	3.11	0.61	3.33	0.43	-0.22	FENN

$X_n$  = mean of needed category,  $X_p$  = mean of performance category,  $SD_n$  = standard deviation of needed category,  $SD_p$  = standard deviation of performance category, PG = performance gap, FEN = Farmer education needed, FENN = Farmer education not needed, N = number of respondents

Results from Table 1 shows that, four (4) items had positive PG (that is,  $X_n \geq X_p$ ), indicating that farmer education is needed (FEN) whereas fourteen (14) items had negative PG (that is,  $X_n < X_p$ ) indicating that farmer education is not needed (FENN). A look at the standard deviation also shows that the respondents were not far from the responses of each other.

**Table 2: Mean and Standard Deviation of respondents on marketing strategies for small-scale tomato farmers (N=391)**

S/N	Item	X <sub>n</sub>	SD <sub>n</sub>	X <sub>p</sub>	SD <sub>p</sub>	PG (X <sub>n</sub> - X <sub>p</sub> )	Remarks
1	Register with tomato buyers and sellers association	3.33	0.48	3.40	0.59	-0.67	FENN
2	Carry out a market survey to enable you fix prices for your tomato	3.06	0.57	3.13	0.73	-0.07	FENN
3	Grade your tomato in different measures	3.00	0.49	3.11	0.49	-0.11	FENN
4	Fix prices for the different measures	3.52	0.43	3.67	0.35	-0.15	FENN
5	Establish link with wholesale buyers	3.49	0.29	3.43	0.45	0.06	FEN
6	Establish link with external sources for transfer of your products to other markets	3.50	0.73	3.52	0.71	-0.02	FENN
7	Advertise your product using available media	3.36	0.99	2.39	0.51	0.97	FEN
8	Identify available marketing agents	3.70	0.55	3.18	0.51	0.52	FEN
9	Supply your product to the market in bits to avoid glut	3.51	0.43	3.76	0.45	-0.25	FENN
10	Prices should be flexible considering the forces of demand and supply	3.49	0.32	3.50	0.30	-0.01	FENN
11	Keep detail records of income	3.49	0.73	3.10	0.65	0.39	FEN
12	Keep detail records of expenditure	3.36	0.79	2.25	0.92	1.11	FEN

X<sub>n</sub> = mean of needed category, X<sub>p</sub> = mean of performance category, SD<sub>n</sub> = standard deviation of needed category, SD<sub>p</sub> = standard deviation of performance category, PG = performance gap, FEN = Farmer education needed, FENN = Farmer education not needed, N = number of respondents

Results from Table 2 shows that, four (4) items had positive PG (that is,  $X_n \geq X_p$ ), indicating that farmer education is needed (FEN) whereas eight (8) items had negative PG (that is,  $X_n < X_p$ ) indicating that farmer education is not needed (FENN). A look at the standard deviation also shows that the respondents were not far from the responses of each other.

**Table 3: Mean and standard deviation of respondents on approaches to farmer education of small-scale tomato farmers (N=391)**

S/N	Item	X	SD	Remarks
1	Structure tomato processing and marketing into modules	3.61	0.61	Needed
2	State the objectives to be achieved at the end of each module	3.82	0.34	Needed
3	Assemble the instructional materials	3.50	0.48	Needed
4	Identify the suitable methods for the training	3.10	0.85	Needed
5	State the needed instructions clearly	2.58	0.36	Needed
6	Itemize the study activities for the trainees	3.00	0.41	Needed
7	Provide reporting format	2.98	1.11	Needed
8	Select the trainees	3.22	0.77	Needed
9	Brief the trainees on the modus operandi	3.30	0.56	Needed
10	Provide the trainees with training materials	2.52	0.75	Needed
11	Provide a schedule of activities	2.83	0.49	Needed
12	Develop appropriate evaluation procedures	2.91	0.85	Needed

13	Assess the performance of trainees	2.78	0.36	Needed
14	Provide the trainees information on their performance	3.02	0.41	Needed
15	Issue the trainees certificate of attendance	2.91	1.11	Needed

X = mean of respondents, SD = standard deviation of respondents, N = number of respondents

Findings from Table 3 showed a mean value ranging between 3.80 to 2.52, indicating that the respondents are unanimous in their opinion that all 15 items represent the approaches to farmer education of small-scale tomato farmers. The standard deviation value, ranging between 1.11 to 0.34, indicates the closeness in the opinions of the respondents. This is supported by Abu, Alumunku and Tsue (2011) who opined that one of the major reasons for low productivity in agriculture all over the world has been ascribed to the inability of farmers to fully exploit the available technologies, resulting in lower efficiencies of production.

### Discussion of Findings

The findings of the study in Table 1 highlighted the processing procedures of tomato to include: selection of ripe tomatoes, washing with clean water, slicing the washed tomatoes into pieces, among many others. The findings agree with Okwori et al. (2016) who highlighted the procedure for making tomato powder and pulp to include; selecting ripe tomatoes, washing, cutting the tomatoes into slices 0.5 cm thick, sun-dry by spread the sliced tomatoes, milling the dried tomatoes using a dry mill, sieving using fine sieve to obtain fine tomatoes powder/flour, package and seal in plastic bags, airtight jars or other suitable containers and store in cool dry place among many others. Alternatively, Okonkwo (2020) see sun drying of tomato fruits by exposing the fruit to the sun, which helps dry up the water in the fruits, making pests and diseases attack difficult; the author describes sun drying as very important. Since no expenses are incurred in the process of preserving tomato fruit.

The findings of the study in Table 2 highlighted the marketing strategies needed by small-scale tomato farmers to achieve sustainable development. The strategies found in this study include: Registration with the tomato buyers and sellers' association, conducting market surveys to fix prices for tomato products, establishing links with external sources for transfer of tomato products to other markets, among many others. The findings are in agreement with the opinion of Awafo (2011), who asserted that tomato farmers should adopt formal marketing strategies which include advertising in both electronic and print media in addition to building trade ties with the traders to ensure continuous patronage of their produce.

The findings of the study in Table 3 highlighted the farmer education approaches for small-scale tomato farmers to attain sustainability. These approaches, as revealed by the study,

include: Structuring tomato processing and marketing into training modules, stating the objectives to be achieved at the end of each module, assemblage of the instructional materials, identification of suitable methods for the training among many others. This is supported by Abu, Alumunku and Tsue (2011) who opined that one of the major reasons for low productivity in agriculture all over the world has been ascribed to the inability of farmers to fully exploit the available technologies resulting in lower efficiencies of production. Farmer education by way of improving farmers capacity is important to attain to higher level. Nweke (2021) Improvement in the contest of this study, is the normal skills addition in order to enable rural small tomatoes farmer, production be in abundant and remove scarcity of the fruit. Furthermore, the need for farmer education is justified by Ijere in Abolusoro *et al.* (2014) who revealed that for sustainable agricultural production to take place, informal education and training must be made a priority.

### **Conclusion and Recommendations**

Tomato is an important vegetable that is widely produced globally with Nigeria because of its attractiveness, potentials for household income, nutritional value and its numerous uses in household meals. However, despite Nigeria's gains in tomato production, most of the freshly harvested tomatoes are lost before reaching the market due to poor processing. Findings from the study revealed that farmer education was needed in some areas of tomato processing and marketing. It was therefore recommended as follows:

1. Farmer educators should educate small-scale tomato farmers on the strategies for processing fresh tomatoes to reduce post-harvest losses
2. Farmer educators should educate small-scale tomato farmers on marketing strategies such as advertisement and financial record keeping.
3. Farmer educators should expose small-scale tomato farmers to farmer education approaches to improve their production potentials.

### **Acknowledgements**

The authors sincerely acknowledge the support of TETFund in carrying out this research.

### **References**

- Abolusoro P. F., Ogunjimi S.I and Abulosoro S.A (2014). Farmers' perception on the strategies for increasing tomato production in Kabba-bunu Local Government Area of Kogi State, Nigeria. *Agrosearch*, 14(2):144-153

- Abu, O., Alumunku, M. & Tsue, P.T. (2011). Can Small-scale Tomato Farmers Flourish in Benue State, Nigeria? *Journal of Agricultural Sciences*, 2(2), 77-82
- Adepoju A. O. (2014). Post-harvest losses and welfare of tomato farmers in Ogbomosho, Osun State, Nigeria. *Journal of Stored Products and Postharvest Research*, 5(2), 8-13
- Akpan, O.N. and Charles, C.I. (2013). Re-engineering business education for wealth creation and sustainable development. *Nigerian Vocational Association Journal*, 18(1), 290 – 300
- Awafo, S. (2011). *An assessment of the marketing strategies of tomato farmers in Ghana: a case of Upper East region*. An unpublished Master of Business Administration (MBA) thesis submitted to the Department of Marketing and Corporate Strategy, Kwame Nkrumah University of Science and Technology (KNUST).
- Donye, A.O. & Ani, A.O. (2014). Policy Issues on Agricultural Extension Practices and the Transformation of Adult-farmer Education in Nigeria. *Am. J. Soc. Mgmt. Sci.* 5(1): 11-18
- Food and Agriculture Organization (FAO) (2014). Agricultural data FAOSTAT.
- Haruna, U., Sani, M. H., Danwanka, H. A. and Adejo, E. (2012). Economic analysis of fresh tomato marketers in Bauchi metropolis of Bauchi State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment*, 8(3):1-8
- Mira, M., Nike, L., Jared, W. and Shane, K. (2014). *Tomato Jos*. Retrieved from [www.tomatojos.net](http://www.tomatojos.net)
- Nweke, F.A. (2021). *Agricultural Development plans and policy*. Anambra, Cap. Publisher.
- Obayelu, A.E., Arowolo, A.O., Ibrahim S.B. and Croffie A.Q. (2014). Economics of fresh tomato marketing in Kosofe Local Government Area of Lagos State, Nigeria. *Nigerian Journal of Agricultural Economics (NJAE)*, 4(1), 58-67
- Okonkwo, S.O. (2020). Dry season vegetable production techniques among women in the Northern-Agricultural zone in Adamawa state. *International Journal of educational research*, 8(23-35).
- Okwori, E., Dikko, H. & Chindo, H. (2016). Tomato processing and utilization. *Extension Bulletin No. 241*, 30.
- PricewaterhouseCoopers (2018). X-raying the Nigerian tomato industry: focus on reducing tomato wastage. Pp.16
- Rogers, E. M. (1962). *Diffusion of innovations (1<sup>st</sup> ed.)*. Free Press of Glencoe.
- Sahel capital (2017). The Tomato Value Chain in Nigeria. *Sahel Capital Agribusiness Managers Limited*, 15, 1-8
- Salami, L.I. (2013). Challenges of technical vocational education and training in ICT era: teachers' role, where we are now, where we are headed and where we must be towards

capacity building for sustainable development. *Nigerian Vocational Association Journal*, 18(1), 1–10

Shehu, A. S. and Mohammed, A. S. (2017). Economic analysis of tomato marketing in Ilorin metropolis, Kwara State, Nigeria. *Journal of Agricultural Sciences*, 62(2), 179-191

Starke Ayres (2014). Tomato production guideline. Retrieved from [https://www.starkeyayres.co.za/com\\_variety\\_docs/Tomato-Production-Guideline-2014.pdf](https://www.starkeyayres.co.za/com_variety_docs/Tomato-Production-Guideline-2014.pdf)

Technical Centre for Agricultural and Rural Cooperation (CTA) (2007). Processing tomatoes. *CTA practical guide series, 12*, Wageningen, The Netherlands

Tsado, E.K. (2016). The best source of compost for tomato production: a study of tomato production in Niger State, Nigeria. *European Journal of Agriculture and Forestry Research*, 4(2), 50-59

Ugonna, C.U., Jolaoso, M.A. and Onwualu, A.P. (2015). Tomato Value Chain in Nigeria: Issues, Challenges and Strategies. *Journal of Scientific Research and Reports*, 7(7), 501-515.

Wombo, A.B. and Azuaga, C.I. (2016). Utilization of non-conventional animal protein sources for improved human nutrition and Farmer Education in Taraba State. *Scholarly Journal of Agricultural Science* 6(5), 148-155.