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Determinant Post Harvest Losses among Tomato Farmers in Imeko-Afon Local Government Area of Ogun State, Nigeria

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Abstract - Food supply can be induced either by increase in production or reduction in loss. Many post harvest losses are direct result of factors such as high field temperatures on crops before harvesting, pests and diseases attack etc, hence increase in the losses after harvest. The study area is Imeko Afon Local Government Area of Ogun State. Purposive sampling technique was employed in selecting 88 respondents and administering the questionnaire, and 88 were used for analyzing the data. Results on socio-economic characteristics revealed that, majority of the farmers (69%) fell into the active workforce and they had farm sizes ranging from 1-5hectares. Larger percentage of the farmers had an education below secondary level (83%).Majority of the tomato farmers had household size greater than 33% and 68% of the farmers had less than 16 years experience in tomato production. About 72% make use of van/pick up in transporting their produce from the farm to the market. No storage facilities were used in the study area to preserve the fruits from rotten after harvesting as at the time of study. The average gross margin with post harvest losses (9,251.41) is less than the average gross margin when no damage occurred in the fruits (72,752.55), thus showing that post harvest losses reduce the mine of farmers in the study area. All the independent variables tested on the dependent variable (Quantity of fruit loss) tested were significant at 5%. The effects of post harvest losses in the study area leads to wastage of the products and tend to frustrate the efforts put into production and their income on the produce.

Keywords : *Post - harvest, Income, Gross-Margin, Losses*

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I. INTRODUCTION

Fresh fruits and vegetables are very important sources of vitamins that are essential for healthy human diet. The quality and nutritional value of fresh produce is affected by post harvest handling and storage condition. {Sablani et al, 2006}. Vegetables are usually harvested when the plant is fresh and high in moisture and are thus distinguished from field crops, which are harvested at the mature stage for grains, pulses, oil seeds or fibre. This high moisture of vegetable makes their handling, transportation and marketing a special problem particularly in the tropics.

Tomato is a major vegetable crop that has achieved tremendous popularity over the last century. It is grown in practically every country of the world in

outdoor fields, greenhouses and net houses. Tomato belongs to the *solanaceae* family. This family also includes other well known species such as potato, tobacco, pepper and egg plant. Tomato has its origin in the South American Andes. {Naika et al, 2005}. The tomato plant is very versatile and the crop can be divided into two categories; fresh market tomatoes, which we are concerned with and processing tomatoes, which are grown only outdoors for the canning industry and mechanically harvested. World production and consumption have grown quite rapidly over the past 25 years. Tomato is one of the most important vegetables worldwide. World Tomato production in 2001 was about 105 million tons of fresh fruit from an estimated 3.9 million hectare. {Naika et al, 2005}. Tomato contributes to a healthy well balanced diet. They are rich in minerals, vitamins, essential amino acids, sugars and dietary fibres. Tomato contains much vitamin B and C, iron and phosphorus. Tomato fruits are consumed fresh in salads or cooked in sauces, soup and meat of fish dishes. They can be processed into purees, juice and ketchup. Canned and dried tomatoes are economically important processed products. Tomato has become an important cash and industrial crop in various parts of the world. One of the reasons for this increases is that tomato cultivation is now being moved to places and seasons that are originally unsuitable for its productivity thereby resulting in an increase in the economic importance of the crop. {Bodunde et al 1993}.

Tomato is cultivated almost throughout the country but the areas of high concentration lie in the northern and south-western parts of Nigeria. In southern Nigeria, tomato is cultivated in small holdings under rain fed conditions while in northern Nigeria; it is grown extensively under irrigation.

The deterioration of the product starts during the harvesting operations, because fresh fruits are inherently perishable. The more carefully a product is handled, the slower the deterioration process during subsequent handling operations. The causes of tomato losses included physical damage during handling, and transport, physiological decay, water loss, or sometimes simply because there is a surplus or glut in the market and no buyer can be found (FFCT, 1993).In developing countries like Nigeria, storage, packaging, transport and handling techniques are practically non-existent with

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perishable crops and so, this allows for considerable losses of produce. Thus as more fresh fruits are needed to supply the growing population areas and as more commodities are stored longer to obtain a year round supply, post harvest loss prevention technology measures become paramount. The losses of quality and freshness of the produce could also be due to improper temperature management, drying of the product, mechanical injury, attacks by bacteria and fungi. These losses can therefore lead to decrease in the returns of the farmers. The main objective is to determine the factors leading to post harvest losses among tomato farmers in Imeko-Afon Local Government Area. The specific objectives are:

- 1) To determine the socio economic characteristics of tomato farmers in the study area.
- 2) To ascertain the causes of the losses of tomato in the study area.
- 3) To determine the effect of the losses on the income of tomato farmers in the study area.
- 4) To examine the adopted preservative methods used by tomato farmers in the study area.

The study area is Imeko Afon Local Government Area of Ogun State. Dominant ethnic groups are the Yewas and the Ketus. Economic activities of the people are mainly farming and trading. Crops grown are maize, cassava, yam, tomatoes, pepper, cocoa, palm e.t.c with which tomato is mostly cultivated by almost every farmer because of its relative profitability compared to others vegetables in the area. Prominent among other occupations is cattle rearing due to the abundance of savannah vegetation in the local government area. Industrial activities in the local government are low and restricted to cottage industries, arts and crafts.

II. MATERIALS AND METHODS

Purposive sampling technique was employed in administering the questionnaire because the research is targeted at Tomato producers. 100 farmers were selected for the study, 25 farmers from each of the villages. The villages are Imeko, Araromi oloka afon, Owode Afon, Gbanla. However, out of the 100 questionnaires that were administered, 88 was retrieved and used in this analysis since some of the questionnaires were badly filled and did not contain information relevant for the work. Descriptive statistics and regression were used as analytical tools

III. RESULTS AND DISCUSSION

Majority of the respondents (51.1%) were male and 48.86% were females, showing that more males are involved in the production of tomato in the study area. This is consistent with the fact that agricultural activities are seen in the western part of Nigeria as labour intensive, and therefore male dominated. Majority of the

farmers are below 41 years of age (69.32%). This indicates a good supply of agile workforce in tomato production in the study area. The result of the marital status shows that majority of the farmers are married (86.4%) while 13.64% are either single or divorced. This could have an implication on post harvest losses in tomato production since; married farmers are likely to have access to more family labour especially for harvesting. The time taken to do the harvesting may be longer and in an attempt to rush the works fruits are badly handled due to poor skill in handling as compared with hired labourers. Table 1 also shows that 82.95% of farmers have no formal education, those with secondary education are 15.91% and for post secondary education 1.14% respondents. This statistics shows that majority of the farmers are illiterate. This could be a contributory factor to high post harvest losses in tomato production because only farmers with knowledge to read and write can appreciate and use most of the post harvest technologies available. The result below shows that majority (68.17%) of the farmers have below 16 years experience in tomato production. This could also have an effect on post harvest losses in tomato production. The low years of experience in tomato production might also be responsible for their lack of knowledge and the unavailability of technology of preservation among the farmers. 11.36% of the farmers are with only one person in the household, 30.68% with 2-6 persons in the household, 25% with 7-11 persons in the household and 32.95% household greater than 12 persons.

Table 1: Socio economic Characteristics of respondents

Gender	Frequency	Cumulative frequency	Percentage
Male	45	45	51.14
Female	43	88	48.86
Total	88		100
Age(Years)	Frequency	Cumulative frequency	Percentage
<30	35	35	39.77
31-40	26	61	29.55
41-50	14	75	15.91
>50	13	88	14.77
Total	88		100
Marital Status	Frequency	Cumulative frequency	Percentage
Single	12	12	13.64
Married	76	88	86.36
Total	88		100
Educational Status	Frequency	Cumulative frequency	Percentage
No formal	51	51	57.95
Primary	22	73	25.00
Secondary	14	87	15.91
Post secondary	1	88	1.14
Total	88		100
Household	Frequency	Cumulative	Percentage

size		frequency	
1	10	10	11.36
2-6	27	37	30.68
7-11	22	59	25
>12	29	88	32.95
Total	88		100

Source: field survey, 2010

Majority of the farmers cultivated between 1 and 5 hectares of land and 17.05% cultivated land area between 6 to 10 hectares, 15.9% cultivated between 16 to 20 hectares and 4.55% cultivated 26 to 30 hectares and this shows that small scale farmers prevail in the study area.

Table 2 : Farm size distribution of Tomato Producers (farmers)

Farm size (ha)	Frequency	Cumulative frequency	Percentage
<1	9	9	10.23
1-5	45	54	51.14
6-10	15	69	17.05
11-15	1	70	1.14
16-20	14	84	15.91
21-25	0	84	0.00
26-30	4	88	4.55
Total	88		100

Source: field survey, 2010

Majority of the respondents (72.73%) make use of the van/pick up as a means of transportation, 4.55% respondents employed the use of bicycle, and 22.73% make use of the motorcycle. This may not necessarily affect post harvest losses because the use of van compared to motorcycle and bicycle will reduce the losses, likely to occur in case head loads were used for transportation

Table 3 : Means of Transportation of tomato Producers (farmers)

Transport means	Mean Frequency	Cumulative frequency	Percentage
Head load	0	0	0
Bicycle	4	4	4.55
Motorcycle	20	24	22.73
Van/ Pick-up	64	88	72.73
Others	0	88	0
Total	88		100

Source: field survey, 2010

The use of post harvest technology is very minimal in the study area because only few of the farmers (5 out of 88) use the mini technology of storing such as drying and storing of the produce before taking it to the market to sell. The reason for their lack of preservation knowledge of adequate methods could be as a result of lack of awareness by the extension

workers themselves or the farmers on various ways by which they can go about preserving their produce. However, during the course of the study, there was an extension programme by the local government and Agriculture media resources and extension centre (AMREC) from the university of Agriculture for the farmers on ways by which they can preserve their produce to reduce the losses. The various ways as taught by ARMEC include:

- 1) Making the tomatoes into tomato paste, Tomato ketchup and also tomato juice.
- 2) Cutting the tomato into slices and drying them.
- 3) Boiling the tomatoes after which shells are peeled off and rinsed, put in bottles in which there is water and a teaspoon of preservative added to the water and covered.

There is also no method of storage in the area because of unavailability of storage facilities and lack of basic knowledge on the practices. The only way by which some of the farmers stored their produce is by covering it with grasses. However, this could only last for one day before they are taken to the market for sale; a period short enough to address issues involved in market delays

The regression analysis carried out to determine the influence of some factors on the quantity of fruit loss from harvesting to marketing stage, gave an empirical result which was subjected to F-test. The value of the F-statistics was found to be significant at 5%. This implies that all explanatory variables (independent) had a joint impact on the dependent variable. This result is presented in below and also increase in the distance from the farm to the market will increase the quantity of fruit loss this is because the longer the distance of the farm to the market, the longer the time it will take for the produce to get to the market and so, the losses will increase because of the congestion and packaging of the tomato together for a long time. Also increases losses was due to the more the days the fruit spent on the farm after maturity, the more the loss. Increase in the number of baskets harvested also results in increase in the losses because there is no effective method of storage hence the more the quality of harvested produce and the more the spoilage. Also, as the demand for the produce in the market is low during the on-season compared to the supply, the produce that is not sold in the market immediately in fresh form will be lost as a result of there is no storage facility on ground.

Pre harvest working days (PHWD) was not significant. The effect of all the independent variables (Pre harvest working days (man days), harvest working days (man days), Distance from the farm to the market (km), days fruit spent on the farm (days), Age of fruit at harvest (months), Area of land cultivated (hectare), Days fruit spent in the market before getting to the consumer

(days) and Number of basket that was harvested) on the dependent variable (Quantity of fruit loss) tested were significant at 5% level of probability with coefficient of determination (R^2) of 0.95.

Linear Function

$$Y = 3.95X_1 + 2.66X_2 + 4.34X_3 + 0.53X_4 + 2.69X_5 + 1.47X_6 + 0.69X_7 + 3.40X_8 - 140.39$$

$$\{5.33\} \{45.28\} \{296.79\} \{12.35\} \{34.23\} \{150.93\} + \{41.23\} + \{32.36\}$$

$$R^2 = 0.72, F = 8.07$$

Semi-log Function

$$Y = 2.27 + 0.76X_1 + 0.19X_2 + 0.31X_3 + 0.02X_4 + 0.79X_5 + 0.81X_6 + 0.63X_7 + 0.11X_8$$

$$\{0.26\} \{0.26\} \{1.47\} \{0.79\} \{0.63\} \{0.44\} \{0.32\} + \{0.34\}$$

$$R^2 = 0.87, F = 8.96$$

Double-log Function

$$Y = 2.25 + 0.12X_1 + 0.19X_2 + 0.21X_3 + 0.31X_4 + 0.22X_5 + 0.42X_6 + 0.19X_7 + 0.73X_8$$

$$S.E. = \{0.24\} \{0.08\} \{0.28\} \{0.49\} \{0.26\} \{0.14\} \{0.13\} \{0.33\}$$

$$R^2 = 0.91, F = 9.10$$

Exponential - log function

$$Y = 0.35 - 0.16X_1 + 0.05X_2 + 0.01X_3 + 0.17X_4 + 0.09X_5 + 0.12X_6 + 0.39X_7 + 0.47X_8$$

$$S.E. = \{0.02\} \{0.01\} \{0.22\} \{0.32\} \{0.36\} \{0.17\} \{0.12\} \{0.11\}$$

$$t = 0.92 \ 0.57 \ 0.36 \ 1.03 \ 1.23 \ 0.69 \ 1.23 \ 0.67$$

$$R^2 = 0.95, F = 9.32$$

Table 4 below shows the comparison between the gross margin with loss and the Gross margin without loss. The average Gross margin with loss (9,251.41) is less than the average Gross margin without loss (72,251.41). This shows that post harvest losses reduce the income of farmers in Imeko-Afon local Government Area of Ogun State. The percentage loss incurred by the farmers is 87.3%.

Table 4 : Gross Margin Analysis

	Total variable cost	Total revenue	Gross margin	Average gross margin
Without loss	1,163,026	7,565,250	6,402,224	72,752.55
With loss	1,163,026	1,977,150	814,124	9,251.41

Source: field survey, 2010

IV. CONCLUSION

This study has analyzed the determinants of post harvest losses in Tomato production in Imeko-Afon Local Government Area of Ogun state. The result indicates that all the identified factors have significant impact on post harvest losses. Therefore, there is a great need to reduce the losses in the study area. The impact of the losses was also noticeable in the income of the farmers with the use of the gross margin analysis. The gross margin with loss as compared with the gross margin without loss shows that losses reduce the income of the farmers considerably.

V. POLICY RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made for policy actions to reduce the post harvest losses thereby increasing the standard of living of the tomato producers in Imeko – Afon Local Government Area of Ogun State.

1. There should be good storage facilities to store the produce that are harvested before they are being taken to the farm. This will help to produce the losses that will occur at the farm level.
2. Post harvest technology should be introduced to reduce the losses. However there was an extension Programme by Agriculture Media resources and Extension centre (AMREC) from University of Agriculture Abeokuta (UNAAB) on post harvest technology and preservation techniques and there should be a continuation of the extension programmes in order to encourage the farmers.
3. There should be ready market for the produce. The markets must be well organized and also the road network must be improved in order to aid easy transportation of their produce.
4. Extension services should be rendered to the farmers considering their years of experience in tomato production and also to educate them on the various ways that can be used in preserving their produce from losses.
5. Establishment of Tomato processing factories to add value to the fruits. For example processing tomato into Tomato Ketchup, Juice and Purees.
6. With the reduction of post harvest losses by 50%, food availability would be increased by 20% without cultivating an additional hectare of land for increasing crop yield.

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