

Economic Analysis of Tomato Losses in Ibadan Metropolis, Oyo State, Nigeria

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Abstract: The study examined economic loss analysis involving four varieties of tomato namely: UC82B, Roma, VT563/JM94/47 and Ibadan local in Ibadan, Oyo State. A random sampling technique was used to collect information on traders= characteristics, types of post harvest loss, intensity of damages and marketing margin accrued from the losses. The data were analyzed with the aid of descriptive statistics, simple margin analysis and t-test. The results showed that more men were involved in wholesaling of tomato while more women were involved in retailing of tomato. Most of the respondents have been in the business for more than 10 years. The major causes of economic losses to tomatoes were physiological, pathological and mechanical damages. In the UC82B variety, pathological damage constituted the greater percentage (44%) of losses; while the greatest cause of damage in Roma and VT563/JM94/47 was physiological and was put at 44% and 36% respectively. Ibadan local suffered the highest kind of damage traced to mechanical factors to the tune of 39%. . There was a significant difference ($p < 0.05$) in the mean percentage damage of UC82B compared to the three other tomatoes varieties ($P < 0.05$), while there was no significant ($p > 0.05$) difference between mean percentage damage of VT563/JM94/47 and Ibadan local varieties. Based on the losses in the marketing margin, there was reduction of 34% in marketing margin of UC82B, Roma 85%, VT563/JM94/47 94% and Ibadan local 79% at the retail level. Provision of improved mode of transportation and storage, is thereby recommended to minimize losses in tomatoes.

Key words: Economic losses • Tomatoes • Marketing • Post harvest damages • Oyo state

INTRODUCTION

Estimates of production losses in developing countries are hard to evaluate. Postharvest losses of fruit and vegetables in some African countries has been estimated to reach 50% [1]. Both qualitative and quantitative losses occur in horticultural commodities between harvest and consumption [2], hence minimizing post harvest losses of already produced food is more sustainable than increasing production [2].

Post harvest losses include the rotting of produce and damage during storage, packaging and transportation which leads to consumer rejection [2]. Most losses and wastes occur in the latter part of the food chain through excessive processing, packaging and marketing [1]. Post harvest loss can be defined as a measurable quantitative and qualitative loss of a given product at any moment along the post harvest chain [3]. Fruits, vegetables and

root crops are much less hardy, quickly perishable except under intensive care during harvesting, handling and transportation. Post harvest loss is much more painful and costlier than pre harvest loss both in terms of money and man-hours [4]. Due to absence of proper storage and marketing facilities, farmers are forced to sell their produces at throw away prices [5]. Losses are caused by mechanical injuries, inadequate storage, unsuitable handling, faulty system of transport and delayed transportation in the retail market [6]. Post harvest losses which decrease returns of fruits and vegetables occur mainly because of lack of infrastructure, poor handling and marketing knowhow [7]. The magnitude of losses depend on the nature of the commodities, the condition of the produce at the time of collection, distance travelled and the nature of the road network. The principal causes of losses are Physiological deterioration, Mechanical damage and pathological damage [2].

Tomato is a major vegetable crop that has achieved tremendous popularity over the last century [8]. Tomato, aside from being tasty, promotes healthy nutritional balance as it is a good source of vitamins A and C. Tomato is also an excellent source of Lycopene (a very powerful antioxidant) that helps to prevent the development of many forms of cancer [8]. However, tomato has relatively poor storage capability. In post harvest loss assessment of tomato in Johart, maximum loss during marketing was recorded in banana (12%) followed by tomato (9.75%) [5]. Notwithstanding, tomato is of particular interest due to its nutritional potentials in our diet. Tomato is perishable and this makes it have the most recorded variations in price on daily basis. It also has high economic value and high incidence of post harvest losses. In order to ensure good quality tomato produce with high economic and marketable potentials, certain questions must be addressed. These include the following: What are the factors responsible for these losses?, what are the varieties that are more susceptible to these losses and what are the ways of reducing post harvest losses in tomatoes?. Consequent upon the factors enumerated above, reducing post harvest losses is very important because sufficient food both in quantity and quality needs to be available to every inhabitant in our planet [9]. Therefore the objectives of the study are to: examine the trend of purchase, variety preferred, handling and storage of the product; identifying the types and intensity of post harvest damages to tomatoes; evaluating in economic term the cost associated with these losses using marketing margin approach in order recommends ways of reducing economic losses.

MATERIALS AND METHODS

Study Area: The study was conducted in Ibadan, Oyo State capital between August and November, 2008. Oyo state is one of the six states in south western Nigeria. Two markets were purposively selected because they have large volume of tomato sales.

Shasha market is in Akinyele local government area of Ibadan, Oyo state. The Market is renowned for large volumes of wholesale and retail trades in horticultural produce. Produce traded in the market are sourced from as far as Sokoto, Kano, Kaduna, Zaria, Funtua, Gboko e.t.c. Prices of these commodities are lower than what is obtained from other markets in the interior areas of Ibadan.

Bodija market is located at Ibadan North local government areas. It is also characterized by large arrays of horticultural produce and operates everyday of the week.

Method of Data Collection: Primary data were collected with the aid of pre-tested and validated structured questionnaire. A random sampling technique was used to select a total of 42 wholesalers and 56 retailers from the two markets. The information sought included socio- demographic data, type of post harvest loss, post harvest loss estimates, mode of transport used during purchase from suppliers, packaging materials, marketing information including volumes or quantities purchased and sold and traders attitudes toward post harvest losses.

In estimating the post harvest losses at the wholesale level, losses were estimated as the difference between amounts received between fresh and damaged tomatoes. Losses at retail level were determined from ten baskets sampled at random from each location. Weight of overall contents of each basket, different types of damages via physiological, pathological, mechanical and unmarketable fruits were isolated, weighed and recorded.

Cphysiological Deterioration: This is caused when fresh produce is subjected to extremes of temperatures, atmospheric modification or contamination.

Cmechanical Damage (Physical Injury): Careless handling of fresh produce causes bruising, thereby resulting in splitting and skin breaks, in addition to increasing water loss, rate of normal physiological breakdown with skin breaks.

Cdiseases and Pests: All living material is subject to attack by parasites. Fresh produce can become infected before or after harvest by diseases widespread in the air, soil and water.

Analytical Technique: The data were analyzed using descriptive statistics such as frequency counts and percentages. Marketing margin was also used to calculate returns to the marketers. The t-test was adopted to compare mean percentage damaged of different tomato varieties in the selected markets.

Marketing Margin = $\frac{\text{Average gross revenue (AGR)}}{\text{Average total cost (ATC)}}$

AVGR = $f(G, Pa, Ph, Mec, Um)$

Where:

AGR = Average gross revenue

G = Wholesome tomatoes

Pa = Tomatoes damaged pathologically

Ph = Tomatoes damaged physiologically

Mec. = Tomatoes damaged mechanically

Um = Unmarketable tomatoes

TC = $f(Cp, S, Hc)$

Cp = Cost price of the produce

S = Storage cost

Hc = Handling cost

T =
$$\frac{x_1 - x_{11}}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

T = Calculated value of t- distribution

X1 = Mean of damage of a particular tomato variety

X11 = Mean of damage of another tomato variety

S12 = Standard deviation of sample mean of a tomato variety 1

S22 = Standard deviation of sample mean of tomato variety 2

N = Number of data points for the markets

Hypothesis: There are no significant differences in the mean damage among the different tomato varieties.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents:

The socio-economic characteristics of the middlemen involved in the marketing of tomatoes across the selected markets in Ibadan metropolis (Table 1) indicated that male wholesaler constituted 88% and the female retailers constituted 93% respectively. This finding implies that wholesale tomato business is painstaking and may not be convenient for female marketers possibly due to labour intensity of the activities involved. More wholesalers (55%) and retailers (58%) were in the age group of 31 and 40 years of age. This indicates that active working age groups are into tomato marketing in the study area. These young people are likely to be more dynamic and willing to take risks associated with marketing of tomato. Active age group is also involved in the marketing of pineapple in south western Nigeria [10]. Most of the respondents sampled (95%) were married while the highest proportion

of the wholesalers (67%) and retailers (79%) had primary level of education. This level of education will affect marketing activities in respect of computation of gain and loss. Therefore, the role of education in prevention of postharvest cannot be overstressed. The study also revealed that 69% of the wholesalers acquired 11-15 years of experience while 50% of the retailers had only 6-10 years experience. This suggests that more people tend to stay longer on tomato wholesale business possibly due to rewarding economic returns. Majority of the respondents (85%) buy their product directly from farmers from Kaduna, Kano, Gombe, Zaki, Iseyin, Oyo and this is followed by those who buy directly from the wholesalers (15%). All the traders probably joined the business because of its profitability and their source of income was mainly from personal savings. The primary occupation of the respondents in the study area was marketing of tomatoes.

Trend of Purchase and Tomato Varieties Preferred by the Consumers:

Primary data generated from the survey indicated that the marketers were selling the following varieties: UC82B, Roma, VT563/JM94/47 and Ibadan local. Up to 80% of the respondents received supply on daily basis at the rate of 30-100 baskets per day (wholesalers) and 2 B 3 baskets per day for the retailers. This indicates high volume of trade and economic turn over. Up to 85% 60%, 20% and 10% preferred UC82B, Roma, VT563/JM94/47 and Ibadan local respectively. The high preference may be due to its firmness, storability and lower levels of post harvest losses.

Handling and Storage:

Generally, rough handling by the marketers inflicted most damage during off loading resulting in high percentages of losses. Baskets holding products were stacked on each other, thus pressure was exerted on the baskets during the transportation. Storage facility was in adequate in the study area therefore, produce were exposed to direct sunlight resulting in high temperature that may accelerates metabolism leading to higher levels of physiological damage and decreased shelf life [2].

Causes and Intensity of Economic Losses to Marketers:

The major causes of economic losses to the tomato marketers (Table 2) in the study area included physiological, pathological, mechanical damage. Table 2 also presents the average intensity of damages on the four tomatoes varieties. Pathological damages constituted the greatest percentage (44%) of losses in UC82B with

Table 1: Socio economic characteristics of respondents

	Characteristics	Wholesalers	Retailers	Average
Sex	Male	88	7	47.5
	Female	12	93	52.5
	Total	100	100	100
Age	21-30	5	7	6
	31-40	55	54	54.5
	41-50	19	32	25.5
	51-60	21	7	14
	61 and above	-	-	-
Marital status	Married	100	95	97.5
	Single	-	5	2.5
	Total	100	100	100
Educational qualification	Primary	67	79	73
	Secondary	29	13	21
	Tertiary	-	-	-
	Non formal education	4	8	6
	Total	100	100	100
Years of experience	5-1	5	21	13
	10-6	26	50	38
	15-11	69	9	39
	16-20	0	20	10
	Total	100	100	100
Source of supply	Farmers	71	-	36
	Agents	29	11	20
	Wholesalers	-	89	44.5
	total	100	100	100

Table 2: Mean Intensity of Damage in a basket (10kg) for the tomato varieties (%)

Type of damage	UC82B	Roma	VT563/JM94/47	Ibadan local
Physiological	35	36	44	31
Pathological	44	23	19	14
Mechanical	19.4	21	23	39
unmarketable	1.3	1.4	14	16

Table 3: T value of damages among tomato varieties

Tomato pairs	T 0.01	T 0.05	T 0.10
UC82B - VT563/JM94/47	4.587***	2.228**	3.169*
UC82B B Ibadan local	4.587***	2.228**	3.169*
UC82B - Roma	4.587***	2.228**	3.169*
VT563/JM94/47 B Ibadan local	ns	ns	Ns
Roma- VT563/JM94/47	4.587***	2.228**	3.169*
Roma-Ibadan local	4.587***	2.228**	3.169*

***, **, * Significant at 1%, 5% and 10%

Table 4: Monetary losses associated with tomatoes varieties

Tomato varieties	UC82B		Roma		VT563/JM94/47		Ibadan local	
	Price N/Kg	% loss/kg	Price N/Kg	% loss/kg	Price N/Kg	% loss/kg	Price N/Kg	% loss/kg
Wholesale	137	-	120	-	100	-	100	-
Physiological	103	25	90	25	80	38	80	38
Pathological	70	49	50	58	50	63	50	63
Mechanical	50	63	40	67	30	75	30	75
Unmarketable	20	85	20	83	10	88	10	88

Table 5: Average Marketing Margin for tomatoes

Description	UC82B	Roma	VT563/JM94/47	Ibadan local
Marketing margin without losses	689.05	364	397.5	346
Marketing margin with losses	458.15	55	22.5	73.5
Reduction in marketing margin (%)	-34%	-85%	94%	79%

physiological and mechanical damages constituting 35% and 19% respectively. However, about 1.6 percent of the total damage was unmarketable. For Roma variety and *VT563/JM94/47*, physiological damage constituted the greatest percentage of losses of 36% and 44% respectively. In Ibadan local, mechanical damage constituted the greatest percentage of damage (39%). This implies that Ibadan local variety was subjected to high degree of mechanical damage. From the result of the t- test, there were significant differences in the mean percentage damage of the different tomato varieties. However, there were no significant differences in the mean percentage damage of *VT563/JM94/47* and Ibadan local tomato varieties. From the analysis, UC82B is prone to pathological damage, Roma and *VT563/JM94/47* (physiological) while Ibadan local was prone to mechanical damage.

Monetary Loss Associated with Different Types of Tomatoes: The losses accrued to the wholesalers were 50 percent on the average; while to the retailers, they ranged between 50-70%. In Jordan post harvest losses were greater at retail level compared to wholesale level [11]. Table 4 presents the price per kilogram of wholesome fruits of various varieties juxtaposed with the percentage losses attributable to various types of damages. The average retail price of UC82B per kilogram was N137/kg as against the lower prices obtained from the various degree of damage. Therefore, the percentage loss from the various types of damages ranges from 25-85% loss per kilogram for the different varieties of tomatoes. Also from Table 3, losses in percentage associated with physiological damages were lower than other post harvest losses. The major reason for this could be due to the fact that the features of physiological damaged tomatoes were hardly noticeable by consumers thereby making the unit price of these commodities to be high. But for mechanical and pathological damaged tomatoes, their features were noticeable but could still be marketable there by giving the retailers some degree of bargaining with consumers.

Estimation of Marketing Margin Incurred with Losses: The average gross margin derived for UC82B was higher than other tomato varieties (Table 5). This could be attributable to high level of demand and preference for

UC82B as depicted on the table, the marketing margin of UC82B per 10kg basket was N689.05 as compared with a value of N458.15 associated with situation of post harvest damages. Therefore, the reduction in marketing margin was estimated at 34% for UC82B. The reduction in marketing margin denoting economic losses for Roma was 85%, *VT563/JM94/47* (94%) and Ibadan local (79%). The above analysis suggests that the incidence of post harvest damages have greater economic losses on Roma, *VT563/JM94/47* and Ibadan local than the UC82B. The major reason for the reduction in marketing margin of these other varieties may be attributable to higher levels of damages observed among them. The survey also revealed that there were seasonal variation in the levels of damage for all varieties. Losses were generally reduced during the dry season compared to the rainy season. This may be justified by the fact that humidity and fruits water content are expected to be lower during the dry season thereby reducing the levels of activities of agents of physiological and pathological damages.

Conclusion and Recommendations: From the results of the study, it has been revealed that there was a high level of post harvest damages on tomatoes. The identified post harvest damages were due to: physiological, pathological and mechanical causes. The percentage of damaged tomatoes was higher in the case of the local variety and marginal in the case of UC82B. For the marketing margin analysis, there was 34 percent reduction in the UC82B against the 85, 74 and 94 percent reduction in Roma, *VT563/JM94/47* and Ibadan local respectively. The mechanical damage for all varieties, recorded the highest economic losses followed by pathological damage while physiological damage recorded the least loss.

Some Proposed Measures in Order to Reduce Losses Include:

- Harvesting of produce at proper maturity stage
- Rough handling should be avoided to reduce physical damage
- Suitable packaging should be introduced to reduce all types of physical damage

- Markets should be improved by building appropriate markets stalls with storage facilities and proper ventilation
- The farmers should be educated on proper packaging, packing and handling techniques
- The public should be encouraged to accept processed agricultural products. This will reduce the percentages of losses that occur between transporting to the market by wholesalers and storage by retailers

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