

The Effect of Reducing Post-Harvest Tomato Wastage on Profitability in Tomato Marketing in Iseyin, Local Government of Oyo State, Nigeria

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Abstract

This study examined the effect of reducing post-harvest tomato wastage on profitability in tomato marketing in Iseyin Local Government Area of Oyo State, Nigeria. A total of 150 tomato marketers were randomly selected; data were collected using structured questionnaires to collect a consistent and standardized approach for details of the respondents and analyzed through descriptive and inferential statistics, including regression analysis.

Results showed that tomato marketing in the study area was dominated by middle-aged people (mean age 45 years), and all the respondents were married. 86% were female, most of them had secondary education and 91.33% depended mainly on personal savings for capital. The study revealed that tomato wastage is a universal challenge, with market glut (70.67%), poor storage (13.33%), and transportation delay (14%) identified as major causes. Sorting and grading (49.33%) and processing (32.67%) were the most commonly used methods to reduce wastage, while 96.67% of marketers attested to their effectiveness. Cost and return analysis showed that tomato marketing is profitable, with the Benefit Cost Ratio (BCR) of 1.1387, which implies that for every naira invested in tomato marketing, there is a return of 1.139 naira with the marketing efficiency of 113.9%, though it is constrained by high transportation and packaging costs. Regression analysis indicated that gender, marital status, access to credit, and the quantity of tomatoes wasted weekly significantly influenced profitability ($p < 0.05$). Postharvest wastage had a strong negative effect on profit, with 98.66% of respondents affirming that wastage reduced their income.

The study concludes that improving access to credit, cold storage, and efficient transportation systems, along with proper handling and packaging, can substantially enhance profitability and sustainability in tomato marketing.

Keywords: Postharvest; Profitability; Tomato Marketing; Tomato Wastage; Iseyin Local Government.

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BACKGROUND TO THE STUDY

Tomato (*Solanum lycopersicum*) is one of the most essential vegetable crops in Nigeria and the whole world. Tomato production has long been a significant agricultural activity in Nigeria, with the country being the largest producer in Sub-Saharan Africa (Adewumi and Adesina, 2022). It is valued not only for its nutritional contribution to human diets, being rich in vitamins A, C, and E as well as minerals and antioxidants, but also for its economic importance in generating income and employment for farmers, marketers, and traders. In sub-Saharan Africa and Nigeria in particular, tomato is widely cultivated, with major production in states such as Kano, Kaduna, Benue, Katsina, and Oyo. Despite the country's significant production volume, tomato marketing remains characterized by inefficiencies and high levels of post-harvest losses. These losses affect profitability, reduce the availability of affordable tomatoes for consumers, and ultimately undermine the agricultural sector's contribution to food security and economic growth (Ojeleye *et al.*, 2023).

Tomatoes are highly perishable with a shelf life of less than two weeks under tropical conditions, making them vulnerable to spoilage during harvesting, storage, transportation, and marketing. In Nigeria, post-harvest losses of tomatoes have been estimated to reach between 40% and 50%, a level that significantly reduces the quantity available for sale and consumption (Suleiman, 2024). The causes of these losses are multifaceted in the constraints of the value chain, including poor harvesting methods, inadequate sorting and grading, inappropriate packaging materials such as raffia baskets, lack of cold storage facilities, exposure to high temperatures, and weak transportation infrastructure. During transportation from farm to market, poor road networks and overloading often result in mechanical damage to tomatoes, further contributing to losses (Magala, 2024).

The economic implications of post-harvest wastage are severe. Farmers and marketers face the challenges of reduced marketable volumes translating into lower incomes and diminished returns on investment. Consumers are left with scarcity due to spoilage, high market prices, and limited access to quality produce. This situation is a threat to food security, as the loss of such a vital vegetable undermines dietary diversity and nutritional intake. At the national level, high post-harvest wastage results in reduced contributions of agriculture to gross domestic product (GDP) and slows down progress toward achieving sustainable development goals related to hunger and poverty reduction (Abulude *et al.*, 2024). To mitigate these losses, several strategies have been recommended and applied in Nigeria and other developing countries. One major innovation is the use of plastic crates in place of raffia baskets, which reduces bruising and mechanical damage during handling and transport. Cold storage technologies, including zero-energy cooling chambers and evaporative cooling systems, have been promoted to extend the shelf life of tomatoes and stabilize supply (Odeyemi, 2022). Additionally, training programs aimed at farmers and marketers on post-harvest handling practices such as careful harvesting, grading, and sorting have proven effective in minimizing spoilage. Investments in rural infrastructure, particularly roads and transport systems, are also recognized as crucial in reducing losses from farm to market (Ojeleye *et al.*, 2023).

Reducing post-harvest losses directly improves profitability in tomato marketing. By minimizing wastage, marketers increase the volume of produce available for sale and reduce costs associated with spoilage. This will lead to higher gross margins and enhanced business sustainability. Profitability is further strengthened when tomatoes of higher quality reach consumers, as traders can command better prices for fresh produce. Furthermore, improved efficiency in tomato marketing encourages reinvestment, job creation, and greater participation

in agribusiness activities. From a consumer perspective, reduced wastage helps to stabilize supply and makes tomatoes more affordable and accessible (Suleiman, 2024). Addressing post-harvest tomato wastage is therefore not only a technical necessity but also a strategic economic intervention. It provides an opportunity to enhance profitability for marketers, ensure food security for households, and contribute to the sustainable growth of Nigeria's agricultural sector. The present study is motivated by these concerns and seeks to assess how reducing post-harvest wastage can enhance profitability in tomato marketing, with a particular focus on practical interventions and their economic outcomes.

Problem Statement

The sector has been plagued by profound inefficiencies, particularly high post-harvest losses estimated between 40% and 50% of total harvest (Suleiman, 2024). These losses have been primarily attributed to a triad of systemic failures: Infrastructural deficits, including poor rural road networks and a near-total absence of cold storage facilities (Ojeleye *et al.*, 2023); and technological stagnation, with continued reliance on highly damaging traditional packaging like raffia baskets and open transportation methods (Yakubu *et al.*, 2023). Also, Institutional weaknesses such as fragmented markets, lack of access to formal credit for value chain actors, and weak extension services (Abulude *et al.*, 2024). Despite massive production, a significant proportion of the harvest has never reached consumers, representing a continuous drain on farmers' and marketers' incomes and a major obstacle to the economic sector and food security.

The present situation in Iseyin Local Government Area of Oyo State reflects these national challenges. Tomato marketing remains a vital but troubled economic activity in the study area. The core problem, therefore, is the disconnect between the current state of high post-harvest wastage and constrained profitability in Iseyin's tomato marketing and the desired state of an efficient, high-return value chain. This disconnect is perpetuated by a lack of localized, integrated analysis that quantifies the specific impact of wastage on profitability and identifies the actionable levelers such as credit access, gender-specific support, and targeted infrastructure for change. Without such evidence-based understanding, policymakers, development agencies, and the marketers themselves will continue to implement fragmented or generic solutions that fail to address the root causes of loss and low profitability in the Iseyin LGA context.

Objectives of the Study

The general objective of this study is to examine the effect of reducing post-harvest tomato wastage on profitability in tomato marketing in Iseyin Local Government Area of Oyo State

The specific objectives are to:

- examine the socioeconomic characteristics of tomato marketers in the study area.
- identify the major causes of tomato wastage in the area.
- determine the methods employed in reducing tomato wastage.
- evaluate the profitability of tomato marketing in the study area.
- examine factors affecting profitability of tomato marketing in the study area

JUSTIFICATION

The study is anchored in the Post-Harvest System Model (Kader, 2005) and Agricultural Profitability Theory (Ellis, 1993), which posit that inefficiencies in post-harvest systems directly undermine economic returns. While these theories are well-established globally, their application within the specific socio-economic and infrastructural context of Iseyin's tomato value chain remains underexplored. This research seeks to empirically test and conceptualize these theoretical frameworks by examining how stage-specific losses (e.g., at market or during transportation) influence the profitability nexus for local value chain actors, thereby contributing to the refinement of location-specific agribusiness theories.

Existing empirical studies, such as Suleiman (2024) in Kano State and Ojeleye *et al.*, (2023) in Osun State, have broadly documented high post-harvest losses and their negative impact on profitability in Nigeria. However, there is a significant contextual and methodological gap. Few studies have provided a micro-level, integrated analysis focusing specifically on marketers (rather than farmers) within a defined local government area like Iseyin LGA, which has its unique market dynamics, actor profiles, and logistical constraints. Furthermore, while many studies identified causes, few concurrently analyse the socio-economic determinants of profitability using regression models as this study does. By filling this gap, the research generates granular, actionable data that complements broader national studies.

This study is justified by its potential to identify practicable, locally adapted strategies such as improved packaging or cooperative credit access that marketers can adopt to reduce losses and increase income. The findings will empower traders with evidence-based knowledge to enhance their business decisions and operational efficiency.

Nigeria's agricultural policy, including the National Food Security Policy (2022) and the Tomato Transformation Agenda, emphasizes reducing post-harvest losses and enhancing value chain efficiency. However, effective policy implementation requires localized diagnostic evidence. This study provides empirically grounded recommendations on infrastructure, credit access, processing, and market information systems directly relevant to policymakers in Oyo State and local government authorities. It addresses the disconnect between national policy objectives and on-the-ground realities, offering a blueprint for targeted interventions that could improve marketing efficiency, reduce food loss, and increase the sector's contribution to local economic development.

Reducing post-harvest wastage is not merely an economic issue but a core component of sustainable agriculture and food security. The Food and Agricultural Organization (2022) identified post-harvest loss reduction as a key strategy for achieving Sustainable Development Goal 2 (Zero Hunger), by minimizing the loss of a nutritious and widely consumed vegetable like tomatoes, this study contributes to efforts aimed at improving dietary diversity, stabilizing food supply, and promoting sustainable consumption patterns within the study area and beyond.

LITERATURE REVIEW

The findings consistently highlight that reducing post-harvest wastage significantly improves profitability and economic sustainability in tomato marketing systems. For instance, Adegbite *et al.* (2022) carried out a study in Lagos and Oyo States, showing that post-harvest losses accounted for over 35% of total harvested tomatoes. The study revealed that marketers who

adopted improved handling practices, such as sorting and grading before sales, experienced significantly higher profit margins compared to those who did not. Similarly, the research found that access to cold storage facilities increased profitability by enabling marketers to sell tomatoes during periods of scarcity when prices are higher.

In Kano State, Suleiman (2024) examined tomato marketers along different nodes of the value chain and found that those using plastic crates for transportation recorded 20–25% lower losses compared to those using raffia baskets. The reduction in losses translated into higher gross margins, confirming the link between packaging methods and profitability. The study also reported that marketers with access to storage facilities recorded greater returns on investment, underscoring the role of infrastructural support in enhancing profitability. Another study by Oyeleke *et al.* (2023) in northern Nigeria focused on the effect of packaging innovations on tomato marketing. Results indicated that plastic crates reduced mechanical damage during transportation and preserved fruit quality, leading to higher prices in urban retail markets. The profitability analysis showed that marketers who invested in crates had a significantly higher benefit-cost ratio (BCR) compared to those relying on traditional baskets. This highlights that relatively small investments in technology can yield substantial economic gains. Empirical studies have also emphasized the role of value addition and processing. Bamidele and Adeyemi (2024) reported that marketers involved in tomato processing, such as producing paste and puree, were able to mitigate losses during glut periods and maintain profitability. This study confirmed that post-harvest processing reduces dependence on fresh tomato markets, providing marketers with more stable and sustainable income sources. Beyond Nigeria, international studies echo similar findings. Magala (2024), in Uganda, observed that simple storage technologies such as evaporative cooling structures significantly reduced tomato spoilage, increasing both the quantity of marketable tomatoes and the profits of smallholder traders. Likewise, Musa and Ibrahim (2023) documented that adoption of post-harvest technologies in rural communities enhanced income security and improved household welfare, showing the broader socio-economic benefits of loss reduction strategies. These empirical findings demonstrate a consistent pattern: marketers who adopt effective post-harvest management strategies such as improved packaging, cold storage, processing, and market timing experience higher profitability compared to those who rely on traditional methods. The evidence suggests that addressing infrastructural gaps, improving access to technology, and strengthening institutional support are critical to reducing losses and enhancing profitability in tomato marketing.

Profitability and the Impact of Wastage Reduction

The findings of Adamu *et al.* (2022), who conducted a cost-benefit analysis in three Nigerian states, revealed that tomato marketers who minimized losses through improved handling had a Benefit-Cost Ratio (BCR) of 1.5, compared to 0.9 for those with high losses. Adegbite *et al.* (2022) established a direct correlation, showing that a 10% reduction in post-harvest losses led to a 15% increase in net profit for tomato retailers in Lagos. Furthermore, Musa and Ibrahim (2023) highlighted the secondary benefits, noting that increased profitability from loss reduction enabled reinvestment in business expansion and improved household welfare among marketers in Niger State.

Techniques for Reducing Losses and Their Efficacy

Oyeleke *et al.* (2023) demonstrated that adoption of plastic crates reduced tomato damage by 25% and increased marketers' net income by 18% in northern Nigeria. However, adoption remains low due to cost, as noted by Bamidele and Adeyemi (2024). For small-scale actors,

low-tech solutions have been explored. Odeyemi (2022) documented the successful use of Zero Energy Cooling Chambers (ZECC) by farmer groups in Ogun State, extending tomato shelf life by 7-10 days. In terms of strategies, the high reliance on sorting and grading as a primary method is echoed by Magala (2024) in Uganda, who found it to be the most common and immediately actionable practice among resource-constrained traders.

Marketers who handle tomatoes carefully, transport them in crates instead of raffia baskets, and utilize simple storage innovations often report lower spoilage levels and higher sales prices because of improved fruit quality. For instance, studies in northern Nigeria revealed that marketers who reduced losses by adopting plastic crates achieved up to 25% higher profit margins compared to those using traditional baskets (Oyeleke *et al.*, 2023). The higher quality of produce not only reduces wastage but also attracts premium buyers, especially in urban supermarkets and hotels where appearance and freshness are highly valued.

Studies consistently reveal that between 40% and 50% of harvested tomatoes are lost before reaching final consumers due to multiple interrelated factors (Suleiman, 2024). These causes can be categorized into production-related, handling-related, infrastructural, environmental, and institutional factors, all of which interact to aggravate the scale of post-harvest losses.

METHODOLOGY

Study Area

The study was carried out in Iseyin Local Government Area (LGA), a major agrarian and commercial town in Oyo State, southwestern Nigeria, well known for its vibrant agricultural production and produce marketing activities. Iseyin serves as a critical linkage between rural farming communities and urban markets within Oyo State and neighboring states, making it a strategic hub for agricultural trade, particularly in perishable commodities such as tomatoes. Geographically, Iseyin lies within the derived savanna ecological zone on latitude 7°58' North and longitude 3°36' East of the equator. The area is characterized by a tropical climate with clearly defined wet (April–October) and dry (November–March) seasons. Average annual rainfall ranges between 1,200 and 1,300 mm, while mean annual temperatures remain relatively stable at 26–27°C, conditions that are generally favorable for vegetable cultivation but also accelerate post-harvest deterioration of perishable produce if not properly managed (Sanusi, 2011). The vegetation of the area is predominantly derived savanna, resulting from prolonged human activities such as farming and fuelwood extraction. Soils are mainly sandy loam to loamy, moderately fertile, and suitable for the cultivation of food crops, including maize, cassava, yam, vegetables, and tomatoes. These agro-ecological conditions support year-round farming activities, especially during the rainy season, contributing to high volumes of fresh produce entering local markets.

Population of the Study

The population of the study comprised tomato marketers operating within Iseyin, Oyo State. These groups were considered because they are directly involved in tomato production, handling, distribution, and sales, and therefore experience the effects of postharvest losses.

Sample Size and Sampling Technique

The study employed a stratified sampling procedure in which two selected markets constituted separate strata.

Stage1: the first stage was purposive selection of two major markets in Iseyin local government, which are Oja-Oba and Oja-Oluwole, due to peculiarity of high level of tomato trading activities. The two selected markets constituted separate strata.

Stage 2: the second stage involved in each market, a sampling frame containing all eligible respondents was prepared and each respondent was assigned a unique identification number (information gotten from their association heads). Simple random sampling subsequently employed to select 80 respondents from each market, giving a total of 160 respondents. The random selection was not biased because every eligible respondent within each market had equal eligible and independent probability of being selected, thereby reduced selection bias. 150 questionnaires were fit for the study, while the remaining 10 interviewed did not give comprehensive or detailed information.

The questions such as socioeconomic/demographic characteristics, costs and returns on baskets of tomatoes, quantity sold per day, quantity of perishables per day, constraints of tomato marketing e. t. c. were asked.

Method of Data Analysis

Analytical Tools

Objectives 1, 2 and 3: Descriptive statistics such Table, percentages, and charts were used.

Objective 4: Profitability analysis for cost and return in tomato marketing

$$\text{Benefit cost ratio (BCR)} = \frac{\text{Total revenue}}{\text{Total cost}}$$

$$\text{Gross Profit Margin} = \frac{\text{Revenue} - \text{Cost of goods sold}}{\text{Revenue}} \times 100\%$$

Objective 5: Ordinary least square (OLS) regression was used to analyse the factors affecting profitability of tomato marketing

$$\beta_0 + \beta_1 \times 1 + \beta_2 \times 2 + \beta_3 \times 3 \dots \dots \dots n$$

Y = log of Cost and return in tomato marketing

X = independent variables

X₁ = Sex, X₂ = Age, X₃ = Marital status, X₄ = Year of education, X₅ = Household size,

X₆ = Tomato type, X₇ = Marketing Channel, X₈ = Membership of marketing organization,

X₉ = Access to credit, X₁₀ = Quantity of tomatoes wasted weekly, X₁₁ = Percentage of tomatoes wasted per sale, X₁₂ = Percentage of tomatoes lost to post-harvest wastage, and X₁₃ = Estimated loss of tomatoes due to wastage.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

Table 1 revealed the socioeconomic characteristics of 150 tomato marketers in the study area. The age distribution indicated that 27 respondents (18%) were less than 40 years old and, 90 respondents (60%) were within the age range of 41 and 50 years old, while 33 respondents (22%) were above 50 years of age. The mean age of the respondents was 45 years old, and this implies that tomato marketing was largely dominated by economically active individuals in the study area. The sex distribution of the respondents revealed that 129 respondents (86%) were female, while 21 respondents (14%) were male. The dominance of female tomato marketers (86%) is a common trend in Nigerian agribusiness, particularly in the marketing of perishable vegetables. This finding aligns with Adewumi and Adesina (2022), who noted that women are the primary actors in the retail and mid-level distribution of tomatoes, often due to their role in household food provisioning and their prevalence in informal market spaces. All the respondents (100%) were married, indicating that tomato marketing serves as an important economic activity that supports family livelihoods.

Educational status of the respondents revealed that 4 respondents (2.67%) had no formal education, 26 respondents (17.33%) had primary education, 117 respondents (78%) had secondary school education, and just 3 respondents (2%) had tertiary education. Most of the respondents, 78%, had secondary education; the high literacy rate (78% with secondary education) is in line with the findings of Oyeleke *et al.*, (2023) in Northern Nigeria, who reported that basic education enhances a marketer's ability to manage records and adopt simple improved practices. This distribution implies that the majority possess basic literacy and numeracy skills, which can enhance record-keeping, price negotiation, and market information utilization. The household size of the respondents revealed that 115 respondents (76.67%) had fewer than 5 household members, while 35 respondents (23.33%) had more than 5 household members. The secondary occupation of the respondents revealed that 127 respondents (84.67%) were into trading, 21 respondents (14%) engaged in farming, while just 2 respondents (1.33%) were civil servants. This suggests that most tomato marketers still chose other forms of trading as their secondary occupation, highlighting the market-oriented nature of their livelihood.

Furthermore, 78% of the respondents belonged to marketing associations, reflecting a high level of organization among traders. Membership in such associations often facilitates collective bargaining, access to credit, market information, and conflict resolution within markets. It also serves as a platform for social capital formation and cooperative support, which are critical for sustaining perishable commodity trade.

The source of capital revealed that 91.33% of marketers relied on personal savings, while only 8.67% obtained funds from cooperatives. The overwhelming dependence on personal capital suggests limited access to formal or institutional credit, which may constrain business expansion. This aligns with findings from Adeoye *et al.*, (2020), who reported that informal credit sources dominate small-scale agribusiness financing in Nigeria due to high collateral requirements and bureaucratic barriers in formal financial institutions. The type of tomato marketed shows that 81.33% of respondents marketed fresh tomatoes, while 18.67% marketed both fresh and processed forms; the dominance of fresh tomato marketing reflects consumers' preference for freshness and the limited development of value-added or processing infrastructure. Finally, 78% of marketers operated through local markets, while 22% purchased directly from farm gates. This indicates that local markets remain the primary marketing

channels, facilitating easy access to consumers and ensuring high turnover rates for perishable produce.

Table 1: Distribution of respondents based on their Socioeconomic Characteristics

Socio-Economic Characteristics	Frequency	Percentage	Mean
Age (years)			
Less than 40	27	18.00	45
41 – 50	90	60.00	
Above 50	33	22.00	
Sex			
Female	129	86.00	
Male	21	14.00	
Marital status			
Single/Widowed/Separated/Divorced	0.00	0.00	
Married	150	100.00	
Educational status			
No formal	4	2.67	
Primary	26	17.33	
Secondary	117	78.00	
Tertiary	3	2.00	
Household size			
Less than 5	115	76.67	4
5 – 10	35	23.33	
Secondary occupation			
Trading	127	84.67	
Farming	21	14.00	
Civil servant	2	1.33	
Membership of marketing association			
Yes	117	78.00	
No	33	22.00	
Source of Capital			
Personal saving	137	91.33	
Cooperative	13	8.67	
Type of tomato marketed			
Fresh	122	81.33	
Fresh & Processed	28	18.67	
Marketing channels			
Farm gate	33	22.00	
Local market	117	78.00	
Total	150	100.00	

Source: Field Survey, 2025

Identifying Major Causes of Tomato Wastage

Table 2 presented information on the occurrence, causes, stages, and extent of tomato wastage in the study area. The data revealed that all respondents (100%) experienced tomato wastage, indicating that losses are a universal and persistent challenge within the tomato marketing system. Identifying the causes of tomato wastage revealed that 106 respondents (70.67%)

experienced market glut, which accounted for the largest proportion; 21 respondents (14%) experienced transportation delay; 20 respondents (13.33%) experienced poor storage, while just 3 respondents (2%) experienced rough handling. The predominance of market glut as the major cause suggests a mismatch between supply and demand during peak harvest seasons when production exceeds market absorption capacity. This often leads to a rapid decline in prices and inability of marketers to sell perishable produce before spoilage occurs. Although rough handling (2%) appeared less significant in this study, it remains an underlying factor that contributes to mechanical injury and reduced shelf life, particularly when combined with high temperatures and poor packaging.

The stages at which most wastage occurred revealed that 106 respondents (70.67%) experienced wastage at the market, 24 respondents (16.00%) experienced wastage during transportation of the tomatoes, and 20 of the respondents (13.33%) experienced wastage during storage. The dominance of market-stage loss suggests that the critical point of wastage lies at the retail and wholesale levels, where tomatoes are exposed to open-air conditions, poor sanitation, and inadequate display or preservation methods. In terms of the proportion of tomatoes wasted per sale, 72.67% of marketers reported that less than 10% of their tomatoes are lost, while 27.33% experienced more than 10%. Although the majority reported minimal losses, the cumulative economic and nutritional implications are significant when scaled across markets and production seasons. Even a 10% loss in perishable produce such as tomatoes can translate into substantial income reduction for small-scale traders, reduced food availability, and increased volatility in market prices. The 27.33% of traders reporting up to 30% wastage reflects severe inefficiencies that could be mitigated through improved post-harvest management, better coordination between market actors, and adoption of appropriate storage technologies. The findings highlight that tomato wastage in the study area is widespread and predominantly market-induced, driven by seasonal gluts, inadequate market infrastructure, and weak post-harvest handling practices.

The main cause of wastage majorly delayed sales, which 103 respondents (68.67%) experienced; that, it results to failure in market coordination, a problem also identified by Adeniyi *et al.* (2023), who advocated for digital market information systems to bridge this gap.

Table 2: Distribution of Respondents Based on Tomato Wastage in the Study Area

Tomato Wastage	Frequency	Percentage
Do you experience tomato wastage?		
Yes	150	100.00
No	0	0.00
Causes of tomato wastage		
Poor storage	20	13.33
Rough handling	3	2.00
Transportation delay	21	14.00
Market glut	106	70.67
What stage does most waste occur in?		
Transportation	24	16.00
Market	106	70.67
Storage	20	13.33

Percentage of tomatoes is wasted per sale		
Less than 10%	109	72.67
10 – 30%	41	27.33
Percentage of tomato lost due to wastage		
Less than 10%	107	71.33
Above 10%	43	28.67
Main cause of wastage		
Inadequate storage	24	16.00
Long distance to market	23	15.33
Delayed sales	103	68.67
Types of storage facilities used		
Wooden crates	91	60.67
Plastic basket	15	10.00
Shade storage	44	29.33
Has reduced postharvest reduce profit		
Yes	148	98.66
No	2	1.34

Source: Field Survey, 2025

Method of Reducing Waste

Table 3 revealed the distribution of tomato marketers according to the methods employed to reduce wastage in the study area. The result showed that sorting/grading (49.33%) and processing (32.67%) are the most commonly adopted strategies for minimizing post-harvest losses. Other methods such as early marketing (10.67%), cold storage (5.33%), and improved packaging (2%) were less frequently used. This distribution suggests that while marketers recognize the importance of handling and value addition in reducing losses, the adoption of modern preservation and storage technologies remains limited due to infrastructural and financial constraints. Furthermore, early marketing, reported by 10.67% of respondents, represents a behavioural strategy aimed at selling produce quickly before spoilage occurs. This method reflects traders' attempts to minimize loss by accelerating turnover, especially when storage and processing options are limited. In contrast, cold storage (5.33%) and improved packaging (2.00%) were minimally used, underscoring the infrastructural and economic challenges associated with adopting modern post-harvest technologies.

When asked about the effectiveness of these methods, an overwhelming majority (96.67%) affirmed that the techniques used were effective, while only 3.33% disagreed. This indicates that traders perceive value in their current loss-reduction practices, even if they are mostly traditional and low-technology. However, all respondents (100%) expressed the need for support to adopt better methods, underscoring a strong demand for institutional, technical, and financial assistance. This unanimous response highlights the awareness among marketers of the potential benefits of modern post-harvest technologies and improved infrastructure. This indicates that while traders are resourceful, they are acutely aware of the limitations of their current practices and are eager to adopt better technologies if the barriers of cost and access are removed, a sentiment strongly supported by Bamidele and Adeyemi (2024).

Table 3: Distribution of Tomato Marketers Based on Methods of Reducing Tomato Wastage in the Study Area

Methods	Frequency	Percentage
Improved packaging	3	2.00
Cold storage	8	5.33
Early marketing	16	10.67
Sorting and grading	74	49.33
Processing	49	32.67
Are the methods effective?		
Yes	145	96.67
No	5	3.33
Do you need support to adopt better methods?		
Yes	150	100.00
No	0	0.00

Source: Field Survey, 2025

Profitability of Tomato Marketing

The analysis provides insights into the profitability and economic viability of tomato marketing, highlighting the relationship between total revenue, variable costs, and gross margin. The results revealed that the total revenue generated from tomato sales amounted to ₦178,650.25, while the total variable cost (TVC) incurred by marketers was ₦156,881.49. Consequently, the computed gross margin — the difference between total revenue and total variable cost — was ₦21,768.76, indicating that tomato marketing is a profitable enterprise, though with relatively modest returns. This finding is in agreement with Adamu et al. (2022), who also reported positive returns in tomato marketing across several Nigerian states. Notably, the cost structure shows that labour cost (₦33,662.12), cost of baskets (₦35,780.42), and nylon packaging (₦28,662.78) were the major contributors to total variable costs, jointly accounting for a substantial proportion of total marketing expenses. These costs reflect the labour-intensive nature of tomato marketing and the importance of packaging materials in the handling and preservation of perishable produce. The relatively high expenditure on packaging also suggests inefficiencies arising from the use of non-durable materials that require frequent replacement. Similarly, transportation cost (₦23,780.12) represents a significant portion of marketing expenses, underscoring the challenges of poor road infrastructure, fuel price volatility, and long distances between production and market centers all of which inflate logistics costs.

Other cost components such as loading (₦9,890.45), offloading (₦16,550.35), and market levies (₦8,555.25), though relatively lower, collectively add to the total cost burden and reflect the series of transaction points involved in moving tomatoes from producers to final consumers. These costs also indicate the presence of multiple market intermediaries and administrative charges that characterize agricultural produce markets in Nigeria. The gross margin of ₦21,768.76 implies that tomato marketing yields a positive return over variable costs, thereby justifying its economic sustainability as a livelihood activity for traders. However, the modest margin relative to total cost suggests that marketers operate under narrow profit margins, making them vulnerable to fluctuations in transportation costs, market glut, or spoilage. This is consistent with findings by Adenegan *et al.*, (2020) and Adeoye *et. al.*, (2021), who reported that while tomato marketing is profitable, the high perishability of the commodity and escalating transaction costs significantly reduce overall profitability.

Table 4: Cost and Returns in Tomato Marketing

Variable Cost Items	Value (N)
Total Revenue	
Total income from tomato sale	178,650.25
Variable cost items	
Transportation cost	23,780.12
Loading cost	9,890.45
Offloading cost	16,550.35
Labour cost	33,662.12
Market levies	8,555.25
Cost of basket	35,780.42
Cost of nylons	28,662.78
Total variable cost	156,881.49
Gross margin	21,768.76
$\text{BCR} = \text{TR}/\text{TC} = 178,650.25/156,881.49$ $= 1.1387$	
For every 1 naira invested in tomato marketing, there will be a return of 1.139	
$\text{Marketing efficiency} = \text{TR}/\text{TC} \times 100\%$ $= 113.9\%$	

Source: Field Survey, 2025

Factors Affecting Profitability of Tomato

Table 5 showed the regression analysis of factors affecting the profitability of tomato marketing in the study area, with an R^2 value of 0.8103, indicating that about 81% of the variation in profitability is explained by the independent variables included in the model. The dependent variable (Y) was the log of Cost and return in tomato marketing, while the independent variables were sex, age, marital status, years of education, household size, tomato type, marketing channel, membership in a marketing organization, access to credit, quantity of tomato wasted weekly, percentage of tomato wasted per sale, percentage of tomato lost to post-harvest wastage, and estimated loss of tomato due to wastage.

The results revealed that the sex of the respondents has a negative influence on the profitability of tomato marketing in the study area at 1%, suggesting that male marketers earn significantly less profit compared to their female counterparts. Marital status has a positive influence on profitability at 1%, implying that married marketers tend to earn higher profits, possibly due to the availability of family labour and social capital, which can be leveraged to enhance marketing operations and reduce transaction costs. Access to credit also has a positive influence on profitability at 5%, indicating that marketers with access to credit are able to invest more in transport, storage, and packaging, thereby reducing losses and improving returns.

Conversely, the quantity of tomatoes wasted weekly has a negative influence on profitability at 1%, showing that higher wastage levels drastically reduce income from tomato marketing. Similarly, the percentage of tomatoes wasted per sale and the estimated loss of tomatoes due

to wastage both have negative and significant coefficients ($p < 0.05$), confirming that postharvest losses are major constraints to profitability. These findings align with previous studies that identified postharvest spoilage as a key challenge in perishable produce marketing due to poor handling, lack of cold storage facilities, and inefficient transportation systems. Interestingly, the percentage of tomatoes lost to postharvest wastage shows a negative and significant relationship ($p < 0.01$) with profitability. Other variables such as age, education level, household size, tomato type, marketing channel, and membership in marketing organizations were statistically insignificant, implying that these characteristics do not have a direct influence on profitability.

Table 5: Regression Analysis of Factors Affecting Profitability of Tomato Marketing

Variables	Coef.	Std. Err.	t	P> t
Sex	-1.213714	0.29027	-4.18***	0.000
Age	0.004412	.0162055	0.27	0.786
Marital status	2.471073	.671088	3.68***	0.000
Years of education	-0.225963	.692759	-0.33	0.745
Household size	-0.042116	.129322	-0.33	0.745
Tomato type	0.095369	.093710	1.02	0.311
Marketing channel	0.078039	.093837	0.83	0.407
Membership of marketing organization	0.036680	.183542	0.20	0.842
Access to credit	0.5845	.267606	2.18***	0.031
Quantity of tomato wasted weekly	-1.02220	.185787	-5.50***	0.000
Percentage of tomato wasted per sale	-.338416	.170754	-1.98**	0.049
Percentage of tomato lost to postharvest wastage	-4.942147	1.342178	3.68***	0.000
Estimate loss of tomato due to wastage	-0.438603	0.177009	-2.48***	0.014
Constant	-0.299883	0.159029	-1.89	0.061
R ²	0.8103			
Number of observations	150			

Source: Field survey, 2025.

Note: *** = sig. at 1%, ** = sig. at 5%, and * = sig. at 10%

CONCLUSION

Tomato marketing in the study area was largely dominated by females, and most of the respondents were in their economically active age. The majority of the respondents relied on personal savings for their tomato marketing, and they marketed fresh tomatoes at the local markets. This limited their ability to invest in modern preservation and processing technologies. Although traders adopt traditional methods such as sorting, grading, and processing to reduce losses, these strategies remain largely insufficient to address the scale of wastage. The findings further establish that postharvest losses have a direct and significant negative impact on profitability, reducing income and discouraging investment in the tomato value chain.

The gross margin of ₦21,768.76 implies that tomato marketing yields a positive return over variable costs, thereby justifying its economic sustainability as a livelihood activity for traders. However, the modest margin relative to total cost suggests that marketers operate under narrow

profit margins, making them vulnerable to fluctuations in transportation costs, market glut, or spoilage.

Marital status and access to credit facilities enhance the profitability of tomato marketing in the study area. Sex, quantity of tomato wastage/week, percentage of tomato wasted per sale, and percentage of tomato lost to wastage reduced profitability of tomato marketing in the study area.

The enterprise is constrained by pervasive postharvest wastage resulting from market glut, inadequate storage facilities, transportation delays, and poor handling practices. However, the adoption of improved packaging, timely transportation, and better storage practices will enhance profit margin and reduce wastage.

Recommendation

Based on the findings of this study, the following recommendations are made:

1. Government and private investors should establish affordable and accessible processing centers in major tomato-producing and marketing hubs. This will reduce postharvest deterioration, especially during periods of market glut.
2. Road networks linking rural production areas to urban markets should be improved to facilitate faster and safer transportation of tomatoes.
3. Financial institutions and cooperative societies should design flexible and low-interest credit schemes tailored to small-scale tomato marketers. This will enable traders to invest in modern packaging materials, improved storage technologies, and business expansion.
4. Encouraging tomato marketers to engage in small-scale processing (e.g., tomato paste and puree production) will help stabilize prices during glut periods and extend product shelf life, thereby increasing profitability.
5. Establishing an efficient market information system will help traders make informed decisions on pricing, timing, and volume of sales, thereby reducing the risk of glut and delayed sales.

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