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Measurement of Technical Efficiency and Value Addition of Hybrid Tomato Production Under Urban Homestead Farming in Southwest Nigeria

Isaac Olusegun Ogunwande

Department of Agricultural and Resource Economics, Federal University of Technology Akure, P.M.B. 704, Ondo State, Nigeria

Email: ioogunwande@futa.edu.ng

Abstract

Food production, processing, distribution and consumption are inevitable activities embarked upon in reversing the upward trend of hunger and poverty globally through profit to producers and utility to consumers. The study measured the technical efficiency and value addition of hybrid tomato under urban homestead in southwest Nigeria. Multistage sampling procedure was used in the selection of 275 respondents which comprised input dealers (50), farmers (100), wholesalers (50) and retailers (75) using copies of well structured and pretested questionnaires administered by trained enumerators. Results of the socioeconomic characteristics for age were average of 51years, 64years, 49years and 64years for input dealers, farmers, wholesalers and retailers respectively while the mean monthly income for input dealers, farmers, wholesalers and retailers were in the respective of N66, 843.00, N40, 556.00, N73, 061.00 and N86, 554.00. Profit ratio showed the financial performances of the operators in the value addition with input dealer (2.59), Farmer (1.22), retailer (1.46) and retailer (2.31) suggesting that input dealers had highest financial gain while farmers recorded the least. The mean technical efficiency ratio for the input dealers, farmers, wholesalers and retailers were 0.95, 0.96, 0.53 and 0.75 respectively, which negate the direction of profit ratio. Inaccessibility to farm credit was ranked first among all the constraints identified revealing the acute effect on the activities of all operators along the tomato value chain. It is therefore recommended that government, non-governmental and stakeholder in the business should make funds available to operators in the tomato business so to invigorate activities in the food network.

Keywords: Farming, Hybrid Tomato, Urban Homestead, Value Addition

Introduction

Tomato (*Lycopersicon esculentum* Mill.) is one of the most important fruit vegetables grown in Nigeria due to its rich minerals, vitamins, essential amino acids, sugars and dietary fibers. The annual global production of fresh tomatoes accounts for approximately 180 million metric tonnes (FAO, 2019). According to data from FAOSTAT(2022), the world produced 186.821 million metric tonnes of tomatoes on 5,051,983 hectares in 2020 achieving an average yield of 37.1 metric tonnes/hectare (mT/ha) while Africa alone produces 21 million tons from 1.3 million hectares (FAO, 2017). Global production of tomato reported that China is the highest producer with 648,658.07mT in Asia, followed by Italy in Europe with 624,791.0mT and Egypt has highest of 6731220mT in Africa amongst others (Parma, 2022). Tomato is one of the most-consumed vegetables in the world, followed by potatoes and onions being a major ingredient for preparation of many kinds of delicacies found on the tables of an average household

worldwide. Nigeria produced 369,372.2mT of tomato in 2022 that is consumed by about 220million population with per capita consumption of 0.0184tons/year which is considered insufficient. Application of technology through the use of new and high yielding varieties of the tomato may be a better option for increased yield that will be enough to consume with surplus converted to cash to meet other financial needs of farmers.

The specific objectives for this research are to describe the socioeconomic characteristics of the respondents; identify prevalent hybrid tomato varieties grown by the respondents; estimate the profitability of hybrid tomato business actors; determine the efficiency of tomato business actors and examine the perceived constraints in hybrid tomato production. Figures 1 and 2 showed the variety of tomatoes mostly grown being displayed and the actors in the business.



Figure 1: Hybrid Tomato Variety Farm



Figure 2: Harvested, Sorted & Graded Tomato

Methodology

Tools of Analysis

Descriptive statistics was used to analyze the socioeconomic characteristics of the respondents. Gross Margin Analysis (GMA) was used in the estimation of profitability of tomato among farmers and this is defined as: $GMA = TR - TVC$; where TR is Total Revenue and TVC is Total Variable Cost. Profitability Ratio = GM/TVC .

Stochastic Frontier Production Function (SFPF)

SFPF was used in the estimation of technical efficiency; this is specified as:

$Y = f(X_{ai} \beta) e^{\varepsilon}$, where Y = Quantity of tomato output (in kg); X_a = Vector of input quantities (in kg and litres); β = Vector of parameter and ε = is error term; where $\varepsilon = v_i - u_i$

Likert Scale Rating

Likert Scale Rating was used in examining the constraints militating against tomato production among the farmers. The five point rating scale consisting of Strongly Agreed (5), Agreed (4), Undecided (3), Disagreed (2) and Strongly Disagreed (1).

Results and Discussions

Socioeconomic Characteristics of the Respondents

Table 1 presents the socioeconomic characteristics of the tomato farmers. The result on average age revealed farmers (47years), wholesalers (49years) and retailers (36years), suggesting that actors are productive. Input dealers (51years) are older but found it easier to deal in input sales probably due to its sedentary nature and lucrative advantage. Average years of experience for input dealers (15years), farmers (19years), wholesalers (16years) and retailers (18years) indicating that all actors had enough experience to perform optimally. The household size for all the four actors was less than seven. This shows that all tomato farmers being in the urban had enough information on family planning as they believe in better welfare for their households. All actors along the value addition chain were cooperative members as this is to enable them access to technical information and credits.

Table 1: Socioeconomic Characteristics of the Respondents

Variable	Input Dealer (%)	Farmers (%)	Wholesaler (%)	Retailer (%)
Age(in yrs)				
≤20	01	02	01	02
20-40	12 (51years)	47 (47years)	15 (49years)	17
41-60	20	27	20	28 (36years)
>60	67	24	64	53
Experience(in yrs)				
≤10	13	19	16	20
11-20	17 (15years)	32 (19years)	11 (16years)	22 (18years)
>20	70	49	73	58
Household(No.)				
≤6	33	40	25	41
7-10	13 (5members)	48 (7members)	52 (7members)	22 (6members)
>10	54	12	23	37

Source: Field Survey, 2022.

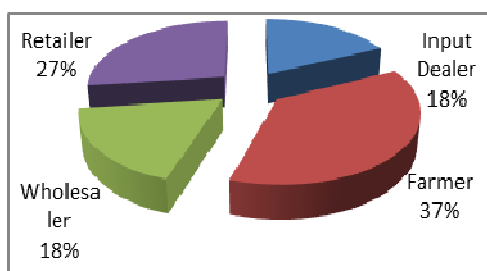


Figure 2: Actors in Tomato Business

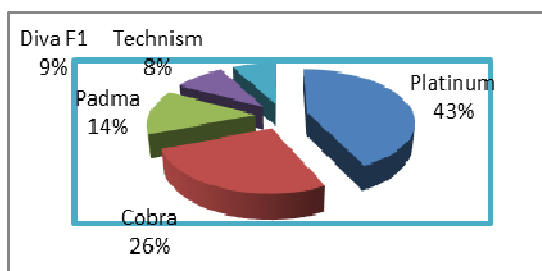


Figure 3: Varieties of Tomato Cultivated

Prevalent Hybrid Tomato Varieties Cultivated by Farmers

In Table 2 showing varieties of tomato grown by farmers, Platinum(43%) received highest patronage while Technism (8%) the least. The period of maturity, quantity of yield and resistance to pest and diseases were the unique attributes determining choice of varieties of tomato planted by the farmers.

Table 2: Distribution of Tomato Varieties Prevalently Produced Based on Choice by Actors

Tomato Mostly Preferred	Frequency	Percentage	Rank
Platinum F1	266	96.7	1 st
Cobra	243	88.4	2 nd
Padma F1	225	81.8	3 rd
Diva F1	187	68.0	4 th
Technism	145	52.7	5 th

Source: Field Survey, 2023

Profitability Estimation of Hybrid Tomato Varieties

Table 3 presents actors' financial performances in terms of profitability. The profitability ratio showed that farmers (1.22) had the least while input dealers (2.59) were most scored. Wholesalers and retailers had 1.46 and 2.31 profitability ratio respectively. The result showed that all actors produced profitably.

Table 3: Financial Performances of Tomato Business Operators

Variable	Value Addition Operators			
	Input Dealer	Farmer	Wholesaler	Retailer
Total Revenue	804,764.00	543,350.00	854,254.00	554,933.00
Total TVC	310,808.40	446,462.14	584,693.00	239,503.05
Gross Margin(TR-TVC)	493,955.60	196,887.86	269,561.00	315,429.95
Profitability Ratio(TR/TVC)	2.59	1.22	1.46	2.31

Source: Field Survey, 2023.

Technical Efficiency of Actors across Value Addition Stages

From the result in Table 4, retailers had mean highest (92%) technical efficiency while farmers had the least (67%) and the respective of input dealers and wholesalers had 83% and 72% respectively. From the result, retailers were rated highest in the conversion of input to output without waste.

Table 4: Technical Efficiency of Different Actors in Each Stage of Tomato Production

Eff. Range	ID(No)	%	F(No)	%	W	%	R (No)	%
Total	50	100.0	100	100.0	50	100.0	75	100.0
Mean TE	83.0		67.0		72.0		92.0	

Source: Field Survey, 2023

NB: ID: Input Dealer F: Farmer W: Wholesaler R: Retailer

Perceived Factors Militating Against Hybrid Tomato Production

Table 5 presents the problem impeding hybrid tomato business and production among farmers. Insufficient labour supply (4.10) was the most critical problem. It could be inferred from this result that despite the fact that labour is massive in the urban, farm labour is still scarce and cost of their services to farmers is high due competition between industries and farming.

Table 5: Perceived Factors Militating Against Hybrid Tomato Production

Conceptual Statement	SA	A	U	D	SD	MS	MW	Rank
Large number of middlemen	37.9	32.1	17.1	9.2	3.8	939	3.91	2 nd
Bad road network	30.0	30.8	32.1	11.7	5.4	884	3.68	3 rd
Insufficient labour supply	49.4	26.4	12.5	8.3	3.3	777	4.10	1 st

Source: Field Survey, 2023

Conclusion and Outlook

From the findings, despite all challenges faced by the operators in the hybrid tomato varieties value addition, they were found to be technically efficient and made optimal revenue and profit.

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