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# Analysis of Tomato production in some selected local government areas of Kano State, Nigeria

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## Abstract

This study analysed tomato production in some selected Local Government Areas of Kano State, Nigeria. The specific objectives were to: describe the socio-economic characteristics of tomato farmers; assess tomato value addition by farmers and marketing channels; determine the profitability of tomato production; and identify the constraints associated with tomato production in the study area. The study adopted multistage sampling technique to collect primary data from 101 respondents using a semi-structured questionnaire. Data collected were analysed using descriptive statistics and gross margin analysis. The findings of the study reveal that tomato production is a male-dominated activity, who are mostly married (85.5%), having an average household size of 9 persons. Similarly, the study revealed that all the respondents were small-scale farmers cultivating below 5 ha of land with a mean farming experience of about 15 years. Findings of the study revealed that the majority of produce are sold at the farmgate and local markets, mostly in fresh forms. The gross margin of the venture was ₦302832, while the Net farm income and return on investment were ₦245916 and 114.5% respectively. This implies that tomato production is a profitable venture in the study area. Based on the result, pest and diseases, lack of modern production and processing facilities, inadequate capital, inadequate information on production and marketing, price fluctuation, and lack of government support were ranked topmost among the respondents' challenges. The study recommends among others the need for farmers to be encouraged to form strong cooperative societies through which they can access resources necessary for their activities.

## Keywords

Gross Margin analysis, tomato, production, Kano State, Nigeria

## Presenters Profile

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## Introduction

The Nigerian state will continue to depend on agriculture to meet its various socio-economic needs, considering its role in the provision of food and employment for the nation's ever-increasing population. Tomato (*Lycopersicon esculentum*) is among the major vegetables being produced in the country, and is consumed in various forms (Aditi *et al.*, 2011; Aremu *et al.*, 2016). Nigeria is among the world's leading producers of tomato (ranked 16<sup>th</sup>), and also the leading producer in Sub-Saharan Africa (Ugonna *et al.*, 2015). As at 2010, the country's production was about 1.8 million metric tonnes, which represent about 68.4% of West-African production (FAO, 2010). Despite this status in the global and regional ranking in tomato production, the country still imports tomato to meet its demands (Edeh 2017; Okojie, 2017). According to Sunday *et al.* (2018), Nigeria's annual tomato imports is valued at US\$170 million. This is because tomato is highly consumed across all the regions of the country, constituting about 18% of the daily vegetable consumption of households (Babalola *et al.*, 2010). The plant is a rich source of vitamin A and C, and also contains minerals like iron, phosphorus and is the richest source of nutrients, dietary fibres, antioxidant like lycopene and beta-carotene, the compounds that protect cells from cancer.

The plant's life span ranges between three to four months, and adapts well to different cropping systems. Tomato in Nigeria is widely cultivated in Northern parts of the country, because of the effect of seasonality (Aminu *et al.*, 2007). Small-scale farmers hiving less than 5 hectares of land constitute the majority (90%) of the producers (Faostat, 2014; Sahel research, 2015). Large scale tomato production in Nigeria is mainly under irrigation during the dry season, when temperatures are mild and humidity is moderate. However, tomato production in the rainy season is usually affected by pests and diseases that are prevalent under such humid and warm conditions. According to Ugonna *et al.* (2015), tomato farmers just like other farmers are constrained by poor production practices due to low soil fertility, lack of improved seeds, lack of improved technology, inadequate pest and weed control, high postharvest losses and lack of processing and marketing infrastructure among others. Currently, tomato yield per hectare in Nigeria is low, estimated at an average of 20-40 tons per ha/annum, and 40-50% of the output is lost due to the poor handling, processing and preservation practices in Nigeria (Faostat, 2014). Similarly, the challenges of the farmers are being compounded by the ravaging incidence of diseases, particularly in 2016 when *Tuta Absoluta* (tomato leafminer) destroyed farmers' annual harvest.

In view of the nation's population, and the level of consumption of the commodity in the country, the Federal Government of Nigeria was able to develop a new tomato sector policy (Olanite 2017; Edeh 2017; AETS Consortium, 2018). The objectives of this sector policy reform were to enhance import substitution of tomato paste, stimulate investments in the national tomato processing industry and create employment, and contribute to the reduction of the huge post-harvest losses (Edeh 2017; Okojie, 2017). This policy targeted the leading locations of tomato production in the country. One of such areas where this policy was expected to stimulate positive gains was Kano State, which produces about 7.5% (44,020 Ha) of the nation's total area under tomato production (Plaisier *et al.*, 2019). The State is located at the merge between the Central area and the Northern area and has a Sahelian climate, which is suitable for tomato production (Van der Waal, 2015). Kano State is the commercial nerve centre of the entire northern Nigeria, and also the most populous state in the country (National Population Commission, 2006).

Tomato production entails different cost out lays, hence the need to know its profitability before venturing into the production. Profit maximization is one of the important goals of farm business. This can practically be achieved through the knowledge of costing production and estimation of benefits in monetary terms hence these prompted this research work. Profitability in some businesses exists because they are managed more efficiently than others. The prospect of earning and maintaining profitability serves as the incentive for creativity and efficiency among farmers. Profitability stimulates farmers to venture into risky business and also drive them to develop ways of cutting cost and adopting new technologies, always in an effort to satisfy consumer interest (Troke, 1981). Therefore, the main objective of the study is to analyse how profitable tomato production has been in one of the leading production areas of Nigeria, which is Kano State. The specific objectives were to:

- i. describe the socio-economic characteristics of tomato farmers;
- ii. assess tomato value addition by farmers and marketing channels;
- iii. determine the profitability of tomato production;
- iv. identify the constraints associated with tomato production in the study area.

## **Methodology**

### ***The Study Area***

Bunkure and Kibiya Local Government Areas (LGA) were selected for the study from areas of high tomato production in the State. The State is located at the merge between the Central area and the Northern area and has a Sahelian climate, which is suitable for tomato production (Van der Waal, 2015). The climate of area is the tropical dry-and-wet type. The and dry season lasts from mid-October to May, during which the mean monthly temperature is between 21 and 23°C with a diurnal range of 12 to 14°C. The harmattan winds prevail at this time. Similarly, the wet season lasts from June to September, the mean monthly temperature during this period is in excess of 30°C and the daily range is up to 20°C.

### ***Sampling Technique***

A multistage sampling technique was adopted to select respondents for the study. In the first stage, two Local Government Areas were randomly selected from the list of areas identified as notable tomato production areas by the Kano state Agricultural and Rural Development Authority (KNARDA). In the second stage, purpose sampling method was used to select five communities that are actively involved in intensive tomato production. These communities were; Bunkure town, Zango, Galadanci, Nasarawa, and Kuruma. In the third stage, simple random sampling technique was used select 101 tomato farmers for the study. Semi-structured questionnaire was used to collect primary data from the sampled respondents for the study.

### ***Analytical Technique***

Descriptive statistics and farm budgeting technique (gross margin analysis) were used to analyse the data collected for the study. Descriptive statistics, which involve the use of frequency table, mean, and percentages were used to describe the respondents' socioeconomic characteristics, value addition and marketing channels, and identify farmers constraints. Similarly, gross margin analysis was used to assess the profitability of tomato production in the area. The formulas are presented thus;

### **Gross margin**

$$GM = \sum P_i Q_i - \sum K_j X_j \dots\dots\dots (1)$$

where:

- GM = Farm Gross Margin (₦/ha)
- $P_i$  = Unit price of output (₦/Kg)
- $Q_i$  = Quantity of output (Kg/ha)
- $K_j$  = Unit cost of variable input  $j$  (₦/ha)
- $X_j$  = Quantity of variable input  $j$  (Kg/ha)
- $P_i Q_i$  = Total revenue (₦/ha)
- $K_j X_j$  = Total cost associated with variable input  $j$  (₦)
- Gross Margin = Total Revenue (TR) – Total Variable Cost (TVC)
- TR = Output (Q) \* Price (P)

### **Net Farm Income**

$$\text{Net farm income (NFI)} = \text{Total Revenue (TR)} - \text{Total Cost (TC)} \dots\dots\dots (2)$$

$$\text{Total Cost} = \text{Variable Cost (TVC)} + \text{Fixed Cost (FC)}^3$$

$$\text{Return per Naira invested} = \text{NFI} / \text{TC}$$

## **Results and Discussion**

### **Respondent's Socio-Economic Characteristics**

The distribution of the respondents' socioeconomic characteristics is presented in Table 1. The result revealed that in terms of age, the result revealed that the majority (51.5%) of the respondents were below 40 years of age. This implies that the majority of the respondents are within their economically active age and would be able to undertake the farming activities with the expected vigour. Based on gender, findings of the study revealed that tomato farming is male-dominated activity as all (100%) the respondents were of the male gender, and mostly married (85.5%). The average household size of the respondents was about nine people, implying a relatively large household size that can supply family labour for production. The distribution of the respondents' level of educational attainment indicated that the majority (79.2%) of the respondents have attended formal schools, while 20.8% had no formal education. This shows that the majority of the respondents are literate enough to understand how best the commodity can be produced using new innovations if they are exposed to them. Findings of this study further revealed that all the respondents were small-scale farmers having farm holdings of less than 5 hectares, but are mostly experienced in the activity (average farming experience of 15.3 years). In terms of access to credit, the majority (53.5%) had no access to the facility, and also most of them do not belong to any cooperative society (83.2%). The study also revealed that most of the respondents were visited by agricultural extension agents.

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<sup>3</sup> The Total Fixed Cost (TVC) is composed of; Depreciation on Farm Implements, Cost of Rent Farm Land, and cost of Labour.

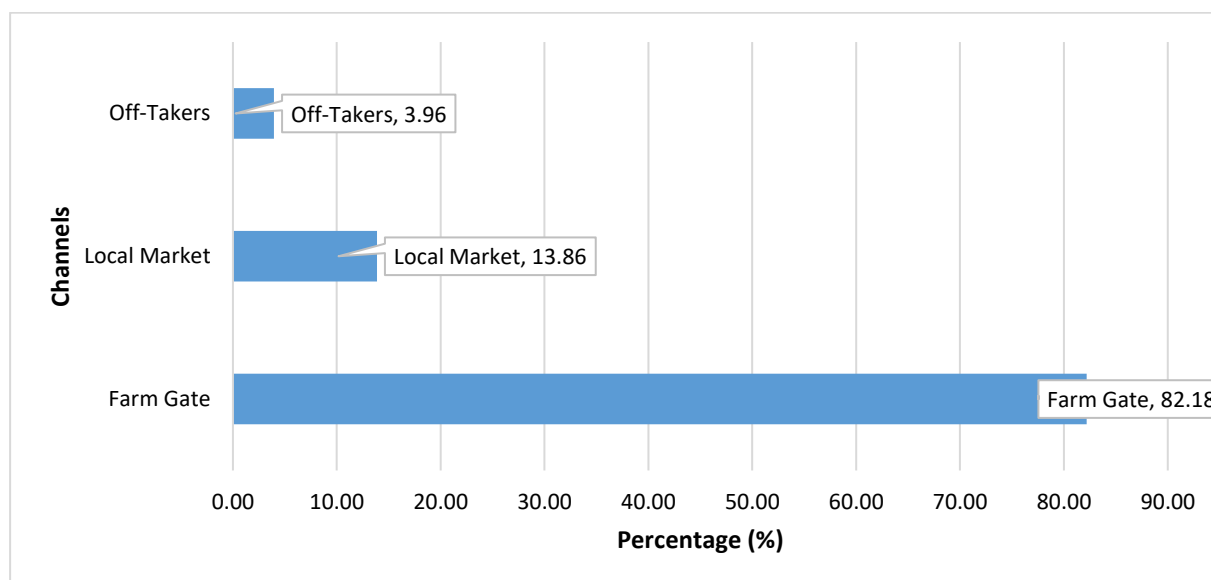
**Table 1: Socioeconomic Characteristics of the Respondents (N=101)**

Variable	Frequency	Percentage	Mean
<b>Age (Years)</b>			39.6 years
20-29	15	14.9	
30-39	37	36.6	
40-49	27	26.7	
50-59	18	17.8	
≥60	4	4.0	
<b>Gender</b>			
Female	0	0.0	
Male	101	100.0	
<b>Marital Status</b>			
Married	86	85.1	
Single	6	5.9	
Divorced	3	3.0	
Widowed	6	5.9	
<b>Household Size</b>			9 People
1-5	19	18.8	
6-10	42	41.6	
11-15	23	22.8	
16-20	13	12.9	
>20	4	4.0	
<b>Educational Attainment</b>			
No Formal Education	21	20.8	
Primary Education	27	26.7	
Mass Literacy	10	9.9	
Secondary School	17	16.8	
Tertiary Level	26	25.8	
<b>Farming Size</b>			0.78 Ha
<5	101	100.0	
<b>Farming Experience</b>			15.3 years
1-5	9	8.9	
6-10	21	20.8	
11-15	25	24.8	
16-20	21	20.8	
>20	25	24.8	
<b>Cooperative Membership</b>			
Member	17	16.8	
Non-Member	84	83.2	
<b>Access to Credit</b>			
No	54	53.5	
Yes	47	46.5	
<b>Access to Extension Services</b>			
No	15	14.9	
Yes	86	85.1	

Source: Field survey, 2019

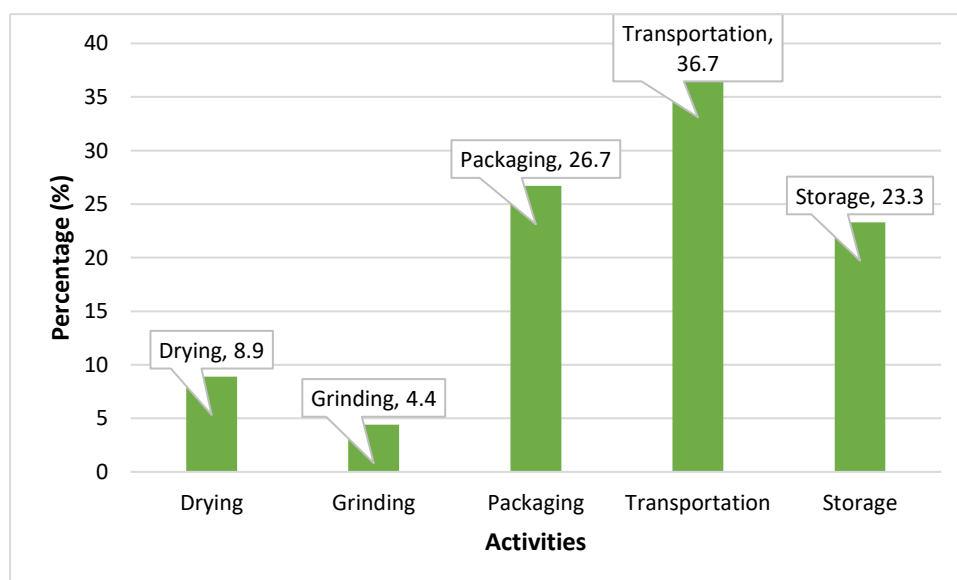
### Tomato Value Addition and Marketing Channels

Farmers are expected to trade agricultural commodities to earn income. Figure 1 shows the channels the respondents use to trade the commodity after harvest. Findings of the study revealed that the majority of the produce is sold at the farmgate, followed by local markets, and then to off-takers. Similarly, Figure 2 shows the value farmers add to their produce before selling them. The result revealed that transportation, packing, and storage are the most prominent activity in the area. Other activities include drying and grinding.



**Figure 1: Tomato Marketing Channels in the Study Area**

Source: Field survey, 2019



**Figure 2: Value Added to Tomato by the Farmers**

Source: Field survey, 2019

### Profitability of Tomato Production

The profitability of tomato production was estimated using gross margin analysis as shown in Table 2. The essence of the analysis was to assess the gains made on the investment in the



farm, and also identify areas that need improvement to maximize gains. The result showed that the respondents incurred the bulk of the expenses on the variable inputs of fertiliser (25.2%), fuel and watering (16.4%), pesticide/insecticide (14.4%), and ploughing (7.9%). Similarly, rent on land was the highest fixed cost component, and constituted about 21% of the total production cost. The gross margin of the venture was ₦302832, while the Net farm income and return on investment were ₦245916 and 114.5% respectively. This implies that tomato production is a profitable venture in the study area.

**Table 2: Average Cost and Return of Tomato Production**

Variable	Value <sup>4</sup> (₦/Ha)	Percentage (%)
<b>A. Variable Cost Components</b>		
i. Clearing	3595	1.7
ii. Ploughing	17020	7.9
iii. Planting	2148	1.0
iv. Fuel and watering	35303	16.4
v. Manure	1799	0.8
vi. Inorganic Fertiliser	54148	25.2
vii. Weeding	3872	1.8
viii. Stalking	1148	0.5
ix. Pesticides/Insecticide	30883	14.4
x. Harvest	5536	2.6
xi. Bagging/Sorting	2400	1.1
<b>Total Variable Cost (TVC)</b>	<b>157852</b>	<b>73.5</b>
<b>B. Fixed Cost</b>		
i. Depreciation on Farm Implements	1895	0.9
ii. Cost of Rent Farm Land	45000	21.0
iii. Labour	1021	4.7
<b>Total Fixed Cost (TFC)</b>	<b>56916</b>	<b>26.5</b>
<b>Total Cost (TVC + TFC)</b>	<b>214768</b>	<b>100.0</b>
<b>C. Returns</b>		
Sales	425349	
Household Consumption/ Gifts	35336	
<b>Total Revenue (TR)</b>	<b>460684</b>	
Gross Margin (GM)	302832	
Net farm income (NFI)	245916	
Return on investment (ROI)	114.5(%)	

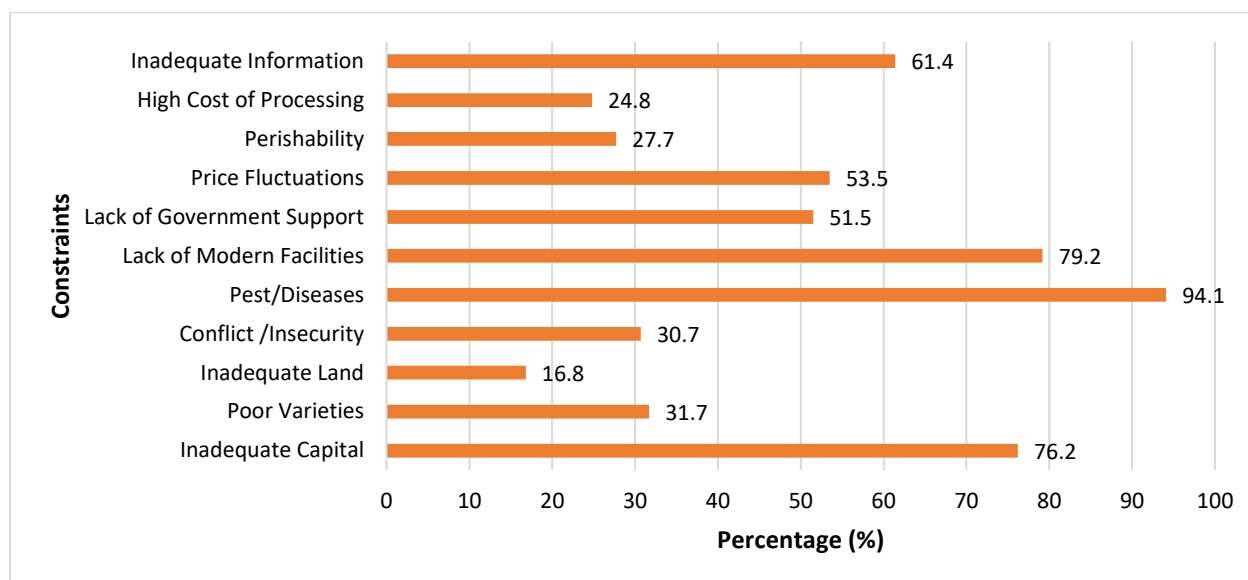
Source: Field survey, 2019

### **Constraints Associated with Tomato Production**

The result in Figure 3 outlines the various constraints faced by tomato farmers in the study area. Based on the result, pest and diseases, lack of modern production and processing facilities, inadequate capital, inadequate information on production and marketing, price fluctuation, and lack of government support were ranked topmost among the respondents' challenges. Other challenges included conflicts/insecurity, high perishability of the produce, high cost of processing, and poor tomato varieties being cultivated. The interplay of these

<sup>4</sup>\$1USD= ₦365 (Naira) as at the time of conducting the survey

myriad of challenges has limited the ability of the farmers to maximise gains from tomato production in the area.



**Figure 3: Constraints Associated with Tomato Production**

Source: Field survey, 2019

## Conclusions and Recommendations

This study has established that tomato production is a profitable venture in the study area, however, if necessary actions are taken by key stakeholders in the sector, particularly by the government, farmers will be able to maximise gains and improve their wellbeing. Based on the study, the following recommendations were made to increase the profitability of tomato production:

- i. There is the need for farmers to be encouraged to form strong cooperative societies through which they can be able to access resources necessary for their activities.
- ii. The government should assist farmers with training and resources that they can use to prevent/control pest and diseases which usually reduce their profitability.
- iii. Financial institutions should be encouraged to give farmers enhanced access to credit facilities as groups or individuals so as to enable them afford the adoption of improved farming technologies that can boost production.

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