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ECONOMIC ANALYSIS OF TOMATO MARKETING IN ILORIN METROPOLIS, KWARA STATE, NIGERIA

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Abstract: Marketing of tomatoes is a complex phenomenon due to their perishable nature, seasonality and bulkiness, and as such, tomato production requires an efficient marketing system. Studies on tomato marketing in the study area are rare in the literature. Thus, this study analysed tomato marketing in Kwara State, Nigeria. A simple random sampling technique was used in the selection of one hundred and twenty tomato marketers. A well-structured questionnaire was used for data collection. Data collected were analysed using descriptive, Herfindahl index, costs and returns analysis and multiple regression analysis. The study revealed that most (70%) of the marketers were female with mean age of 39.5 years. The Herfindahl index of 0.008 revealed that the tomato market tended toward pure competition. Furthermore, tomato marketing is a profitable venture in the study area with a monthly gross margin of ₦310,095. The average rate of returns to total investment was 52.6%. This implies that an average profit of ₦53k was realized on every naira invested in vegetable marketing in the area. Moreover, the regression analysis indicated that about 96% of the total variation in net returns was explained by the independent variables. The study revealed that purchase cost, labour cost, transport cost and marketing experience were important in determining the net returns of tomato marketers. Most (30%) of the respondents identified finance to be their major constraint. This study therefore recommends that tomato marketers should pool their resources to reap the benefits of economies of scale. Also, policies and strategies that lower marketing cost should be vigorously pursued.

Key words: profitability, wholesalers, Herfindahl index, marketing and tomato.

Introduction

Despite the high oil revenue, agriculture is still one of the most important sectors of the Nigerian economy. Agriculture contributes over 40% of Nigeria's

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GDP, employs about 70% of the population and produces about 80% of the food needs (Aye, 2013). Among the wide range of agricultural crops, vegetables occupy an important place because of their economic potentials. The term 'vegetable' applies to those plants and plant parts that are edible, especially leafy or fleshy parts that are usually eaten with staples as main courses or supplementary foods in cooked or raw forms. It is estimated that there are at least ten thousand (10,000) plant species used as vegetables worldwide although only about fifty (50) are of great commercial value (Shing-Jy and Hsiao-Feng, 2003). Vegetables play a very significant role in human nutrition; they contain vitamins, minerals and chemical compounds that are essential for human health. For instance, vitamin A maintains eye health and strengthens the immune system, vitamin B helps convert food to energy, folate reduces the risk of some birth effects and helps prevent heart diseases. Vitamin C increases the absorption of calcium and iron from other food. Vitamin E is a powerful antioxidant that protects the cell from cancer causing agents. Dietary fibre helps move food through the digestive tract and lower blood cholesterol levels (FAO, 2006). The World Health Organization (WHO) places low vegetable intake sixth among its twenty risk factors of global human mortality, just behind better known killers such as tobacco use and high cholesterol (FAO, 2006). It is to this end that a minimum level of 400g per head per day is recommended for the consumption of vegetables by the WHO. However, according to the FAO (2010), vegetable consumption per head per day in Nigeria is as low as 179g compared to the recommended rate. Apart from its nutritional benefits, vegetables also serve as a source of employment for both the rural and urban dwellers directly or indirectly providing smallholder farmers with much higher income and more jobs per hectare than staple crops (AVRDC, 2006).

Among different vegetables grown in Nigeria, tomato clearly stands out as the most important both in scale of production and level of consumption (Adejobiet al., 2011). Tomato (*Solanum lycopersicum*) is grown by most dry season market gardeners who regard it as the principal crop. Tomato is one of the most important vegetable crops both in scale of production and level of consumption. Most other vegetables have restricted demand in Nigeria, demand for tomato is universal. Tomato has the great poverty alleviation capacity. Its production, handling, transportation, distribution and marketing will definitely employ a large number of people. Tomato can be processed and exported to other West African nations or sold within the country. An increase in agricultural productivity depends heavily on its marketability. An efficient market does not only link sellers and buyers in reacting to current situations in supply and demand but rather has a dynamic role to play in stimulating consumption of outputs which are essential elements of economic development (Haruna et al., 2012). Katharina and Stefan (2011) have reported that the concept of marketing subsumes a set of different innovative advertising instruments which aim at having a large effect with a small budget.

Agricultural marketing is defined as the performance of all the activities involved in the flow of agricultural products and services from the initial points of agricultural production until they reach the hands of the ultimate consumers. It is concerned with all that happens to crops after they leave the farm gate; making decisions, taking actions and bearing the responsibility of the action. Agricultural marketing also articulates all processes that take place from when the farmer plans to meet specified demands and market prospects to when the produce finally gets to its consumers (Haruna et al., 2012). Aminu (2009) pointed out that in a typical vegetable marketing, retailers and wholesalers were observed to sell both tomato and onion at the same time in addition to other vegetables like hot pepper, sweet pepper, cabbage, salad and in some cases, chili pepper. The crops were sold in heaps, small baskets and metal containers of varying weights.

Tomato marketing is poorly developed in Nigeria. It is characterized mainly by the problem of seasonality and perishability amongst others. Worst still, in the past, the government paid more attention to production with little attention to the marketing of vegetables such as tomato, pepper, onions, garden eggs, okra and leafy vegetables despite the fact that they need spatial marketing facilities (Idachaba, 2000). Consequently, losses of 40–50 percent occur for many vegetables mainly due to spoilage, inadequate transportation, sorting, improper packaging and handling and lack of storage facilities. Also, another problem with tomato marketing is in the area of standard weights and measurements. These leave the consumer to their luck and haggling abilities in securing a good deal. Thus, this study describes the marketing functions and structure, estimates costs and returns to tomato marketing and determines the factors influencing net returns of tomato marketers.

Materials and Methods

Area of study

The study was carried out in six major vegetable markets within Ilorin metropolis, namely: Oko-olowo, mandate, sango, ipata, tanke and garage-offa markets. Ilorin is the capital of Kwara State, Nigeria. The choice of Kwara State for this study was deemed to be appropriate given its antecedent in agriculture and food marketing. The State lies midway between the Northern and Southern parts of the Country (Figure 1). It has a population of about 2,371,089 with a total landmass of 32,500 square kilometres, most of which is arable (NPC, 2010). About 1,094,232 people of the State are engaged in direct farming, out of whom 26,865 are vegetable farmers. The State has two main climatic seasons, the dry season and wet season with annual rainfall ranging between 1,000 and 1,500 mm while the average temperature lies between 30ºC and 35ºC. The climate is conducive for growing fruits and vegetables. Common vegetables cultivated include: amaranthus,

okra, pepper, lettuce, rosette, tomato, carrot, cucumber, cabbage and jute mallow (Kwara state diary, 2002). The rainy season lasts between April and October while the dry season starts in November and ends in March of the following year providing ample opportunity for irrigated tomato production and marketing.

Figure 1. A map of Nigeria showing the location of Kwara State.

Data collection and sampling methods

The primary data were used in this study. The data were obtained from a field survey through the use of a well-structured questionnaire, administered through personal interview. The questionnaire was designed to elicit information on marketing activities, functions and structure of tomato marketers, cost and returns, factors determining the net return of tomato marketers and the major constraints confronting marketers in the study area.

Ilorin metropolis is made up of three Local Government Areas (LGAs), namely: Ilorin west, east and south LGAs. A two-stage sampling method was used to select the respondents for the study. The first stage involved the purposive selection of 2 major markets in each of the 3 LGAs that make up Ilorin metropolis. In the second stage, 20 wholesale marketers were randomly selected in each market to make up a sample size of 120 respondents. The response rate was 100%.

Analytical framework

The data derived from the field survey were analysed using descriptive statistics which involved the use of mean, frequency distribution and percentages.

Simple frequency tables and percentages were used to profile the socio-economic characteristics and constraints facing the respondents in the study area.

Herfindahl index

The Herfindahl index was used to determine the structure of tomato marketers.
The Herfindahl index (HI), $HI = \Sigma Si^2$,
where Si = Market share for respondent i, calculated as: Si = Qi/Q,
where Qi = Basket of tomato sold per month by respondent i, and
Q = Total number of baskets sold per month by all respondents.

Gross margin (GM) analysis

According to Olukosi and Erhabor (2005), gross margin (GM) analysis is the difference between gross income (revenue) and total variable cost (TVC) of production. This was used to determine the costs, returns as well as profitability of tomato marketers.

GM = TR-TVC,
where: GM = Gross margin, TR = Total revenue, TVC = Total variable cost.
The net return represents the total profit and was determined using:
Net return = TR-TC,
where: TR = Total revenue, TC = Total cost and
Rate of return to investment (ROR) = TR-TVC/TVC x 100.
The depreciation of the fixed cost was calculated using the straight line method of depreciation: D = C−S/N,
where: D = Depreciated amount, C = Initial cost of the assets, S = Salvage value, N = Expected useful life. The salvage value was assumed to be zero.

Multiple regression technique

A multiple regression technique was used to ascertain factors determining net returns of tomato marketers. The implicit form of the equation is: $Q = F(X_1 + X_2 + X_3 + X_4 + X_5 + U)$,
where: Q = Net return (measured in naira),
X_1 = Purchase cost (naira),
X_2 = Labour cost (naira),
X_3 = Transport cost (naira),
X_4 = Tomato marketing experience (years),
X_5 = Storage cost (naira) and
u = Error term assumed to fulfill all the assumptions of the classical linear regression model.

Definition of economic indicators

Labour cost: Labour is human efforts in the production or marketing processes.

It adds to the cost incurred by the trader and therefore it is expected to have a negative effect on tomato traders' profits.

Purchase price: This is the price at which a basket of tomatoes is sold at the farm gate. It adds to the cost incurred by the trader and therefore it is expected to have a negative effect on tomato traders' profits.

Quantity of tomatoes offered for sale: The quantity of tomatoes that a marketer handles defines his/her scale of business operations. Ceteris paribus, the higher this scale, the higher the marketing profit because of possible economies of scale. Therefore, the quantity of the tomatoes offered for sale is expected to have a positive effect on marketing profit.

Transportation costs: This is the cost incurred in moving baskets of tomatoes from the point of purchase to the market. It adds to the cost incurred by the trader and therefore it is expected to have a negative effect on tomato traders' profits.

Selling price: This is the value of a basket of tomatoes. Higher selling prices of tomatoes benefit tomato traders and therefore this variable is expected to positively affect marketing profit.

Cost of storage: This is the cost of renting or putting up a warehouse. It adds to the cost incurred by the trader and therefore it is expected to have a negative effect on tomato traders' profits.

Results and Discussion

Socio-economic characteristics of the respondents

Majority (70%) of the marketers were female with an average age of 39.5 years (Table 1). This is contrary to the findings of Haruna et al. (2012), who found out that 88% and 12% of tomato marketers in Bauchi State were males and females, respectively.

The implication of this is that most of the respondents were in their active age being able to go about their business with vigour. The respondents' years of experience ranged between 5 and 30 years with an average of 13.9 years. This indicates that most of the respondents have been involved in tomato marketing for quite a long time. About sixty-four percent (64%) of the respondents were literate. Given this level of literacy, it is expected that information can be disseminated with ease among the respondents. The family size ranged between 3 and 12 persons with an average of 8 persons. Most (79.2%) of the respondents belonged to one cooperative society or the other and so had access to credit facilities. According to Akinsanmi et al. (2005), cooperatives are a vehicle for development since they

provide informal credit to farmers. Members of the cooperative, ceteris paribus, are likely to perform better than non-members because of possible economies of scale.

Table 1. Socio-economic characteristics of the respondents.

Variables	Frequency	Percentage
i) Age		
11–30 years	28	23.3
31–50 years	70	58.3
51–70 years	22	18.4
Total	120	100
ii) Marital status		
Married	92	76.7
Single	12	10.0
Divorced	16	13..3
Total	120	100
iii) Household size		
1–10	89	74.2
11–20	31	25.8
Total	120	100
iv) Education status		
No formal education	43	35.8
Formal education	77	64.2
Total	120	100
v) Years of marketing experience		
1–10	39	32.5
11–20	61	50.8
21–30	20	16.7
Total	120	100
vii) Sex		
Male	36	30.0
Female	84	70.0
Total	100	100
viii) Members of cooperative		
Yes	95	79.2
No	25	20.8
Total	100	100

Source: Field survey, 2015/2016.

Marketing functions and practices of respondents

Table 2 shows that the marketers performed the transportation function, and in doing this, 95.5% of them used vehicles as means of transport while 2.7% and 1.8% respectively opted for motorbikes and headloads.

Table 2. Marketing functions and practices.

Variables	Frequency	Percentage
i) Transportation means		
Vehicle	115	95.5
Motorbike	3	2.7
Headload	2	1.8
Total	120	100
ii) Storage facilities		
Shed	69	57.5
Rented shop	35	29.2
Home	16	13.3
Total	120	100
iii) Source of purchase		
Farm	69	57.3
Suburb	2	1.8
Market place	49	40.9
Total	120	100
iv) Distribution channels		
Wholesalers	17	14.1
Retailers	28	23.3
Consumers	51	42.7
Processors/food vendors	24	20.0
Total	120	100
v) Sales (basket sold per week)		
< 50	11	9.1
50−-100	14	11.8
101−-150	24	20.0
151−-200	22	18.2
> 200	49	40.9
Total	120	100
vi) Major source of capital		
Personal savings	60	51.6
Friends and relatives	2	1.8
Cooperative loans	52	43.3
Bank loans	4	3.6
Total	120	100

Source: Field survey, 2015/2016.

Furthermore, analysis of storage function showed that 57.5 % of respondents stored their wares under sheds, 29.2% stored in rented shops while 13.3% claimed to store in their houses. Regarding tomato bulk purchase, 57.3% of the respondents bought directly from the producers' farms, 1.8% opted for suburbs. Data analysed showed that the marketers used diverse channels for carrying out their distributing

function. About 14.1% claimed to supply their wares in bulks. The remaining 23.3%, 42.7% and 20% sold their wares directly to the retailers, final consumers and processors/food vendors, respectively. The major (51.6%) source of capital was personal savings. This was closely followed by cooperative loans (43.3%).

Results of Herfindahl index

The result of the analysis revealed an estimated Herfindahl index (HI) of 0.008.

The highest value obtainable here is 1. A very low (0.008) HI obtained here revealed that the concentration ratio for tomato marketers was very low, thus implying that the market structure of tomato tended toward perfect competition, which is characterized by (1) The product sold is homogenous, (2) There is no barrier to entry into the business, (3) There are many buyers and sellers in the study area.

Costs and returns analysis of tomato marketers

Table 3 indicates that the gross revenue, total variable and fixed costs obtained from tomato marketing per month were ₦899,248, ₦589,153 and ₦7,419 respectively, leaving a gross margin of ₦310,095.

Table 3. Costs and returns to tomato marketers per month in Kwara State.

Item	Costs (₦)	Returns(₦)
Gross revenue (GR)		899, 248
Less Total variable costs (TVC)	589,153	
Tomato purchased	408,528	
Transport	100,556	
Storage	15, 998	
Agent	10, 786	
Labour	53, 285	
Equals		
Gross margin (GR-TVC)	310,095	
Fixed costs		
Sacks	1,580	
Baskets	2,090	
Tables and chairs	1,189	
Shed	2,560	
Total fixed cost	7,419	
Total cost	596,572	
Net return		302,676
Rate of return on investment (GR-TVC/TVCx 100/1)		52.6%

Source: Field survey, 2016. Note: The official *naira* to *dollar exchange rate* was pegged at ₦305 per $1 while the black market rate was pegged at ₦403 per $1. On the other hand, 1EUR is ₦330 and ₦470 at the official and black market rates, respectively.

The average rate of returns to total investment was 52.6%. This implies that an average profit of ₦0.53k was realized on every naira invested in vegetable marketing in the area. This signifies that, on the average, the investment was highly profitable.

Results of regression analysis

The double-log functional form was chosen as the best fitted equation (Table 4). The regression analysis revealed a coefficient of multiple determinations (R^2) of 0.957. This implies that the estimated variables explained 95.7% of variation in net returns of the tomato marketers.

Table 4. Results of regression analysis.

Variable	Coefficient	T-ratio
Constant	6.430	9.367
Purchase cost (X_1)	-0.399	4.293***
Labour cost (X_2)	-0.965	-3.821***
Transport cost (X_3)	0.330	2.083**
Marketing experience (X_4)	1.999	7.358***
Storage cost (X_5)	-0.002	-0.091

R^2 = 0.959; Adjusted R^2 = 0.957; F-statistic = 534.958; *** significant at 1%; ** significant at 5%.

Furthermore, four variables were found to be important in determining the net returns of tomato marketers. Purchase cost (X_1) and labour cost (X_2) were negative and statistically significant at the 1% level of probability. This implies that an increase in these variables will reduce the net returns of marketers. This is in line with a priori expectation. On the other hand, transport cost (X_3) and year(s) of marketing experience (X_4) were positive and significant at the 5% and 1% levels respectively. This suggests that the more the commodity for sale, the higher the transport cost incurred. Thus, the effect of higher transport cost paid was compensated for by better profits made in returns.

The lead equation can be written as:

Log Q = 6.430 - 0.399log X_1 – 0.965log X_2+ 0.330log X_3+ 1.999log X_4 - 0.002log X_5.

Challenges facing tomato marketers

Table 5 shows the major problem facing marketers was inadequate capital (29.2%). About 23% and 19.2% of respondents claimed the high transportation cost and perishability of the commodity as their major problems, respectively.

Table 5. The most important challenges facing tomato marketers.

Variables	Frequency	Percentage
Perishability	23	19.2
High cost of transportation	28	23.3
Price fluctuation (seasonality)	14	11.6
Inadequate capital	35	29.2
Storage problem	5	4.2
Poor marketing information	10	8.3
Low demand	5	4.2
Total	120	100.0

Conclusion

This study analysed the economic activities of tomato marketers in Kwara State, Nigeria. The results showed that the tomato market was dominated by females, with an average age of 39.5 years. The Herfindahl index of 0.008 revealed that tomato market tended toward pure competition. The costs and returns analysis indicated that tomato marketing was profitable in the study area with a monthly gross margin of ₦310,095. The average rate of returns to total investment was 52.6%. This implies that an average profit of ₦0.53k was realized on every naira invested in vegetable marketing in the area. Furthermore, the regression analysis revealed that purchase cost, labour cost, transport cost and marketing experience were the important variables determining the net returns of tomato marketers. Marketers should strengthen themselves by forming cooperative groups to enjoy the benefit of economies of scale. Policies and strategies that lower the costs of marketing should be vigorously pursued to enhance better market performance and profitability.

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EKONOMSKA ANALIZA PRODAJE PARADAJZA U METROPOLI ILORIN, DRŽAVA KVARA, NIGERIJA

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R e z i m e

Prodaja paradajza je složena pojava zbog njegove kvarljivosti, sezonskog karaktera i veličine i kao takva, proizvodnja paradajza zahteva efikasan sistem prodaje. Istraživanja o prodaji paradajza u posmatranom području su retka u literaturi. Stoga se ovim istraživanjem analizira prodaja paradajza u državi Kvara u Nigeriji. Tehnika jednostavnog slučajnog uzorka korišćena je pri odabiru sto dvadeset ispitanika koji se bave prodajom paradajza. Dobro strukturiran upitnik korišćen je za prikupljanje podataka. Prikupljeni podaci su analizirani uz pomoć deskriptivnog, Herfindalovog indeksa, analize troškova i povraćaja i analize višestruke regresije. Istraživanje je pokazalo da su većina (70%) ispitanika koji se bave prodajom ženskog pola prosečne starosti od 39,5 godina. Herfindalov indeks od 0,008 ukazao je da tržište paradajza teži ka čistoj konkurenciji. Osim toga, prodaja paradajza je profitabilan poslovni poduhvat u ispitavanom području sa mesečnom bruto maržom od ₦310.095. Prosečna stopa povraćaja ukupne investicije bila je 52,6%. Ovo ukazuje da je prosečan profit od ₦53k ostvaren za svaku nairu koja je uložena u prodaju povrća u ovom području. Pored toga, regresionom analizom se ukazuje da se oko 96% ukupne varijacije neto povraćaja objašnjava nezavisnim varijablama. Istraživanje pokazuje da su troškovi kupovine, troškovi rada, troškovi transporta i markentinško iskustvo važni u određivanju neto povraćaja ispitanika, koji se bave prodajom paradajza. Većina (30%) ispitanika prepoznala je finansije kao glavnu prepreku. Ovim istražavanjem se preporučuje da bi oni koji se bave marketingom paradajza trebalo da udruže svoje resurse, kako bi iskoristili ekonomiju obima. Politike i strategije kojima se smanjuje cena prodaje trebalo bi takođe energično nastaviti.

Ključne reči: profitabilnost, veletrgovci, Herfindalov indeks, prodaja i paradajz.

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