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Economic Impact of Yam Value Chain in Nigeria

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

This study analyzed the profitability and marketing margins obtained by actors at various nodes of the yam value chain; and examined the organizations of the value chain, linkages among the key actors as well as the challenges faced by actors in the value chain in Nigeria using Baruteen Local Government Area (LGA) of Kwara State as a case study. 120 respondents consisting of 40 producers, 20 processors, and 60 sellers were selected through a three-stage sampling technique and were interviewed accordingly using structured questionnaires. Data collected were analyzed with; descriptive statics, statistics budgetary, marketing channels and Chi-Square analyses. Findings revealed significant difference in the net income of the value actors, with the processors having the highest share ₦3,558,63*statistics*
0, followed by the marketing agents ₦1,426,497 and the least ₦26,773.34 by the producers. Marketing margins also differed markedly among the actors. Sellers had the highest marketing margin per kg of yam. The identified constraints affecting yam value chain were high cost of production, inadequate market information, storage facilities, transport facilities, record keeping, and unfavourable government policies. The study recommends the need to scale up level of awareness in the value chain among smallholder farmers

Keywords: Yam; value chain; producers; processors and marketing agents.

1. INTRODUCTION

Michael Porter in a book published in 1985 popularized the term value chain by illustrating how companies could achieve competitive advantage by adding value to their organizations [1]. Subsequently the term was adopted for agricultural development purposes [2] and has

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been in use since the beginning of the millennium by those working on agricultural development in developing countries (Wikipedia, 2018). Agricultural value chain does not have a universally accepted definition, it generally refers to the whole range of goods and services necessary for an agricultural product to move from the farm to the final consumer [3]

At the heart of the agricultural value chain concept is the idea of actors connected along a chain producing and delivering goods to consumers through a sequence of activities including; bulking, cleaning, grading, and packaging, transporting, storing and processing which reduces post-harvest loss as well as increasing shelf life, safety and quality of farm products [4,5]. It describes coordinated and collaborative activities in which actors in the chain are responding to specific consumer demands.

An important aspect of value chain approach is that it considers both the vertical relationship among actors in the chain as well as horizontal impacts on the actors in the chain, such as input and finance provision, extension support and the general enabling environment. The focus of the current study is the vertical relationship among actors in the yam value chain in Nigeria

Yam (Dioscorea species) is in the class of tubers serving as an important staple food and cash crop in Nigeria. Nigeria happens to be the major producer of yam crop globally, it produced over 70-76 percent of the world yam in 2021 [6]. Yam is an integral vehicle for food security, source of income, and employer of labour in the producing areas in Nigeria [7]. However, despite high yam production in Nigeria, its supply has not kept pace with population growth leading to demand-supply deficit [8]. Ayado [9] traced the deficit to postharvest losses, low shelf life, poor storage facilities and inefficient marketing system. Adejo [9] in his study stated that estimated value of 30 to 40 percent of yam produced in Nigeria does not reach the consumers on the account of postharvest losses. Ayado [9] further explained that about 10 to 15% of storage loses in yam occur after the first 3 months, and moves to as high as 50% after 6 months of storage.

Result of late sales of excess production is the huge storage losses commonly associated with traditional transactions where farmers produce without having a clear idea in advance of when, to whom and at what price they are going to sell their products [10] With agricultural value chain, independent farmers sell directly to companies under specific stated agreement. Farmers undertake to supply agreed quantities of yam product based on the quality standards and delivery requirements of the company often at a price that is established in advance [2,10]. Companies often also agree to support the farmer through input supply, land preparation, extension advice and transporting produce to their premises [11]. Farmers therefore, will only produce what will meet the requirements of their buyers and the market will be cleared once and for all.

However, a major challenge in the value chain development in Nigeria where smallholders are the major food crops producers is creating awareness among the farmers and marketers on how to link to the existing / new value chain, and how they can extract greater value from the chain, either by increasing efficiency or by also carrying out activities further along the chain [10].

The present study investigated economic impact of value chain on yam production in Nigeria. It looked at the profitability in yam value chain activities and created awareness among the farmers and marketers on the organizations of the yam value chain and linkages among the key actors in the study area to assist smallholder farmers and marketers in deciding the stage/s where they can join the chain and how they can improve on the existing value chains. The study is also focused on challenges being faced by actors in the chain in Baruteen LGA to assist the policy makers to formulate appropriate policies which may encourage, protect and expose smallholders to the potentials of value chain. The result of the study is expected to enhance increased yam production which will bridge the demand-supply deficit and increase marketing efficiency for increased income and profit.

2. RESEARCH METHOD

The study was carried out in Baruten LGA of Kwara State (9°35'N3°15'E) being the leading yam producing community in the State. Baruten LGA covers a total area of 9,749 km^2, features two distinct seasons - rainy season and the dry season. Rainfall is between 800cm and 1500 cm per annum and it's supported by River Nano which flows through the area. It has an average temperature of 30^0C. Baruten's soil is sandy-

loamy and easy to farm. Agriculture is the economic mainstay of its people with crops such as yam and cashew grown in substantially large quantities. The area is home to a number of Agro processing mills for massive production of yam flour [12].

Primary data were obtained through three sets of structured questionnaires administered to 40 producers, 20 processors, and 60 yam sellers selected through a three-stage sampling technique. Stage 1 entailed purposive selection of Baruten LGA being the largest yam producing community in the state. This was followed by the use of a stratified sampling technique to divide the yam value chain actors into strata comprising yam producer, yam processors and yam sellers. Thereafter, random sampling on the basis of percentage, proportional to the stratum size was used to select the respondents.

Both quantitative and qualitative analyses were employed to achieve the specific objectives of the study. The qualitative analysis employed descriptive statistics including percentages, frequency distributions and mean flow charts to capture the socioeconomic characteristics of the respondents and also to indicate the organization and linkage among key chain actors, as well as the challenges facing yam value chain actors. The quantitative analysis involved the use of Profit Margin, Benefit-Cost Ratio and Returns on capital investment to describe profitability, marketing margin analysis to measure the share of the final selling price captured by a particular actor at each node in the chain and Chi-Square analysis was to test the significance of the differences in the profit and the marketing margins at each node of the chain.

2.1 Analytical Technique

2.1.1 Profit margin

Profit margin aimed at determining net returns obtained by actors at various nodes of the value chain from production to consumption. At each stage (i) of the yam value chain, profit margin was obtained by the following formula:

$$PMi = TRi - (TVCi + TFCi)$$

Where;
PMi= Profit margin at stage i
TRi= Total revenue at stage i
TVCi= Total variable cost at stage i
TFCi= Total fixed cost at stage i

2.1.2 Chi-square statistical tool

Used to establish the relationship between profitability of the value chain actors was computed as follow:

$$X^2 = \sum \frac{(O-E)^2}{E}$$

Where: O = Observed Net farm income
E = Expected Net farm income

2.1.3 Revenue cost ratio

Is the ratio of Total Revenue to Total Cost. Obtained through the formula;

$$\text{R.C Ratio} = \frac{TR}{TC}$$

2.1.4 Rate of Return on Investment (RORI)

Measures the actual gain per Naira invested. Calculate as;-

$$\text{Rate of Return on Investment} = \frac{Net\ farm\ income}{Total\ cost}$$

Where Net Income (NI) =TR-TC (TFC+TVC)

2.1.5 Marketing margin

Is the cost of providing a mix of market services plus a “normal” profit (Mendoza and Rosegrant 1995) was calculated as;

$$TTGMM = \frac{CP-PP}{CP}\ X\ 100 \quad (1)$$

$$GMMi = SPi - SPi - 1\frac{SP_i - SP_{i-1}}{cp}\ x100 \quad (2)$$

Where: TGMM = Total gross marketing margins in (%)
CP = Consumer price in Naira
PP = Producer price in Naira
GMMi = Gross marketing margin of ith actor at a given point in the value chain in (%)
SPi = Selling price by ith actor at a given point in the value chain in naira
SPi-1 = Selling price by a preceding actor (i – 1), is the buying price paid by ith agent at a preceding point in the value chain in Naira.

3. RESULTS AND DISCUSSION

3.1 Socio Economic Characteristics

Table 2 shows significant variation in the average net income obtained by the actors in the chain the processors had the highest net farm income of 3,558,630.000 followed by the yam sellers with 1,426,496.667 while yam producers had the lowest 26,773.34. The result probably implies variation in reward to value addition activities. Explanation for this may be because yam produce is bulky and perishable, to increase the shelf life, retain yam quality and present it in the forms that best suit the consumers the processors need to be engaged in various forms of activities with cost implications. The processors do more and they earn more. The net farm income of the marketers is the next after processors; this may also because Marketers also perform additional functions including that of place and time. They gather yam produce either directly from the farmers or the processors and distribute to consumers at different locations and appropriate time through conducive transportation and storage facilities. The net income of the producers is the least probably because they often sell off their produce immediately after harvesting at farm gate with little or no post-harvest cost incurred.

Revenue-Cost (R/C) Ratio analysis for the producer, processor and yam seller are 1.25, 1.14 and 1.16 respectively. The rationale behind R/C analysis is to determine the capability of the venture to offset cost of production and still makes maximum profit. Since R/C ratio is more than one in all the chain nodes, it implies yam venture is profitable. The venture at each stage is capable of offsetting cost of production and still stands strongly. The producer had the highest R/C ratio probably because of the low cost of production.

Analysis of Rate of Return per unit of capital investment (RORI) shows that the producers, the processors and the marketers made 25%, 16 % and 17% gain from the capital invested respectively. This implies a gain of 25k, 16k and 17k per Naira spent on the respective enterprises of the value actors. RORI is commonly used for investment decision by comparing the return with the ruling market interest rate. When RORI is higher than the ruling market interest rate, it implies that the investment is worthwhile and profitable and better than keeping the money in the bank. Since the market interest rate as at 2019 is 10% (i.e. 10k on every Naira kept in the bank) which is lower than any of the RORI calculated, it shows that it is economical to invest in yam venture. This conclusion was supported by the responses of the producers who indicated that they were satisfied with their work and had no plan changing to other occupation or business.

Also, RORI analysis revealed that producers made more return than processors and marketers this may probably be because of the earlier reason of low cost of production.

3.2.2 The marketing margins of the value chain actors

Table 3 shows the different marketing margins of; 0%, 12.38% and 16.03 earned by the producers, processors and yam marketers respectively for the different duties they performed in the marketing channel. The margin represents the cost incurred in providing different market services plus the normal profit. The services rendered to increase quality and reduce postharvest losses include; proper handling of the commodity, transportation, storage, paying of wages etc. The producer did not have marketing margin may be because they only produce to sell, most likely at the farm gate without rendering any marketing service. Yam sellers had the highest marketing margin (16.0%) may be because they are engaged in various marketing activities to provide time and place unity for consumers. While the processor followed closely (12.38%) because of the various activities they also performed to enable them provide form utility.

3.2.3 Constraints in yam value chain activities

Table 4 shows that yam value chain activities are constrained in many ways in the study area as expressed by respondents. Major constraints faced by producers in yam value chain include; low capital formation, inadequate market information, unavailability of improved inputs, inadequate storage facilities, inadequate transport facilities, unfavorable government policy and inadequate record keeping. respectively.

Table 1. Reveals that all through the stages, young educated male farmers dominated the yam value chain activities. This may have resultant improvement in yam value addition

Variable	Yam Producers (N=40)		Yam Processor (N=20)		Marketing Agents (N=60	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
Gender						
Male	**29**	**72.5**	**11**	**55**	**39**	**65**
Female	**11**	**27.5**	**9**	**45**	**21**	**35**
Age						
20-30	**21**	**52.5**	**7**	**35**	**25**	**41.7**
31-50	**19**	**47.5**	**13**	**65**	**35**	**58.3**
Marital status						
Single	**26**	**65**	**9**	**45**	**33**	**55**
Married	**14**	**35**	**11**	**55**	**27**	**45**
Family size						
1 – 10	**24**	**60**	**9**	**45**	**50**	**83. 4**
11 – 20	**16**	**40**	**11**	**55**	**10**	**16.6**
Educational status						
No formal	**12**	**30**	**4**	**20**	**9**	**15**
Formal	**28**	**70**	**16**	**80**	51	85
Years of experience						
1-10	**18**	**45**	**8**	**40**	**31**	**52**
11 – 20	**22**	**55**	**12**	**60**	**49**	**48**
Source of investment						
Family &friends	**36**	**90**	**17**	**85**	**43**	**71.7**
Loan from bank	**1**	**2.5**	**2**	**10**	**10**	**16.7**
Cooperatives	**3**	**7.5**	**1**	**5**	**7**	**11.6**
Farmland size						
≤1 Ha	**15**	**37.5**				
>1-5Ha	**20**	**50**				
>5-10Ha	**5**	**12.5**				
Scale of operation						
Small			**3**	**15**		
Medium			**13**	**65**		
Large			**4**	**20**		

Source: Field survey, 2021

Table 2. Profitability Indicators of the Value Chain Actors in Study Area

Variables	Producers	Processors	Market sellers
Value of cost and benefit	₦	₦	₦
Average revenue	**132,050**	**25,835,950**	**10,442,125**
Average variable cost	**91068**	**22,265,010**	7,560,, 254
Average fixed cost	**14,208.6**	**12,310**	**1,455374**
Average total cost	**105,276.6**	**22,485,770**	**9,015,628**
Gross margin (TR-VC)	**122882**	**33,570,940**	**2881871**
Net farm income (ATR -ATC)9	**26,773.4**	**3,558,630.00**	**1,426,496.**
Revenue cost ratio TR/TC	**1.25**	**1.l4**	**1.16**
Rate of return on Investment TR – TC/TC	**0.25**	**0.14**	**0.16**

Source: Field survey, 2021

Table 3. Marketing Margin among the Yam Value Chain Actors

Value Chain Actors	Producer	Processor	Yam seller
Yam selling price (₦/Bag)	43075	50525	60177
Marketing Margin	-	12.38%	16.03%
TGMM	0.2814		

Source: Field survey, 2017
NB: 1 Bag = 100kg

Table 4. Identified constraints in Yam Value Chain Activities

Problems	Producers		Processors		Marketing Agents	
	Frequency	(%)	Frequency	(%)	Frequency	(%)
Inadequate Capital	38	95.0	15	75.0	NAP	NAP
Unavailability of Improved Input	**31**	**77.5**	**NAP**	**NAP**	**NAP**	**NAP**
Inadequate Storage facilities	28	70.0	16	80.0	43	71.7
Inadequate Market Information	**32**	**80**	**15**	**75**	**49**	**81.7**
Inadequate Transport Facilities	27	67.5	14	70.0	44	73.3
Unfavourable Government Policy	**27**	**67.5**	**14**	**70**	**NAP**	**NAP**
Inadequate Record keeping	25	62.5	14	70.0	39	65.0
Unstable Supply	**NAP**	**NAP**	**NAP**	**NAP**	**40**	**66.7**
High Cost of Produce	N/A	N/A	16	80.0	40	68.4
High Competition among Marketes	**NAP**	**NAP**	**NAP**	**NAP**	**46**	**76.7**
Low Quality Produce	**NAP**	**NAP**	**NAP**	**NAP**	**31**	**51.7**
Unstable Demand	NAP	NAP	NAP	NAP	39	65.0

NOTE; - NAP means Not a problem
Source: Field survey, 2017

4. CONCLUSIONS AND RECOMMENDATION

The study investigated economic impact of value chain on yam production in Baruten LGA, Kwara state, Nigeria. It specifically looked at the profitability in yam value chain activities with the ultimate aim of creating awareness among the farmers and marketers on the potentials of value chain activities.

Organizations of the yam value chain and linkages among the key actors in the study area were discussed and finding of the study showed that each node of the yam value chain in the study area was highly lucrative and profitable. The implication of this is that any interested would - be actor can join at any node of the chain and still be comfortable. However, the processing node tends to be more profitable, an indication that value addition to farm produce will attract more profit margin. Therefore, for farmers to reach their profit potential they need to add value to their produce.

The study also focused on challenges in yam value chain activities and it was discovered as expressed by respondents in the study area that all the Major actors; the producers, processors and yam sellers faced serious constraints in the areas of capital formation, market information, improved inputs, storage facilities, transport facilities, government policy and record keeping. To enhance increased yam production which will bridge the demand-supply deficit and increase profit and income of yam merchants and rural economy in general, the policy makers need to formulate appropriate policies which will ameliorate the constraints.

The study however, only analysed the financial aspect of the yam value chain activities in the study area there are other aspects that were not adequately covered like the effect of climate change on yam value chain activities which causes occasional flooding of the area and the influence of poor road network which are constraining integration of value chain activities in the area. It is therefore requested that further research be carried out on these aspects to be able to achieve government objective of turning Baruteen to center of yam exportation in the state.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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