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Economic Analysis of Cocoyam Marketing in Anambra Agricultural Zone of Anambra State, Nigeria

D. O. Enibe^{1*}, E. Nwobodo, Cynthia², M. J. Nworji³ and C. A. Okonkwo¹

¹Department of Agricultural Economics and Extension, Chukwuemeka Odumegwu Ojukwu University (COOU), Igbariam Campus, Anambra State, Nigeria.

²Department of Agricultural Extension, University of Nigeria, Nsukka, Enugu State, Nigeria.

³Department of Crop Science and Horticulture, Chukwuemeka Odumegwu Ojukwu University (COOU), Igbariam Campus, Anambra State, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author DOE designed the study, wrote the protocol, managed the literature searches, performed the statistical analysis with author CAO, and wrote the first draft of the manuscript with author ENC. Authors ENC and MJN managed the analyses of the study. Author CAO collected the primary data. All authors read and approved the final manuscript.

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ABSTRACT

This study analyzed cocoyam market in Anambra Agricultural Zone of Anambra State, Nigeria. It determined the sources of cocoyam marketed in the study area; examined the profitability of crop's marketing; compared the marketing efficiency of the crop's wholesalers and that of the retailers and identified their marketing problems. Data for the study were collected from 60 respondents comprising of 40 retailers and 20 wholesalers sampled through Snow Ball Method (SBM) from the 4 major assembly markets (Eke Otuocho Aguleri, Oye-Olisa Ogbunike, Eke-Igwe Nteje and Oye-Farm Igbariam) of the study area. The markets were purposively selected as they are the biggest in each of the town communities. Data were collected using two sets of interview schedules (One for the Wholesalers and the other one for the Retailers). Descriptive statistics, gross margin analysis

*Corresponding author: E-mail: enibedav@yahoo.com;

and Shepherd-Futrel Model were used in data analysis. The study *inter alia* revealed that larger proportion (78.3%) of cocoyam consumed in the study area were sourced by the marketers from outside Anambra Agricultural Zone of Anambra State implying that the Zone is not self-reliant in cocoyam production. Result further shows that 0.33 and 0.62 returns on investment were made by the wholesalers and retailers respectively; revealing that cocoyam business is profitable. High transportation cost, lack of fund to increase business scale and poor storage facilities were found to be the main problems of the marketers. The study reveals that encouraging business opportunities exist on cocoyam's marketing. Entry into the crop's business was recommended for potential farmers, processors, traders and entrepreneurs.

Keywords: Cocoyam; marketing; profitable; Anambra agricultural zone of Anambra State; Nigeria.

1. INTRODUCTION

Cocoyam (*Colocasia esculenta*) is a tuber crop cultivated in many parts of the tropics. It belongs to the family *Araceae* with two members (*Colocasia* and *Xanthosoma*) that are used as staple foods in Africa, Asia and pacific countries [1]. The crop can be planted from the large corm or from the small cormel [2]. They are popular and rich carbohydrate food crop. In southeast Nigeria for example, it is the third most important root and tuber crop after yam and cassava [3]. Although, it is ranked third in the region, [4] revealed that it is more nutritious than yam and cassava. Furthermore, Talwana et al. [1] reported that the crop's nutrient content is comparable to that of potato. One of the reasons why yam and cassava were ranked first and second is because consumers lack adequate knowledge of cocoyam's nutritional values [3].

Nigeria ranks first position in the world's cocoyam output with annual output of about 3,450,000 metric tons [4]. The leaves are used as vegetable and as feed to farm animals [2]. This is understandable because the leaves are soft textured and are reported to contain important mineral elements, vitamins and thiamine [2]. According to Adepoju and Oyewole [5], the leaves of *colocasia* are rich source of vitamin A (β -carotene), C, calcium and micronutrients of nutritional importance due to their antioxidant properties. In essence, the leaves are reported to have medicinal values. Vitamin A in *colocacia* leaves is known to improve the immune system and reduce the rate of anemia in children [6]. In addition, [5] because of the low sodium, carbohydrates and gross energy content of *colocasia esculenta* leave recommended it a good vegetable for the hypertensive, diabetics, obese and normal people. Cocoyam corms are revealed to contain 31g of carbohydrate, 2.0g of protein, 1.0g of fibre and 20 mg of calcium [4]. The crop's

carbohydrate is found to be low in starch hence, it is recommended for the diabetics as against its close substitutes such cassava and yam [4].

Cocoyam in some Southeast Nigerian village and town communities offer socio-cultural and entertainment values. According to Enibe [7], production of cocoyam in some town communities of Southeast Nigeria is gendered-culturally regarded women's crop and immortalized with annual festivals that bore its name such as "Ede Aro" and/or "Ede Opoto". Some of those cocoyam festivals appear raucous, but with entertaining activities that are entwined with cultural exhibitions. For example, in Abagana, a town community in Anambra State of Nigeria, it is observed that cocoyam (*colocasia esculenta*) festival is celebrated in the last week of December. The cultural activities include cooking and serving of cocoyam meal to family members, friends and august visitors; youth and masquerade flogging contests and cultural show day which attracts spectators from many different places.

The nutritional content and production capacity of cocoyam in Nigeria, its uses and potentials expose it a good raw material in industries for production of different products and a good potential agricultural business product. This is because the crop has been recommended as composite material for production of different products which include bread and biscuit baking, production of pasta, starch, salad cream and sausage binder [4].

The aim of marketing research is information provision on the needs and desires of customers, marketing opportunities existing in different products, goods or services, and the customers' changing behaviors and regular buying order or pattern [8]. Though, cocoyam's export has not been established officially in Nigeria, but it is revealed to be sold in different assembly markets in rural areas [9] and in urban centers [3]. Also,

cocoyam is observed to be sold at shops of Africans as found in other continents such as Europe and America [10]. Precisely, [11] revealed that cocoyam is sold and bought in the United Kingdom's supermarkets. This indicates that the crop has international market potentials. This may benefit Nigeria as the biggest producer of the crop and the other producing countries if its output is enhanced and the market developed. In support, Oseo-Adu et al. [11] reported that cocoyam export from Ghana to the United Kingdom began in year 2000 and that there exists opportunity for its export to other countries. In Nigeria, cocoyam is one of the sources of income for many farmers and rural households where they are produced for value addition, consumption, and sales or business.

In Southeast states of Nigeria, cocoyam's business and utilization appears to be dwindling and suffer neglect irrespective of its many uses and the country's leading position in its annual production which is estimated at about 40% of annual world output [4]. Evidently, Igbozulike [4] reported that cocoyam's commercialization is at its weakened and depressed state. He attributed the reason for the crop's low ebb commercialization to its low yield. Some authors such as [10] were of the consideration that the crop's underutilizing is mainly because it is overshadowed by its close substitute food crops such as yam and potato. There could be other reasons for cocoyam's low output, underutilization and low ebb market condition. Such conditions may include poor return on investment by the traders, capital outlay of the crop's traders, limited exposure of the crop's business opportunities and religious beliefs. There is need to reveal *colocasia esculenta* business opportunities. The other problem is that there is lack of understanding on the reasons for the weak market situation of *colocasia esculenta* in the study area.

This study is designed to contribute to *colocasia esculenta* business opportunities exposition through determination of the: sources of cocoyam marketed in the study area, monthly costs and returns in the business, efficiency of the market intermediaries and their marketing problems. This is important because [7] revealed that cocoyam is in Southeast Nigeria is regarded a crop of women while [9] in their study of the determinants of women participation in food crop marketing in Abia State of Nigeria, recommended that formal and informal sources of income ought to be made accessible to women. Data obtained will encourage entrepreneurs and farmers to

invest in the production and processing of the crop. Also, it will encourage women, unemployed and potential traders to discover and explore cocoyam's business opportunities. In addition, further research data that will benefit students, researchers and consultants will be provided in the study. In the above consideration, the following pertinent research questions were raised and answered in the study: What are sources of the cocoyam marketed in the study area? Is Cocoyam trade in the study area profitable? Do the cocoyam wholesalers and retailers differ in marketing efficiency? What are the major constraints of cocoyam marketers? The broad objective of the study was to analyze cocoyam market in Anambra Agricultural Zone of Anambra State, Nigeria. The specific objectives were to: Determine the sources of cocoyam marketed in the study area. Examine the profitability of cocoyam marketing. Compare the marketing efficiency of the cocoyam wholesalers and that of the retailers. Identify the problems in cocoyam marketing.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Anambra Agricultural Zone of Anambra State, Nigeria. Anambra State is one of the five states of the Southeast geopolitical zones of Nigeria. The state lies between latitude $5^{\circ} 38' 1''\text{N}$ to $6^{\circ} 47' 1''\text{N}$ and longitude $6^{\circ} 36' 1''\text{E}$ to $7^{\circ} 21' 1''\text{E}$. The state is in the north bounded by Kogi State, in the South by Imo State, in the east by Enugu State and in the west by River Niger and Delta State. The State has twenty one local government areas (LGA), four agricultural zones and assembly markets in its village and town communities and in its cities. Each of the assembly markets are identified with one of the four Igbo market days, namely Eke, Oye, Afor, and Nkwo. The four market days made up one week in Igbo of Nigeria tradition. Following this four market days counting, 7 weeks of 28 days is generally regarded a month in the study area and in Igbo land. This gave a total of 13 months (Moon) of 364 days in Igbo traditional year.

Anambra State and her agricultural zones are within the tropical rainforest region and with two major seasons that are recognized as dry and rainy seasons. Anambra Agricultural zone (AAZ) shares common boundary with: Delta State on the West, Uzo Uwani LGA of Enugu State on the North, Ezeagu LGA of Enugu State and Igbola LGA of Benue State on the South. The zone has

a population of about 469,959 distributed in four Local Government Areas (LGAs) named Oyi, Anambra East, Anambra West and Ayamelum [12,13,14,15]. The zone has four extension blocks which comprised 45 Circles [16]. Anambra River (Omambala) is in AAZ and it is a tributary to the river Niger. The climate of this zone is suitable for production of different kinds of crops which include yam, rice, cassava, maize, cocoyam and potatoes. Productions of these crops are the major farming activities of inhabitants of the zone. Hence, the zone is commonly regarded as the food basket of Anambra State. The off farm income sources of the inhabitants of the zone include petty trading, teaching and services. The major assembly markets in the zone include Eke Otuocho and Oye-Farm Igbariam in Anambra East LGA; Afor Nzam, Nkwo Otupu Mmiata, and Afor Oroma Etiti in Anambra West LGA; Oye-Olisa Ogbunike, Nkwo Awkuzu and Eke-Igwe Nteje in Oyi LGA; Nkwo Omo, Oye Ifite Ogwari and Eke Igbakwu in Ayamelum LGA.

2.2 Sampling Procedure and Sample Size

Data were collected from primary and secondary sources. Secondary data were sourced from Journals articles, Books, thesis and research documents. Primary data were purposively collected from the following four major markets in the zone: Otuocho market, Oye-Olisa market, Eke-Igwe Nteje market and Oye-Farm market at Igbariam. Eke Otuocho market was purposively selected for three major reasons: First, It is more strategically located near River Omambala where it is easily accessed by people of the zone and outside the zone via the river and or roads. Second, Otuocho is the headquarters of Anambra East LGA. Finally, Eke Otuocho is one of the biggest and good representative of the assembly markets in the zone where cocoyam is demanded and supplied. Eke-Igwe Nteje was purposively selected because it is one of the biggest markets in the zone and because Nteje is the headquarters of Oyi LGA. Oye-Olisa Ogbunike was purposively selected because it is one of the biggest assembly markets in Oyi LGA and because Ogbunike is one of the important town communities in Anambra State with important land marks which include a cave and biggest building materials market in the state. The last one (Oye farm) was purposively selected because it is the only farm settlement market of the study area and in Anambra State of Nigeria.

Respondents were asked to reveal whether they sourced cocoyam within Anambra Agricultural Zone of Anambra State or from outside the Zone. On the marketing costs, the middlemen were requested to reveal their cocoyam monthly average quantity (Kilogram (Kg) they purchased and their average monthly variable costs of: transportation, loading and off-loading, Association dues, storage and security costs. They were further requested to reveal their fixed cost expenses on: monthly market stall and store rents, the local government rate, and the cost price of their marketing equipment. The depreciation values of the marketing equipment were estimated from their cost price. For estimation of the returns on investment, respondents were requested to state the average quantity of cocoyam they sold per month and the average price per Kg. Respondents were also asked to state the problems they encounter in the crop's marketing. For in-depth understanding of cocoyam marketing problems from different perspectives, the middlemen were asked to reveal their sources of business capital, mode of their cocoyam transportation, and to state whether lack of capital is one of their cocoyam marketing problems or not.

2.3 Sampling Method

The study's aim was to *inter alia* understand whether cocoyam business in the study area is profitable. From each of the four markets mentioned in section 2.2, 10 retailers and 5 wholesalers were selected through Snowball Sampling Method (SBSM) and interviewed using two sets of interview schedule (one for the wholesalers and the other for the retailers). This totaled 60 respondents (40 retailers and 20 wholesalers) from the 4 markets. SBSM is a link-tracing methodology which takes advantage of the social networks of an identified respondent to provide the research with expanding set of potential respondents [17]. In this, one respondent accessed and interviewed gives the researcher the name of another or direction on how to locate another respondent. The respondent in turn provides information on the next respondent and so on. It is an established method for identifying hidden population and contacting them [17].

2.4 Data Analysis

Data were realized using descriptive statistics, gross margin (GM) and marketing efficiency analysis. Gross margin is the difference between total variable costs (TVC) and total revenue (TR).

$$GM = TR - TVC \quad (1)$$

Other variables assessed for the analysis were the: total fixed costs (TFC), total variable costs (TVC), total costs (TC), net return on investment (NROI) and net marketing income (NMI).

The NROI is the ratio of net marketing income to the total cost. $NROI = NMI/T$ (2)

The NMI on the other hand is the difference between gross margin and TFC.

$$NMI = GM - TFC \quad (3)$$

The business enterprise with higher NROI is noted to be the most profitable [18]. The line calculation method was used to calculate the annual depreciation values of cocoyam marketing assets. The annual depreciation

Values were determined using this mathematical formula: $D = C - S/L$. (4)

Where:

D = Annual depreciation expense

C = Cost of fixed asset (N)

S = Salvage value of the asset

L = Useful life span of the asset

Marketing efficiency (ME) analysis was used in comparing the business of the cocoyam retailers and those of the wholesalers. The ME of the cocoyam wholesalers and that of the retailers were determined using Shepherd-Futrel Model (SFM). The ME determined helped to understand whether the crop's market system is performing well or not. According to [16] SFM is preferably used for the determination of the marketing efficiency because it offers more accurate measurement than the other methods such as Maximization of consumer satisfaction concept, Technological or operational/pricing approach and the marketing margin approach [16].

3. RESULTS AND DISCUSSION

3.1 Distribution of the Respondents According to Sources of the Cocoyam Marketed in Anambra Agricultural Zone

Result presented in Fig. 1 shows that majority (78.3%) of the respondents' sourced Cocoyam stocks from outside Anambra Agricultural Zone in

Anambra State. The respondents revealed that the cocoyam from outside the zone was sourced from places such as Nsukka and Ugwuoba in Enugu State, Otulu in Delta State. On the other hand, 21.7% of the respondents revealed that they sourced cocoyam from town communities within the study agricultural zone such as Igbariam, Umuleri and Nando). The implication is that the cocoyam consumed in the study area is mainly produced outside Anambra Agricultural Zone of Anambra State. This shows that the zone is not self-sufficient in cocoyam production and this reveals the need for the crop's increased production to meet its current market demand. Result also indicates that the zone has available market on the crop and that entrepreneur and other farmers not previously involved in its production can invest in it for increased production and marketing. It further reveals that there is the need to encourage farmers for crop's increased production. The result is against expectation because the zone is regarded to be the food basket of Anambra State where large quantity of the crop is expected to be produced. This suggests that there may be some reasons why the crop appears to be under-produced by farmers in the zone. Such reasons may include systems norm, beliefs or other socio-cultural issues. The result appears convincing because many communities of the zone such as Aguleri, Enugu-Otu, Eziagulu-Otu and Umuoba-Anam are known to have yam and cassava as their major crops. In evidence, [19] did not include cocoyam as dominant crops in the zone. Also, it is not certain whether any of the varieties of cocoyam has some festive or cultural values in the zone as pointed out about *colocasia esculenta* in some communities such as Abagana and Ukpo in Awka agricultural zone. Moreover, [4] reported that the market supply of the crop in Nigeria is declining. The result supports [9] whose study noted that there is increased consumption of the crop and encouraged its increasing output for farmers' food security and income generation.

3.2 Monthly Estimates of the Costs and Returns of Cocoyam Wholesalers and the Retailers

Result in Table 1 shows that wholesalers and retailers made a gross margin of N2, 000,000.00 and N1, 571,200.00 respectively. The wholesalers and the retailers made a mean net marketing income of N94, 700.00 and N38,480.00 respectively. Table 1 shows that the net return on investment (NRI) of the wholesalers and retailers were 0.33 and 0.62. This indicates

that for every one naira, the wholesalers and retailers made 32 kobo and 62 kobo respectively. This reveals that the business is profitable. However, the retailers' net return on investment is higher than that of the wholesalers. The reason could be because the wholesalers incurred bigger marketing costs due to their bigger trade volume. However, the wholesalers' smaller net returns on investment seem compensated with higher profit due to their

bigger trade volume and quick turn over (See Table 1).

In a study of profitability and constraints of cocoyam production in Abia State, Nigeria [3] found that return on investment of the farmers was N1.67. Although the study was conducted in a different Agricultural Zone and in a different State, it indicates that the farmer's share of the consumer spending was fare and that farmers

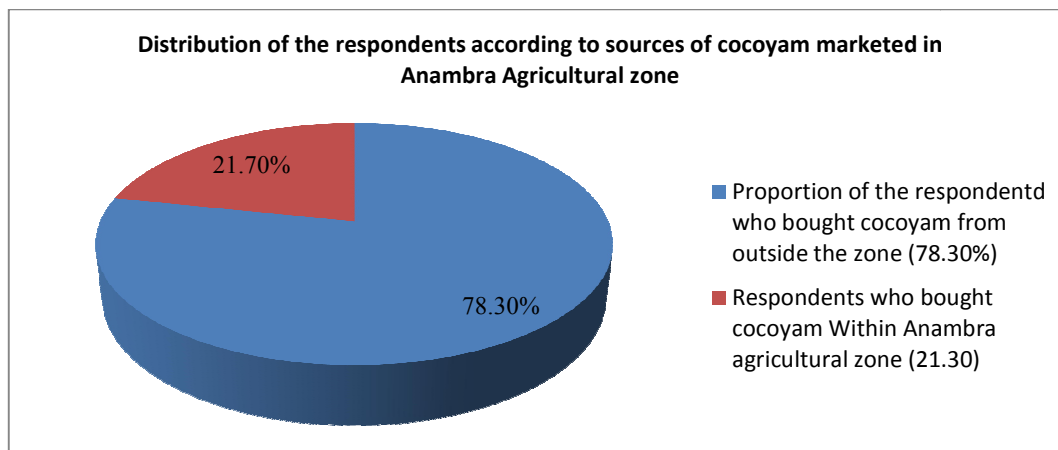


Fig. 1. Distribution of the respondents according to sources of the cocoyam marketed

Table 1. Monthly estimates of marketing costs and returns of cocoyam wholesalers and retailers

Item/Respondents	Wholesalers	Retailers
Total Revenue (TR)	7,500,000.00	4,000,000.00
Variable Costs:		
Purchases	5,500, 000.00	2,400, 000.00
Transportation	25,000.00	8,000.00
Storage	10,000.00	4,000.00
Loading	15,000.00	4,800.00
Off-loading	15,000.00	4,800.00
Security	10,000.00	4,000.00
Association dues	8,000.00	8,000.00
Total Variable Costs (TVC)	5,573,000.00	2,428,800.00
Gross Margin (TR-TVC)	2,000,000.00	1,571,200.00
Fixed Costs:		
Rent	26,000.00	8,000.00
Local Government Rate (LGR)	10,000.00	6,000.00
Equipment depreciation	70,000.00	18,000.00
Total fixed cost (TFC)	106,000.00	32,000.00
Net marketing income (NMI)		
NMI = GM- TFC)	1,894,000.00	1,539,200.00
Mean NMI = NMI/N	94,700.00	38,480.00
Total costs	5,679,000.00	2,465,600.00
Net Return on investment (NROI)		
NROI = NMI/TC	0.330.62	
ME = TC/TR x 100/1	0.76 = 76%	0.62 = 62%

Source: Field survey, 2017

receive cocoyam price signal which should encourage them to increase production of the crop. This is also because the middlemen's profit revealed in this study was very much lower than that of the cocoyam farmers found by Ekunwe et al. [3]. However, the middlemen's businesses were found profitable. The trader's none complaint about poor profit indicates that they received fair share of the consumer spending and were contented.

3.3 Marketing Efficiency of Cocoyam Wholesalers and Retailers

By the Shepherd-Futrel Model, an accurate marketing efficiency measure is the total cost estimate incurred by the market intermediaries or agencies and producers, divided by the total value of products sold and expressed in percentage [20]. This emphasizes the productivity of the resources invested by the marketing agency in the process of marketing their product and is expressed quantitatively by computation of the coefficients of the marketing efficiency [20].

In view of the above, the coefficient of the cocoyam wholesalers and the retailers is expressed mathematically as follows:

$$\text{Marketing efficiency (ME)} = \text{TC/TR} \times 100/1$$

Where ME = Marketing efficiency (Measured in percentage).

TC = Total Cost

TR = Total Revenue

Result in Table 1 shows that the cocoyam market intermediaries (Wholesalers and retailers) respectively recorded marketing efficiency of 76% and 62%. This implies that marketing costs made up 76% of the wholesalers' sales revenue while those of the retailers constitute 62%. The result reveals that costs constituted a lower percentage on the part of the retailers than the wholesalers indicating that the retailers were more efficient than the wholesalers in their monthly marketing activities. This is because it is established that the lower the coefficient values in a marketing process, the higher the level of efficiency [20]. The result appears convincing because wholesalers normally prefer quick sale at lower prices unlike the retailers who seems not to be in haste, but patiently sit and sell their products in their assembly market stalls. This is in line with [9] who found that women in marketing food crops sit in their stalls without much stress.

Table 2 shows that majority (40%) of the respondents use commercial buses as means of cocoyam haulage, 21.7% used wheel barrow while 35% use commercial motor cycle and tri-cycle. From experience, high transportation cost experienced by the marketers was reasonable because of the present high petroleum products prices and high vehicle purchase, repair and maintenance costs. From observation, Poor rural road conditions may also be a contributory reason for the high transportation cost complained by the respondents. In evidence, [6] attributed high transportation cost to poor road conditions.

The problem of lack of fund to increase cocoyam business scale and strategies is expected because only a small percentage (4%) of the respondents obtained commercial bank loans while a large proportion of them (48.3%) sourced their capital from personal savings and from family members and relatives (23.3%) as presented in Table 2. The result on the small percentage of the traders who obtain commercial bank loan is understandable because [9] reported that women are often denied credit offer due to their inability to provide the required collateral. This result reveals that cocoyam marketers do not have sufficient business fund, indicating that the offer of credit facilities at lower interest rates will be a strategy to help in the development of cocoyam market and sensitization of the farmers for increased production of the crop. In support of this reasoning, [21,22] reported that provision of effective micro-credit facilities, incentives and subsidies are some of the strategies for improving pineapple production. Similarly, [9] found that the ability to raise funds from formal sources could lead to women participation in food crop marketing.

3.4 Problems of Cocoyam Marketers

Table 2 shows that the most serious problems encountered by cocoyam marketers in the study area were high cost of transportation (20%), lack of capital to increase business scale (18.3%), poor storage facilities (15%), price fluctuation (15%) and seasonality (15%). The last three problems had equal scores of 15% and this is understandable because they appear to be interrelated. This is in the sense that availability of good storage facilities to the traders and the farmers may help to reduce the effects of seasonality of the crop and at the same time contribute to the crop's market price stability.

Table 2. Respondents' distribution according to sources of fund and transportation mode

Item/Respondents	Wholesalers	Retailers
Sources of fund		
Family members and relatives	14	23.3
Co-operative societies	7	11.7
Micro Finance banks	6	10
Commercial banks	4	6.7
Total	60	100
Mode of transportation		
Personal car, bus and trucks	02	3.3
Wheel barrow	13	21.7
Motorcycles/Tricycles	21	35
Commercial vehicles	24	40
Total	60	100

*Source: Field survey, 2017***Table 3. Respondents' distribution according to the problems encountered**

Item/Respondents	Wholesalers	Retailers
High cost of transportation	12	20
Lack of enough capital	11	18.3
Poor storage facility	09	15
Cocoyam price fluctuation	09	15
Seasonality of cocoyam	09	15
Lack of credit facilities	06	10
Lack of other marketing activities/Strategies	04	6.7
Total	60	100

Source: Field survey, 2017

The implication of the result is that the best way to solve the problems of the marketers is through increase of their business capital which will help them to overcome the effects of high transportation and acquire storage facilities. The result on storage facility agrees with [4] who concluded that very little attention has been given to cocoyam post-harvest operations. The study also agrees with [3] who recommended that the National Root Crop Research Institute in Umudike of Nigeria should help to tackle the incidence of diseases and pest of cocoyam.

4. CONCLUSION AND RECOMMENDATIONS

The study revealed that: greater proportion of the cocoyam marketed in the study area was sourced from outside the study area indicating the need to increase the output of the crop in the area.; cocoyam business in the study area is profitable and efficient because it returned 32 and 62 kobo for every one naira spent by wholesalers and the retailers respectively; the retailers were found to be more efficient than the wholesalers because of their lower marketing costs and that the major problem of the

marketers was lack of fund to increase their business scale. Extension agencies, Non Governmental Organisations (NGOs) and other development workers should encourage potential farmers to go into cocoyam production sector; encourage current farmers to increase their production scale and to meet cocoyam market demand in the study area; increase farmers' knowledge and access to improved cocoyam varieties and storage facilities. This will help to increase cocoyam production and the shelf life as ways of reducing the seasonal effects on its availability and also contribute to the crop's price stability. Adequate policy measures or interventions are needed from the government to facilitate bank credit facilities acquisition at lower interest rate for the cocoyam famers and traders.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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