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YAM VALUE CHAIN ANALYSIS AMONG SMALLHOLDER FARMERS IN SOUTH-SOUTH NIGERIA

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ABSTRACT

(1US\$ = ₦ 1,307)

The study analyzed yam value chain among small holder farmers in South South Nigeria, with specific objectives of estimating the profit margin and examining the factors that affect the profit margin of the yam value chain actors. Gross and marketing margins, marketing efficiency and multiple regression analyses were used to realize the objectives. Data from eighty, fifty and sixty yam producers, processors and marketers, respectively were collected with the use of questionnaires. Results of analyses showed that the gross margin of yam producers was ₦554,133.3/ha and 35% of which went into operating expenses. That of processors was ₦154,877.58 with 47% operating expenses and ₦96,0752.68 with 66% operating expenses for marketers respectively. Marketing margin of yam processors was estimated to be 0.332 (33.2%) and a marketing efficiency of 58.65%, which meant that the yam processors gained ₦58.65 kobo for every naira spent on processed yam. The marketing margin of yam marketers was estimated as 42.1% and a marketing efficiency of 54% meaning that yam marketers gained ₦0.546 (54.6 kobo) for every naira spent on marketing yam in the area. Factors that affected the profit margin of the yam producers were age, household size, education, farm size and access to credit. Age, level of education and processing experience influenced the profit margin of yam processors, while household size, level of education, marketing experience and membership of association influenced the profit margin of yam marketers. Nonetheless, the yam value chain actors made appreciable profit. Following the results, the following are recommended: because of the good profit margins of the actors, more people should be encouraged to become actors in the yam value chain and education of yam value actors should be encouraged to give them more capacity to use innovation in their business.

Key words: value chain, yam producers, yam marketers, marketing margin, marketing efficiency

INTRODUCTION

Yam is a vegetable tuber from the family '*Dioscorea*' (D). 'There are hundreds of wild and domesticated *Dioscorea* species for which Guinea yam *D. rotundata* are the most important species in the dominant yam production zones of West and Central Africa and indigenous to West Africa is the Yellow yam, *D. cayenensis* and Water yam, *D. alata*,' [1]. Yam is, however, grown in Africa, Asia and some parts of Latin and Central America. There are also various species of this product from the white variety, to the yellow and pink varieties but one common feature is the thick brown cover. According to Ekunwe *et al.* [2] yam is prepared in various ways such as boiled, roasted, fried or mashed as done with mashed potatoes or processed into powder for puddings or for other meals. The authors went further to posit that the back of the yam is also used as feed for livestock; therefore, all parts of it are useful. Yam tubers however, consist of about 21% dietary fiber and are rich in carbohydrates, vitamin C and essential minerals and are also low in fat [3]. In the same vein, Bamire and Amujoyegbe [3] noted that in Nigeria, yam has a cultural value and there is an annual yam festival to celebrate the importance of the crop. This occurs mostly at the end of the rainy season between August and September, whereby a date is fixed by the elders of the community and families go out to harvest the product, it is often called new yam festival although this celebration occurs predominantly in the southern parts of Nigeria [4]. Also, Ogaji *et al.* [5] noted that yam does not only have a traditional value of consumption but it is also used for industrial purposes.

The production process for yam requires 6 different processes [6, 7]. The first stage requires clearing the field, the second level requires making of mounds that is often called 'heaps' and is the most difficult part of the production process. These heaps are often made at the beginning of the rainy season when the soil is soft or early before the rain in swampy areas. The next stage involves the planting of the yam seedlings. This occurs at the beginning of the rainy season in April. This is followed almost immediately by the application of herbicides, which is done in May just before the seeds fully germinate [8]. After the herbicides, the need to apply fertilizer on the field is important to ensure adequate growth of the crop, this is therefore done in the month of June. The final stage of the production process is harvesting of the yam, which is carried out between December and January.

Yam value chain results in more effective and efficient ways of entrepreneurship in yam business. The value chain in yam production begins with the level of inputs which consist of land, planting materials and farm tools. The production stage is next and starts with clearing to harvesting; it is followed by transportation which is the movement of the product to selling point. At the wholesale/retail stage, yam is sold to final consumers and following closely is the processing level where yam is

turned into desirable products for consumption and finally the consumption stage which represents the utilization of the yam products. The actors in the value chain can be summarized into farmers, middlemen, processors, consumers and exporters [8, 9].

The importance of yam in this area is underscored by the fact that it is deeply tied to the lives, livelihoods and cultures of the people of the area. This assertion is exemplified by the yam titles, an annual festival celebration heralding the harvest of the crop. The quest for yam titling and its cultural value therein has a boost in the people's participation in the yam value chain and has therefore made yam production competitive in the area [10]. A value chain according to Offor *et al.* [10] as cited by Ogaji *et al.* [11] is a *full range of activities which are required to bring a product or service from conception through different phases of production thereby integrating a number of inputs and services from the producer, to the supplier, down to the consumer and the final disposal after use*. Ogaji *et al.* [11] noted that value chain practice is instrumental for achieving desired outcomes such as poverty alleviation, entrepreneurship and decent labour conditions while also affording vulnerable farmers marginal benefits from production.

Also, Robert *et al.* [12] and Agbachom *et al.* [13] reported that value chain is a line of activities carried out to add value to a product and involves the various processes a crop goes through before getting to the final consumer, which are basically from producer, to the supplier, down to the consumer and its disposal after use. Yam value chain shares light on the fact that production must have a linkage to demand. Despite the contribution of yam to human diet, its value chain is in the hands of smallholder farmers who are resource poor and as such, cannot afford all it takes to boost the sector. These actors are constrained with diverse problems that range from production to marketing.

Furthermore, Dinesh and Amod [14] reported that marketing efficiency is a term used to describe all efforts of farmers streamlined so that they are producing the maximum return for minimal cost, both in terms of budget and resources. In the same vein, Ettah *et al.* [15] accepted that marketing efficiency focuses on reducing marketing costs without reducing output or results to overall profit of an enterprise. They further stated that marketing margin of a farm product is the difference between what farmers pay for the product and what it charges for the product in the market in order to make profit. The smallholder yam farmers in the South South Nigeria are unable to meet up with the production scale and efficiency because of their absence in some stages of production where value is being added [13]. This study is predicated on this assertion and hence designed to achieve the following specific objectives:

- i. To estimate the profit margin of yam value chain actors
- ii. Examine the factors that affect the profit margin of the yam value chain actors

MATERIALS AND METHODS

The study area was South -South Nigeria in West Africa and purposively chosen for its large-scale contribution to the sub-Saharan production of yam, and the peculiarity of the marketing margin and efficiency problems in the region [14]. The South-South region is one of the six geopolitical divisions of Nigeria, a country on the Gulf of Guinea with a population of about 26 million people, representing around 12% of the total population of the country. The south-south region is located within Latitude 6.2059' N and Longitude 6.6959° E of the Greenwich Meridian and stretches along the Atlantic Seaboard from the Bight of Benin coast in the East and is sometimes called the Niger Delta because of the extensive oil and natural gas reserves, which is instrumental in the environment and economic development of the region. The region has a tropical climate with variable rainy and dry seasons. The dry season in the area spans from November to late March, while rainy season spans from April to October with a short spell in August called "August break" [15]. The mean annual rainfall is between 1,300mm to 3,000mm, which varies from place to place across the region. Highest temperature is recorded between February and March and does not exceed 37°C, and the lowest between May and October and does not go below 18°C and also varies from place to place around the region. Agriculture is the major activity of the people of the region, accounting to about 75% of the population, distributed in agricultural production, processing and distribution [15, 16].

Sampling Procedure, method of data collection and Sample size:

The six states of the region are: Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers States were covered in the study, with focus in the coastal areas, where large scale production of yam is found. A multistage sampling procedure was then adopted to select respondents as follows:

Stage 1: purposive selection of two Local Government areas (LGA's) in each of the six States bringing the total number of LGA's in the sample to twelve. The selection was based on the LGA's with large production, processing and marketing of the crop.

Stage 2: purposive selection of three yam farming villages in each of the twelve Local Government Areas earlier selected in stage 1. Again, this selection was based on the preponderance of yam production, processing and marketing activities in the study area, bringing the total number of yam farming villages to thirty-six.

Stage 3: In this stage, from the list of actors in the yam value chain, eighty yam producers, fifty processors and sixty marketers were randomly selected using 50%, 60% and 55% of the total actors in the list, respectively. The choice of the percentage for each actor was based on the total number of the different actors available at Federal Ministry Agriculture Zonal office of the study area and the percentage that would give a sample size for the time this study was expected to be accomplished and also a sample size that could accommodate the lean resources of the authors. Data were collected with the use of structured and validated questionnaire which was subjected to both reliability and validity tests, with a Cronbach Alpha value of 0.83, indicative of a high assurance level.

DATA ANALYSIS

Gross margin analysis

Gross margin analysis was used to determine the cost and returns of yam producers along the value chain and calculated on per hectare basis. It was given as:

$$GM = GVO - TVC \quad (i)$$

Where: GM = gross margin

$$GVO = \text{Gross value of output in Kg} \quad (ii)$$

$$TVC = \text{total variable cost in naira} \quad (iii)$$

Marketing margin

$$\text{Marketing margin} = \frac{\text{selling price producers price}}{\text{selling price}} \quad (iv)$$

Marketing efficiency

$$\text{marketing efficiency} = \frac{\text{marketing margin}}{\text{marketing cost}} \quad (v)$$

Regression Analysis

Ordinary Least Square multiple regression analysis was used in estimating the factors that influence profit of the actors in the yam value chain. Explicitly the model used is stated as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} D_1 + \beta_{12} D_2 + \beta_{13} D_{13} + U. \quad (vi)$$

Where:

β_0 = intercept

β_1 - β_9 are the parameters to be estimated

Where Y = profit margin in naira

X_1 = age of the producers in years

X_2 = years of education (number of years spent in school)
 X_3 = household size (Number of persons in farmers house)
 X_4 = yam production/ processing/ marketing experience (no. of years)
 X_5 = area of land (in hectare)
 X_6 = cost of chemicals (in naira)
 X_7 = cost of yam sett (in naira)
 X_8 = cost of labour (in naira)
 X_9 = cost of other inputs (in naira)
 X_{10} = transaction cost (in naira)
 D_1 = gender (1 if male, 0 if otherwise)
 D_2 = membership of association (1 = yes, 2 = no)
 D_3 = access to credit (1 = yes, 2 = no)
 U_i = the error term which captures all other factors that can affect gross margin but not considered in this model.

RESULTS AND DISCUSSION

Socio-economic characteristics of the actors in the yam value chain

The distribution according to age of respondents shows that majority of the respondents were in the age bracket of 41 and 50. This indicates that the actors were all in their active age of production [15]. Aboh and Effiong [22] reported in their study of analysis of marketing margins and efficiency of cassava-based product that efficiency in production could be guaranteed within this age bracket. Females dominated marketing of yam while males dominated yam production and processing; this could be as a result of the stress of production and processing of yam as against marketing. Majority in the yam value chain have household of between 6 –10. The large size could be because of their marital status and the fact that they rely mostly on family labour for their production, this finding is also in line with that of Okweche *et al.* [16] and Ettah *et al.* [17] who showed that farmers prefer large family size to deploy later as cheap labour source in their farm activities. On education, 47%, 60% and 46.7% of producers, processors and marketers, respectively were educated only up to secondary education level. This could explain why their margins were relatively low. Dinesh and Amond [14] asserted in their study of marketing margin, price spread and marketing efficiency analysis on different poultry farms that good education equips and sharpens value chain actors for entrepreneurship, which results in efficiency. Membership of association had only marketers in the value chain with majority (65%) as members of the associations, while almost all the producers and processors (98.7%) and (86%), respectively did not belong to any association, which affected their margins. Against this background Offor *et al.* [10] discovered in their study of the region that value chain associations in these two actors are often not available in the area.

The distribution according to experience of respondents shows that majority of the producers (53.7%), processors (58%) and marketers (51.6%) had between 6 – 10 years of experience, this shows that they were fairly young actors in the yam value chain. Majority of producers (88.7%) and processors (84%) did not have access to credit for their business, while 65% of marketers had access to credit. This finding conforms to that of Ogaji *et al.* [5], who posited that producers and processors are not well organized to be considered for credit. The coordination in the marketing value chain could be responsible for the awareness and request of this facility. Finally, all the actors in the yam value chain: producers (86.2%), processors (98%) and marketers (96.7%) had little or no extension contact, an indication of neglect from government and other stakeholders in the agricultural subsector of the Nigerian economy.

Gross margin analysis of yam producers

The result of gross margin analysis of yam producers in the area is presented below:

The gross margin of yam production in the area was ₦303,709.99/ha, which indicates that for every one hectare of farm land used for yam production per planting season, the farmer made ₦303,709.99 (US\$206.49). The operating ratio value indicates that yam producers spent about 35% of their gross income for yam production in operating expenses; the result is contrary to that of Dinesh *et al.* [12] who found that yam producers used over 50% of their gross income in production.

Gross margin analysis of yam processors

The result of gross margin analysis of yam processors in the area is presented below:

The gross margin of yam processors in the area was ₦157,877.59 (US\$107.38) per tonne, this indicates that these value chain actors made a gain of this amount of money per tonne of yam purchased. Also, the operating ratio of 0.47 shows that the processors spent 47% of their gross income for yam processing in taking care of processing expenses.

Gross margin analysis of yam marketers

The result of gross margin analysis of yam marketers in the area is presented below:

The gross margin of yam marketers in the area was ₦ 96,075.68 (US\$ 65.33) per tonne, this shows that the marketers in the value chain made ₦ 96,075.68 per tonne of yam bought. The operating ratio was 0.66 and shows that the marketers spent 66% of their gross income for yam marketing in expenses.

Marketing margin and efficiency for yam processors

This subsection presents results of the analysis of marketing margin of yam processors.

$$\text{Processor marketing margin} = \frac{1100.35 - 734.76}{1100.35} = 0.332$$

$$\text{Processors marketing efficiency} = \frac{580.98 \times 100}{990.50} = 58.65\%$$

The marketing margin of yam processors estimated was 0.332 (33.2%). This indicates that for every tuber (s) of 2kg weight, the processors made a profit of ₦ 332. Similarly, the marketing efficiency of yam processors was estimated to be 58.65%. This means that the yam processors gained ₦0.586 (58.65 kobo) for every naira spent on processed yam, this result agrees with that of Ettah *et al.* [15] who got an almost similar marketing margin and efficiency in the processors they studied.

Marketing margin and efficiency for yam marketers

This subsection presents result of the analysis of marketing margin of yam marketers:

$$\text{Marketers 'marketing margin} = \frac{1,230.42 - 711.66}{1,230.42} = 0.421$$

$$\text{Marketers marketing efficiency} = \frac{413.79 \times 100}{756.82} = 54.67\%$$

The marketing margin of yam marketers was estimated as 0.421 (42.1%). This shows that for every 2 kg weight of yam tuber sold, the marketers made a profit of ₦421. Similarly, yam marketing efficiency was estimated to be 54%. This shows that the yam marketers gained ₦0.546 (54.6 kobo) for every naira spent on marketing yam in the area, the result is in line with the findings of Ettah *et al.* [15].

Factors that affect the profit margin of the yam value chain actors

Result of regression analysis for factors that affect the profit margin of the yam value chain actors is presented below:

Results in Table 3 show that Age (X_1), household size (X_2), education (X_3), farm size (X_5) and access to credit (X_7) were significant at various levels of probability and had positive coefficients. The significance of these variables implies that a one unit increase in the variables will increase the marketing margin for the yam producers by the values of their coefficients. The positive signs on the significant variables are in line with a - priori expectation and indicate that there is a direct

relationship with yam production (output). The age of the farmer is expected to influence the productive use of resources, older farmers may not be able to engage resources effectively for optimum production, and this assertion is agreed Okweche *et al.* [16], that younger farmers are more efficient in resource use. The positive and significant nature of household size could be as result of using large family size as source of labour for yam production as noted earlier. The significance of educational level could be because educated producers can better harness innovation and training in yam production, as posited by Ettah, Ettah and Ukwuaba [17]. Farm size also returned a positive coefficient for yam producers, indicative of the fact that the larger the farm size the larger the output. Access to credit was also positively signed implying that the more the yam producers have access to credit, the more their output. This is because more money and other credit facilities would translate to enhanced production and hence output [17,18]

The coefficient of multiple determinations R^2 of 0.926 shows that 93% of the variation in level of profit margin of yam producers was explained by the explanatory variables in the model; which shows the goodness of fit of the model [20,21]. Also, an F-statistics of 121.0, implied that more of the variables have positive and significant effect on level of profit margin of yam producers and that the model was well specified.

Factors that affect the profit margin of the yam processors

Result of regression analysis of factors affecting the profit margin of yam processors is presented in Table 4. The result indicates that the coefficient (0.0475) of age of yam processors is positively signed and significant at 5% level of probability, meaning that as the age of the processors increases or as they get older, level of profit margin also increases. This stems from the fact that older processors have enough experience and skills to make more profit than younger processors. Educational level (5.0774) also has a positively and significant coefficient at 5%, indicative of the fact that the more yam processors are educated, the more they are aware to participate in meaningful processing by way of using innovative and productive processing techniques. This conforms to the result of Effiong *et al.* [19] that education is key to productive farm business activity.

Regression result further indicates that processing experience (60.25) also had a positive relationship with profit margin of yam processors at 1% level of probability. This means that the more the number of years in processing of yam, the more the profit margin of the processors. This result is expected and can be attributed to the fact that the more the years of processing, the more marketing strategies are acquired that could bring more efficient and effective ways of marketing for increased profit [20]. The coefficient of multiple determinations R^2 of 0.86 shows that 86% of the variation in level of profit margin of processors of yam was

explained by the explanatory variables in the model; which shows the goodness of fit of the model. Also, an F-statistics of 198.7, implied that more of the variables have positive and significant effect on level of profit margin of yam processors and that the model was well specified [22].

Factors that affect the profit margin of the yam marketers

Household size (2.1777), level of education (1.5460), marketing experience (1.4161) and membership of association (1.5460) are the positive and significant variables that affect the profit margins of yam marketers in the area at various probability levels. Again, the significance of these variables implies that a one unit increase in these variables would increase the marketing margin for the yam marketers by the values of their coefficients. The positivity of household size indicates that the higher the size, the more the profit margin of the marketers. More members in the household would mean more helping hands and more sale outlets for the marketing of yam, which could bring more profit. More education increases profit margin of marketers as it enables them to deploy effective and cutting-edge marketing strategies in the marketing of yam.

Similarly, marketing experience affords the marketers the knowledge of market trends, skills, customer relations, techniques and so on, and guarantees profit in marketing of yam. Membership in an association increases profit margin of marketers, this is because market associations as cooperative societies enables marketers pool their resources together to buy at farm gates prices. Associations also form cartels to create artificial scarcity for increased profit margin to their members [18, 19, 20]. The coefficient of multiple determinations R^2 of 0.854 shows that 85% of the variation in level of profit margin of yam producers was explained by the explanatory variables in the model; which shows the goodness of fit of the model. Also, an F-statistics of 121.0, according to Aboh and Effiong [21] implied that more of the variables have positive and significant effect on of level of profit margin of yam marketers and that the model was well specified.

CONCLUSION, AND RECOMMENDATIONS FOR DEVELOPMENT

Gross margin of yam producers was ₦554,133.3/ha and 35% of which went into operating expenses. That of processors was ₦154,877.58 (US\$ 0.10) with 47% operating expenses and ₦96,0752.68 (US\$ 0.06) with 66% operating expenses for marketers, respectively. The marketing margin of yam processors was estimated as 0.332 (33.2%) indicating a profit of ₦332 per 2kg tuber of yam and a marketing efficiency of 58.65%, which means that the yam processors gained ₦58.65 kobo for every naira spent on processed 2kg yam. The marketing margin of yam marketers estimated was 42.1% indicating that for every 2 kg weight of tuber sold, the marketers made a profit of ₦421 and a marketing efficiency of 54%

meaning that yam marketers gained ₦0.546 (54.6 kobo) for every naira spent on marketing yam in the area.

Factors that affected the profit margin of the yam value chain actors were age, household size, education, farm size and access to credit. Age, level of education and processing experience influenced the profit margin of processors, while household size, level of education, marketing experience and membership of association influenced the profit margin of yam marketers. Nonetheless, the yam value chain actors made appreciable profit. Following the result, the following is recommended: because of the profit margins of the actors, more people should be encouraged to become actors in the yam value chain and education of yam value actors should be encouraged to give them more capacity to use innovation in their business.

Table 1: Socio-economic characteristics of the actors in the yam value chain

Characteristics	producers (n=80)	processors (n=50)	marketers (n=60)
Age			
30-40	18 (20.5)	11 (22)	11 (18.4)
41-50	30 (37.5)	21 (42)	28 (46.6)
51-60	24 (30)	13 (26)	13 (21.6)
> 60	8 (10)	5 (10)	8 (13.4)
Mean	51.7	41.4	42.1
Sex			
Male	74 (92.5)	41 (82)	11 (18.3)
Female	6 (7.5)	9 (18)	49 (81.7)
Household Size			
1-5	21 (26)	16 (32)	18 (30)
6-10	52 (65)	28 (56)	33 (55)
>10	7 (8.8)	6 (12)	9 (15)
Mean	7	6	7
Education			
Primary	23 (28.8)	14 (28)	20 (33.3)
Secondary	47 (58.8)	30 (60)	28 (46.7)
Tertiary	10 (12.6)	6 (12)	12 (20)
Member of association			
Yes	9 (11.3)	7 (14)	39 (65)
No	71 (88.7)	43 (86)	21 (35)
Experience			
1-5	15 (18.8)	9 (18)	11 (18/3)
6-10	43 (53.7)	29 (58)	31 (51.6)
>10	22 (27.5)	12 (24)	18 (30)
Mean	6	4	6
Access to credit			
Yes	9 (11.3)	8 (16)	39 (65)
No	69 (86.2)	49 (98)	58 (96.7)
Extension contacts			
Yes	11 (13.8)	1 (2)	2 (3.3)
No	69 (86.2)	49 (98)	58 (96.7)

Figures in parenthesis are percentages

Table 2: Gross margin analysis of yam producers

Variables	value (₦/ha)
Gross value of yam	857, 843.82
Cost of labour	210, 285.91
Cost of chemicals	42,400.32
Cost of yam seedling	51,023. 76
Gross margin (i minus ii-iv)	554,133.83
Operating ratio (ii-iv divided by i)	0.35

Table 3: Gross margin analysis of yam processors

Variables	value (₦/tonne)
Gross value of yam	330, 456.70
Cost of equipment	134, 435.65
Cost of taxes and charges	18,598.40
Cost of labour	22,545.06
Gross margin (i minus ii-iv)	154, 877.59
Operating ratio (ii-iv divided by I)	0.47

Table 4: Gross margin analysis of yam marketers

Variables	value (₦/tonne)
Gross value of yam	143, 786.21
Cost of equipment/transportation	31, 345.47
Cost of taxes and tolls	11,877.32
Cost of labour	4,487.74
Gross margin (i minus ii-iv)	96, 075.68
Operating ratio (ii-iv divided by i)	0.66

Factors that affect the gross margin of yam producers

Table 5: Regression result of factors that affect the gross margin of yam producers

Variables	Coefficient	Standard error	t-values
Age (X ₁)	108.759**	59.884	1.816
Gender (D ₁)	-160.946	-144.585	-1.113
Household size (X ₂)	307.088	162.430	-1.891
Level of education (X ₃)	1024.627*	147.777	6.934
Farm size (X ₅)	4835.818***	253.068	19.109
Access to credit (X ₇)	289.765**	112.321	2.579
Extension contact (X ₈)	-117.883	74.643	2.389
Constant	501.596	492.327	1.018

R² = 0.926; Adjusted R² = 0.910, F-statistics = 121.026 * = 10%, ** = 5%, *** = 1%

Table 6: Regression result of factors that affect the profit margin of yam processors

Variables	Coefficient	Standard error	t-values
Age (X ₁)	0.0475**	0.022	2.16
Gender (D ₁)	-1.086	6.650	1.63
Household size (X ₂)	-7.0891	0.854	-8.30
Level of education (X ₃)	5.0774**	442	3.52
Processing experience (X ₄)	60.25***	4.761	12.6
Membership of association (D ₂)	-2.7634	0.9967	-2.7725
Input cost (X ₉)	-2.0582	0.546	3.4636
Transportation costs (X ₁₀)	-2.4079	0.2631	9.1520
Constant	117.681	8.965	13.13

R² = 0.86; Adjusted R² = 0.80; F-statistics of 198.7 * = 10%, ** = 5%, *** = 1%

Table 7: Regression result of the factors that affect the profit margin of yam marketers

Variables	Coefficient	Standard error	t-values
Age (X ₁)	-0.5906	-0.2960	-1.9951
Gender (D ₁)	-1.5643	0.7895	1.9812
Household size (X ₂)	2.1777*	1.0123	2.1512
Level of education (X ₃)	1.5460***	0.3226	4.79
Marketing experience (X ₄)	1.4161	1.1342	1.2485
Membership of association (D ₂)	1.5460*	0.3226	4.79
Access to credit (X ₉)	-0.2476	0.6449	-0.38
Inputs costs (X ₉)	-1.821	1.2423	1.4658
Transportation costs (X ₁₀)	9.312	4.442	2.09
Constant	2149.422	2621.11	0.82

R² =0.854; Adjusted R²=0.830; F-statistics= 103.741 *= 10%, **=5%, ***=1%

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