



## Determinants of Profitability Among Agricultural Equipment Fabricators in Oyo State, Nigeria

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## Abstract

*The study examined enterprise profitability among agricultural equipment fabricators. It was conducted in Oyo State, Nigeria using a multistage sampling procedure to select the 48 respondents from whom data were collected using a structured questionnaire. Percentage was used to analyse the socioeconomic and enterprise characteristics of the respondents, while gross margin analysis was used to determine the profitability of the enterprise. A linear regression model was used to ascertain the drivers of enterprise profitability among respondents. Findings revealed that over half (54.4%) of the fabricators produced processing equipment, while fewer (28.2%) produced farm tools. Most of the fabricators operated with a mean workshop space of 1.3 m<sup>2</sup>. The gross margin analysis showed a total revenue of ₦95,302,900 exceeding the total cost of production (₦20,374,205), indicating (₦74,928,695) profitability of their enterprise with an ₦3.68 return on investment per Naira. Fabrication being a secondary occupation ( $\beta=0.340$ ), and business registration with the Corporate Affairs Commission ( $\beta=0.473$ ) significantly influenced profitability among the respondents. This study recommends regulating the fabrication sector through policies, ensuring that fabricators register their outfits with designated statutory bodies to significantly enhance the standardization of outputs and increase the units of production, hence, improving the profitability of the enterprise.*

## Introduction

Technological advancement has been a primary driving force in enhancing agricultural productivity and supporting agricultural growth (Liu et al., 2020). From on-farm operations to off-farm activities, agricultural mechanization has been identified as a crucial factor in increasing agricultural productivity and promoting rural sector industrialization, as well as the overall economic development of nations (Lewis et al., 2022). Agricultural mechanization is also considered to heavily impact the supply and demand of labour and agricultural profitability, hence serving as a backbone for every thriving agricultural economy (Peng et al., 2022).

Over 70% of Nigeria's populace is engaged in agriculture mostly at the subsistence level (Aderinoye & Abdulbaki, 2020). However, poor access to modern inputs and equipment are constraint to food sufficiency, indicating a shortage of appropriate tools and equipment for agricultural activities (Ntagu et al., 2022). Agricultural fabricators play a vital role in enhancing manufacturing and processing technologies essential to the improvement of food security through manufacturing and processing facilities, which increases the value of agricultural products (Ampah et al., 2021). Unlike other developed countries, Nigeria still lags behind in the mechanization of the agricultural sector with most of the country's agricultural production activities performed manually (Oyelade et. al., 2022).

In developing countries of Africa, including Nigeria, the agricultural fabrication industry has been faced with constraints resulting from the high cost of production materials, inadequate labour, safety and low level of technology (Olorunnisola, 2021). Despite the crucial role of agricultural fabricators in supplying tools to

resource-poor actors along the agricultural value chain, they continue to face challenges in maintaining profitability, and their ability to meet the growing need for agricultural machinery and equipment. There is therefore a need to identify factors that influence the profitability of agricultural fabricators in Nigeria. Hence, this study seeks to investigate the determinants of agricultural fabricators' profitability in Nigeria. Specifically, this study seeks to identify credit and support services accessible to fabricators, examine the production status of fabricators, examine the material input used by the fabricators, determine the profitability of fabricators, and determine the factors influencing the profitability of the fabricators. The findings of this study will give insights into the factors influencing agricultural fabrication and will stimulate policy formulation to support the growth and development of the industry in Nigeria.

### Methodology

This study was conducted in Oyo State with coordinates approximately between latitude 8.1574°N and longitude 3.6147°E, and a population of 9,233,010 (National Population Commission, 2019). Data used for this study were collected using a structured questionnaire. A multistage sampling procedure was used for the selection of respondents for this study. The Oyo State Agribusiness Development Agency (OYSADA) stratified all 33 Local Government Areas (LGAs) into seven zones. The first stage was to purposively select LGAs in each zone to give a total of 21 LGAs in the State. In the second stage, a snowball sampling technique was used to generate a list of 128 fabricators across the 21 LGAs because there was no record of fabricators in the State. In the third stage, questionnaires were randomly administered to the fabricators, however, 48 of them consented to respond to the questionnaires as some of the fabricators were sceptical about giving out financial information about their enterprises. Frequency, gross margin analysis, and linear regression models were used to analyse the data. The gross margin analysis is specified as:

$$GM = \sum p_i (Q_i - \sum p_j X_i)$$

Where GM = Gross Margin, Pi = Unit price per output,

Qi = Quantity of each output

Pj = Unit of each input Xi = Quantity of each input

GM = Total Revenue (TR) – Total Cost (TC)

TC= Total Variable Cost (TVC) + Total Fixed Cost (TFC)

The linear model is specified as:

$$y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 \dots b_nx_n + ei$$

Where:

Y = Fabricators' profitability

x<sub>1</sub>= Age

x<sub>3</sub>= Household size

x<sub>5</sub> = Marital status

x<sub>7</sub> = Religion

x<sub>9</sub> = Educational qualification

x<sub>11</sub> = Studied engineering

x<sub>13</sub> = Had technical training

x<sub>15</sub>= Primary occupation

x<sub>2</sub> = Sex

x<sub>4</sub> = Ethnic group

x<sub>6</sub> = Business registration with CAC

x<sub>8</sub> = Benefitted from intervention

x<sub>10</sub> = Access to credit

x<sub>12</sub>= Belonged to association

x<sub>14</sub>= Belonged to professional body

x<sub>16</sub> = Access to extension services

$x_{17}$ = Secondary occupation  
 $x_{19}$ = Size of workshop  
 $e_i$  = Error term

$x_{18}$  = Type of labour engaged  
 $x_{20}$ = Years of experience

## Results and Discussion

### Credit and Support Services Accessible to Fabricators

Table 1 shows that the majority of the respondents (83.3%) were not beneficiaries of intervention programmes. This shows that there are few intervention programmes targeted at fabricators. Interventions such as training and incentives from banks and cooperatives were some of the intervention programmes fabricators benefitted from. The majority of the respondents (70.8%) did not benefit from training. Nonetheless, some fabricators received training in bookkeeping, money management and fabrication. Training is essential to enhance fabricators' knowledge of record keeping, improve their skills and safety, and also to enhance their adaptation to new and improved technology. Consequently, this will impact the quality of work fabricators can produce. More than half of the respondents (57.8%) had no access to credit.

Credit facilities are essential to increase fabricators working capital, increase their tendency to purchase improved equipment for production processes and enhance their ability to take advantage of business opportunities. In this case, where a large proportion of the fabricators are unable to access cash, it creates a limit to their productivity, thus reducing their profitability. Ampah et al. (2021) carried out a similar study in Ghana which revealed that agricultural fabricators had serious challenges in accessing credit and that the majority of the fabricators had no access to credit facilities.

Most of the respondents (76.9%) responded that high interest rate placed by lending institutions was a major challenge they faced in accessing credit. The result further revealed that 48.0% of the respondents belonged to formal associations such as cooperatives and 21.0% of the respondents were members of informal associations such as Oyo Blacksmith and metal fabricating associations. Membership in an association enables fabricators to pool resources together and engage in projects that are beneficial to the growth of their business. Most of the fabricators (63.0%) belonged to professional bodies such as the Blacksmith Welder and Iron Association of Nigeria, the Nigeria Society of Engineers and the Nigerian Institute of Industrial Engineers. This shows that most respondents identified as members of professional bodies related to their industry. Professional bodies create avenues for knowledge sharing, exposure to new and improved technology and increased access to business opportunities among fabricators.

Findings from the result show that the majority of the fabricators (89.6%) owned bank accounts. This shows that most of the fabricators were informed about banking services and engaged in bank transaction activities. The majority of the respondents (97.9%) indicated that they owned mobile phones. This means that the fabricators had access to a swift medium of communication and could easily source information among themselves without having to meet physically. This also shows that the fabricators are conversant with the operation of mobile phones and can perform financial transactions that do not involve the use of the internet on their phones. The

result revealed that less than half of the respondents (42.9%) had access to extension services. This shows that most of the fabricators did not receive the support services provided by extension agents. Extension services are essential to bridge the gap between agricultural fabricators and farmers, enabling fabricators to make informed decisions on the appropriate equipment and tools that are useful to the agricultural needs of the farmers. Furthermore, the result revealed that 44.4% of respondents employed hired labour and 37.8% of them employed both family and hired labour. This shows that the major source of labour for the fabricators was hired labour, implying that they have a responsibility to pay wages to their workers.

**Table 1: Credit and support services accessible to fabricators**

Variables	Percentage
<b>Benefitted from intervention</b>	16.7
<b>Benefitted from training</b>	29.2
<b>Access to credit facilities (Yes)</b>	42.2
<b>Source of credit facilities</b>	
Formal	45.8
Informal	10.4
None	43.8
<b>Challenges faced in accessing credit</b>	
Collateral	11.5
High-interest rate	76.9
Stringent bureaucratic process	3.9
Short moratorium period	7.7
<b>Belonged to association</b>	
Formal	48.0
Informal	21.0
None	31.0
<b>Belonged to a professional body (Yes)</b>	63.0
<b>Possessed bank account (Yes)</b>	89.6
<b>Possessed mobile phone (Yes)</b>	97.9
<b>Access to extension services (Yes)</b>	42.9
<b>Labour</b>	
Family	11.1
Hired	44.4
Family and hired	37.8
Apprentice	6.7

Source: Field survey, 2022

### **Fabricators' Production Status**

The result in Table 2 shows that 54.4% of the fabricators produced processing equipment such as feed mill machines, graters, maize grinders and maize shellers.

Few of the fabricators (28.2%) produced farm equipment such as hoes, cutlass, poultry cages and drinkers, Household equipment such as knives, pepper grinders and coal pots were produced by 17.4% of the respondents. Most of the respondents (51.2%) spent between 1 and 24 hours in production, 41.9% spent between 25 and 168 hours, and 6.9% spent between 169 and 720 hours. More of the farmers (66.6%) made between 1 and 50 units of production weekly, 28.6% made between 51 and 100 units, while very few (4.8%) made above 100 units weekly. More of the fabricators (58.3%) sold between 1 and 50 units of their products, 33.4% sold between 51-100 units of their output weekly, while 8.3% sold above 100 units of their output. The majority of the respondents (80.0%) sold their output for less than ₦400,000 per unit, 17.5% sold their output for prices between ₦400,000 and ₦800,000, while only 2.5% sold their output above ₦800,000 per unit.

**Table 2: Fabricators' production status**

<b>Variables</b>	<b>Frequency</b>
<b>Type of equipment produced</b>	
Processing equipment	54.4
Farm equipment	28.2
Household equipment	17.4
<b>Time spent (Hours)</b>	
1-24	51.2
25-168	41.9
169-720	6.9
<b>Number of units made (weekly)</b>	
1-50	66.6
51-100	28.6
Above 100	4.8
<b>Number of units sold (weekly)</b>	
1-50	58.3
51-100	33.4
Above 100	8.3
<b>Price/unit</b>	
Less than 400,000	80.0
400,000-800,000	17.5
Above 800,000	2.5

Source: Field survey, 2022

### **Material Input Used by Fabricators**

Table 3 shows that 14.6% of farmers used steel for production and spent above ₦100,000 on it. Few of the fabricators (4.2%) used engines and bearings for their production, 2.1% of the respondents used chains, gum rigid, aluminium, iron sheet, pipe, angle, wire mesh, cutting disc, grinding disc, rivet machine, spraying machine, and welding glass for their fabrication process. The result also shows that 12.5% of the fabricators used paints and spent between ₦20,000 and ₦40,000. Also, 6.3% of the respondents spent less than 10,000 on bolts and nuts for production, and 4.2% of them spent above ₦10,000. The result further shows that 12.5% of the respondents spent less than ₦10,000 on the use of sandpaper. Findings of the result show that 16.7% of the respondents spent above ₦ 20,000 on the use of *las electrodes*, while 14.6% of them spent between ₦10,000 and ₦20,000 on the use of *las electrodes*. The result shows that the *las electrode* was more used by the respondents followed by paints and steel. Electrodes are crucial components for the fabrication process and they are responsible for conducting electrical current that melts and fuses the metals used. Hence, this could be a reason why it was mostly used by fabricators.

**Table 3: Material input used by fabricators (Total cost of input in ₦)**

Items	Percentage
<b>Steel</b>	
Less than 50,000	2.1
50,000-100,000	6.3
Above 100,000	14.6
<b>Engines</b>	
Less than 100,000	4.2
Above 100,000	4.2
<b>Bearings</b>	
Less than 100,000	4.2
Above 100,000	4.2
<b>Chains</b>	
20,000	2.1
<b>Paints</b>	
Less than 20,000	8.3
20,000-40,000	12.5
Above 40,000	4.2
<b>Bolts and nuts</b>	
Less than 10,000	6.3
Above 10,000	4.2
<b>Drill bit</b>	
Less than 10,000	2.1
Above 10,000	8.3
<b>Las electrode</b>	
Less than 10,000	4.2
10,000-20,000	14.6
Above 20,000	16.7
<b>Sandpaper</b>	
Less than 10,000	12.5
Above 10,000	2.1
<b>Grinder cut</b>	
Less than 10,000	2.1
Above 10,000	6.3
<b>Grinder</b>	
Less than 5,000	6.3
Above 5,000	4.2
<b>Belt</b>	
Less than 5,000	6.3
Above 5,000	2.1
<b>Gum rigid</b>	
12,000	2.1
<b>Aluminium</b>	
1,050,000	2.1
<b>Galvanized pan</b>	
Less than 50,000	4.2
Above 50,000	2.1
<b>Iron sheet</b>	
16,000	2.1
<b>Alumico</b>	
50,000	2.1
<b>Pipe</b>	
450,000	2.1
<b>Plate</b>	
Less than 500,000	2.1
Above 500,000	2.1
<b>Angle</b>	
38,000	2.1
<b>Shaft</b>	
64,000	2.1
<b>Wire mesh</b>	
80,000	2.1
<b>Cutting disc</b>	
4,000	2.1
<b>Grinding disc</b>	
4,800	2.1
<b>Rivet machine</b>	
2,000	2.1
<b>Spraying machine</b>	
50,000	2.1
<b>Welding glass</b>	
5,000	2.1

Source: Field survey, 2022. Note: Multiple responses apply.

### Profitability of Fabricators (Gross Margin Analysis)

The profitability of the fabricators is presented below. The gross margin analysis was obtained using values of the fabricators' total revenue and total cost. The total revenue of the fabricators was ₦95,502,900, while their total cost, including their



variable cost and fixed cost, summing up to ₦20,374,205. This shows that the total revenue of the fabricators exceeded the total cost. The profitability of the fabricators was ₦74,928,695, revealing that agricultural fabrication is profitable. Hence, it can be deduced that the respondents profited from their fabrication business in the study area. The rate of return showed that for every one naira invested in fabrication, the return on investment (ROI) was ₦3.68kobo.

### **Determinants of Profitability Among Agricultural Fabricators**

Table 4 shows an  $R^2$  value of 0.618 revealing that the variables in the regression model explain 61.8% of the variance in the determinants of profitability among agricultural fabricators. Secondary occupation, business registration with the Corporate Affairs Commission (CAC) and ethnic groups had a significant impact on the profitability of agricultural fabricators. Fabrication as a secondary occupation was positively significant to the profitability of fabricators. This shows that respondents who engaged in fabrication as their secondary occupation were likely to have higher profitability. This can be due to diversified income from their primary occupation, hence their ability to access necessary resources and make profitable investments in their fabrication business. This is in line with Miaris & Hansson (2022) that businesses which served as secondary occupations to their owners yielded high profitability owing to a better income balance.

Business registration with CAC positively influenced the profitability of fabricators. This shows that fabricators who had their business enterprise registered with CAC had a better chance of increasing their profitability. Business registration with CAC gives a legal recognition and credible outlook to the enterprise, promoting trust and confidence, since clients will more likely purchase their equipment and tools from credible sources. This could result in an increased patronage level, leading to an increase in the earnings of the fabricators. Business registration also provides fabricators access to credit facilities and government incentives which would increase their working capital, increase their productivity and profitability and also promote business growth. Ethnic group was positively significant in determining the profitability of fabricators. The ethnic group of the fabricator could influence customers' trust and confidence in their business, hence increasing their level of patronage and sales.

**Table 4: Determinants of profitability among agricultural fabricators**

Variables	Coefficient	T
Constant		-0.877
Age	0.151	0.624
Sex	0.025	0.129
Marital status	0.052	0.311
Religion	0.262	1.677
Educational qualification	-0.057	-0.271
Had technical training	0.126	0.694
Primary occupation	-0.285	-1.779
Secondary occupation	0.340	2.161**
Size of workshop	-0.090	-0.503
Years of experience	-0.146	-0.485
Household size	-0.245	-1.235
Ethnic group	0.317	2.059**
Business registered with CAC	0.473	2.444**
Benefited from any intervention	0.219	0.979
Benefitted from training	0.077	0.482
Access to credit facilities	-0.216	-1.302
Belonged to association	-0.293	-1.753
Belonged to professional body	-0.145	-0.916
Access to extension services	0.094	0.533
Type of labour engaged	-0.057	-0.323

R=0.786, R<sup>2</sup>=0.618, Adjusted R square=0.310, \*\*p≤0.05

Source: Field survey, 2022

### **Conclusion and Recommendations**

The total revenue of the agricultural fabricators exceeded their total cost of production, indicating the profitability of the enterprise. Also, agricultural equipment fabrication as a secondary occupation and registration of business enterprises with the CAC positively influenced the profitability of agricultural fabricators. Given that few fabricators have benefitted from interventions, it is recommended that fabricators coordinate themselves into an organized group(s) to help them access necessary support from the government and other relevant agencies/organizations. With the high profit margin from the fabrication enterprise, the government should provide

fabricators with credit and further training as this will enable fabricators to make progress and comply with best global practices thus, positioning them for the market. Government should also incentivize fabricators to register their enterprises with designated statutory bodies as this will provide fabricators with more recognition, enhance the standardization of their equipment and position them to attract higher patronage, thereby improving their profitability.

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