

## Potentials Of and the Socio-Economic Benefits of Blacksmithing Production in Promoting Agricultural Development and Poverty Alleviation in Kwara State, Nigeria

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**Abstract:** Agriculture and technological development including blacksmithing promotes agricultural tools production and offers an unexploited succor capable of salvaging the people from abject poverty. Blacksmithing and its products are frequently valuable in diverse ways and contribute to technological and agricultural development through agricultural tools production, income to artisans and technological recycling. The study examined the potentials and contribution of blacksmithing practices to household income and poverty alleviation in Kwara State, Nigeria. Eighty blacksmith artisans were randomly selected in the sixteen LGAs of Kwara State for the study. Primary data were obtained with the aid of structured questionnaire and personal interview schedule to elicit information relevant to the study. Descriptive statistics, net income and OLS models were employed in data analysis. The results revealed prospects of increased revenue generation to blacksmiths. The blacksmiths were at the edge of productive age with modal class of 48-57 years, low literacy rate and the bulk had subsidiary occupations to supplement their income. The average household size per smith was approximately 7 and mean daily income earned from production ranges from ₦500 to ₦950. The postulated explanatory variables explained 48.8% in the variations in income earned by blacksmiths. Given the opportunity and amazing potentials for widening agricultural tools production in Kwara State, it was recommended that the industry's private operators and government at all levels should provide social services particularly electricity, increased budgetary commitment to artisan sector and create enabling policies for the industry to thrive and shift from crude methods to mechanize system.

**Keywords:** Potentials, Blacksmith, Mechanize, Poverty alleviation, Nigeria.

### I. Introduction

The current global economic meltdown has had its devastating turn on Nigeria as a nation, biting hard on organizations, businesses, families and homes. The frantic search for alternative resource of national revenue aside oil has become imperative for economic emancipation of the lots of Nigerians. Agriculture and technology including blacksmithing offers an unexploited succor capable of salvaging the people from abject poverty. Creating renewed awareness and practice of blacksmith in the rural setting would go a long way in eradicating global economic challenges and create a self-reliance enterprise that will help reduce the hardship, unemployment and other social vices associated with it. However, the blacksmith sector in Nigeria is rudimentary and not well explored due mainly to the high technical manpower requirement and neglect of artisans from successive government over the years. The industry is fading away like all other artisans and crafts as well as small and medium enterprises native to the country. However, blacksmith has direct, meandering and multiplier impacts on agricultural and technological development and its one of most crucial sectors that advanced technological development in the world.

For example, prior to the industrial revolution in develop countries; a village smithy was a staple of every town. However, factories and mass-production reduced the demand for blacksmith made tools and hardware. As demand for their products declined, many more blacksmiths augmented their incomes by working as shoeing horses. With the introduction of automobiles, the number of blacksmiths continued to decrease, many former blacksmiths becoming the initial generation of automobile mechanics. The nadir of blacksmithing in the United States was reached during the 1960s, when most of the former blacksmiths had left the trade and few if any new people were entering trade. By this time, most of the working blacksmiths were those performing farrier works, so the term blacksmith was effectively co-opted by the farrier trade.

Therefore, while developed nations saw a decline and re-awakening of interest in blacksmithing, many developing nations' particularly Nigerian blacksmiths have not advanced the frontier of technological development and continued doing what blacksmiths have been doing for 3500 years. These include making and repairing iron, steel and agricultural tools and hardware for people in their local area.

The word smith is from the Proto-German "smithaz" meaning skilled worker while the term "forging" means to shape metal by heating and hammering. A subset of smith is blacksmith which emanates from the activity of "forging" iron or the "black" metal and it was named due to the color of the metal after being heated, a key part of the blacksmithing process. Blacksmith is vocational sector that require competencies, strength and physical conceptualization. In other word, a blacksmith is a metal smith who creates objects from wrought iron or steel by forging the metal by using tools to hammer, bend, and cut (David and Bernhard, 1993). The "black" in "blacksmith" refers to the black fire scale, a layer of oxides that forms on the surface of the metal during heating. The word "smith" was also derives from an old word, "smite" (to hit). Thus, a blacksmith is a person who hits black metal (Bealer, 1996).

Therefore, blacksmith turns various reagents mostly metals, into agricultural implements, plate armor, local weapons, and some utility items. In addition, they produce objects such as gates, grilles, railings, light fixtures, furniture, sculpture, tools, decorative and religious items and cooking utensil. Suffice to note that blacksmith is recognize as one of the veritable weapons that can assist underdeveloped countries including Nigeria to achieve the 2015 anti poverty millennium

development goals (MDGs). For example, Kwara State has granted a loan of ₦100 million to artisans and expands an estimate of about 30 artisan trade in 2013, thus accounting for more than 20 per cent of sizeable employed artisans in Kwara State and subsidiary employment to a large number of farming households in the State. The bulk of artisans in the State include farming, artisanal fishery, blacksmith, tailoring, carpentry, weaving, dyeing, sculpture and ceramics; clay molding, hunting, mining, bead work, pottery, mud layer and other small scale enterprises native to State.

Furthermore, blacksmith in the State has advanced their service and production by going into repairing and maintaining mechanical devices and other related automobile industry. In addition, some youth who bag their certificate in city and guide in technical colleges and diploma in vocational and engineering in the State can venture into modern and mechanized blacksmithing that is powered by electricity, to design and manufacture agricultural implements, household utensils, mending and joining the machines and iron amongst other.

Essentially, blacksmith can have profound impact on the society particularly the youth, economy, agricultural and technological advancement. Socially, one of the most immediate benefits of blacksmith is its ability to create both skilled and unskilled employments. It is technological inclined trade and has the potential to create more jobs per unit of investment than any other artisan and can significantly cater for the employment of technical incline youth and adult alike. On technological and agricultural development, blacksmithing when properly developed and managed can advanced production of agricultural implements amongst other human utilities and stimulate local cultures and folklores (David and Bernhard, 1993, Francisco, 2005; Adedoyin et al., 2011). Economically, blacksmithing brings many benefits to both the government and private sector through the generation of foreign revenue, financial returns on investment as well as linkages to other local industries such as farming, carpentry, sculpture and ceramics; hunting, artisanal fishing, mining and fisheries.

### ***Statement of Problem***

Blacksmith is an ancient indigenous technology, which is the progenitor of various metal forging operation in used today and can be found virtually in all major cultures of the world (Oke and Aderoja, 2000). But, blacksmith processes still remain subsistence, primitive and rudimentary that it is hardly employed as the viable means of commercial production of metal wares in Nigeria (Thomas, 1980). For long particularly during the pre-colonial era and even now, some of Nigeria local blacksmith are traditional producer of simple tools such as cutlasses, knives, head pan, digger and machetes and many features and devices primary use for agricultural production. Other items produce through blacksmithing processes are domestic products, which include; kitchen ware, cooking utensils, basin, pails, which have found application in various homes. However, some blacksmith are involved in the production of industrial products, which include hammer head, key, chisel punch, bolt and nuts. The forge product of blacksmithing is also very important and highly demanded by those in the construction industry (RMRDC, 2000).

It is suffice to note that the major operations in local blacksmith shops consist of heating of work pieces, hard forging operation and heat treatment processes. There are several basic operations or techniques employed in forging: drawing down, shrinking, bending, upsetting, at a minimum, but smiths will also make use of other tools and techniques to accommodate odd-sized or repetitive jobs. The production facilities, consists of a forging facilities, which include anvil, hammer, chisels, fuller, drift punches. Open furnace with bellow is another blacksmith production facility for heating operation. This furnace makes use of palm kernel shell/waste to heat the metal, which is mostly iron and the heated metal is forged manually into desired tool. Occasionally, a primitive heat treatment process is achieved by quenching the forged metal in a container containing palm oil, water or some vegetable oil solution (Oke, 2007).

Blacksmith products have been recognized in the country from time immemorial and its importance, as an enterprise cannot be contested as one of the local skill necessary for sustainable development. The skill was extremely important to early Arkansan, to make and repairs tools, automobile spare parts, household implements and weapons (Oyeneye, 1984). The potential of blacksmiths for serious application sometimes demonstrated under unusual circumstances is beginning to find commercial application in satellite town of Nigeria urban centre where they serve as an adjunct to roadside mechanics (Eboh et al., 1995). Although the advent of the imported farm implements and machineries spare parts distorted the activities of local producers, but the increasing scarcity of foreign exchange is now necessitating a change of direction to abandon indigenous products (Obikwelu, 1999).

It is also suffice to note that the blacksmith skills is one of the basic skill required for producing innovative appropriate technological implements, but is unfortunate that, local blacksmith shop is about to be faced out due to the influence of western education and rural urban drift (Ezeadichie, 2002). The problem of flow of advance and improved western industrial products give blacksmiths little room to improve on their product in accordance with modern appropriate technology innovation (Atteh, 1992). The people are now neglecting the products of local blacksmith shops for the foreign products which suites the changing circumstances of time in term of quality and quantity. The situation has made the blacksmiths to be periodically engaged in the practice base on the demand of the product from individual customer. It was stressed that, development of indigenous technology for developing small-scale industry in which blacksmith shop is included is important for fast development of complex technology industries (Okopo and Ezeadichie, 2003). In addition, the development of this type of small-scale manufacturing industries is the cornerstone of sustainable economic self reliance (Oni and Lawal, 2006).

Despite these huge potentials of small scale enterprises including blacksmith, they have suffered neglect for long and have been less favoured by the different tiers of government and nongovernmental organisations in Nigeria to the oil, telecommunication and agriculture industries. This may be due to lack of know-how to develop and exploit the local resources and talents couple with our value of over dependence on the earlier traditional source of revenue. Small scale industry and artisans trade should be a source of income and revenue generation pivot for unemployed youth in the rural and

urban areas in the State, but the present revenue allocation structure which allows for allocation of nationally generated funds to the State may be a major factor for the State's reluctance to look inward and probably develop its resources and potentials. This has been a big concern for the State governments who again have shown little political will to create enabling environment and commit enough resources to develop the artisanal and local industry (Adedoyin et al., 2011).

From the foregoing considerations, it is very important to undertake in depth socioeconomic studies into artisanal blacksmith in the study area. This will enable us to accumulate adequate, sufficient and reliable data for analysis geared towards meaningful policy formulation for the artisans' sector especially artisanal blacksmith in the country. This study therefore investigated the potentials of and socioeconomic benefits of randomly selected blacksmiths in Kwara State, Nigeria.

Specifically, the study;

- (i) examine the structure and socioeconomic characteristics of blacksmiths;
- (ii) determined economic benefits derived by blacksmiths;
- (iii) determine the contribution of blacksmithing to household income;
- (iv) estimate factors that influence net income of the blacksmiths in the study area.

## II. MATERIAL AND METHODS

### *Description of the Study Area*

The study was conducted in 16 Local Government Areas (LGAs) of Kwara State (Figure 1). The State has a land mass covering about 32,500 square km and a total land size of 3,682,500 ha with majority living in rural areas. It has a population of about 2,365,353 people in 2006 according to the National Population Census (NPC, 2006). This is projected in 2013 to be 2,948,858 representing 3.2% annual growth rate in population and an average density of ninety one persons per km<sup>2</sup>. It is bounded in the North by Niger State, in the South by Oyo, Osun and Ekiti states, in the East by Kogi state and in the west by Benin Republic (KWADP, 2011).

The State is divided into four agricultural zones by the Kwara State Agricultural Development Project (KWADP) in consonance with ecological characteristics, cultural practices and project administrative. The zones are: zone A; Baruten and Kaima LGAs; Zone B; Edu and Patigi LGAs; Zone C; Asa, Ilorin East, Ilorin South, Ilorin West and Moro LGAs and Zone D; Ekiti, Ifelodun, Irepodun, Offa, Oyun, Isin and Oke Ero LGAs. Blacksmith in the study area is contributing immensely to the socio-economic factors of the entire populace due to economic influx of people in search of agricultural tools, local weapons and kitchen utensils from the adjoining communities. The economic importance of blacksmith to the community includes provision of income, tools to rural development and source of raw materials to manufacturers.



Figure 1: Map of Kwara State Showing the 16 LGAs; Source: (KWADP, 2008)

### *Sampling Procedure and Data Collection*

Primary data which was subjected to a pre-survey were used for this study. Blacksmith workshop survey provided the basic cross-sectional data from 80 blacksmiths in the study area. Data were collected from artisanal blacksmiths with the aid of structured questionnaire and interview schedule. A random sampling technique was used to select the representative of blacksmiths that were used for this study. Then, the lists of artisanal blacksmiths in all the 16 LGAs were compiled through blacksmith association for random selection. The stage involved random selection of twenty blacksmith workshops in each of the four ADP zone. In all, eighty respondents were sampled.

The questionnaire was administered to the blacksmith households randomly selected to generate information on socio-economic and demographic characteristics of households such as age, sex, marital status, family size, vocational and skill education, their smith experience, size of households as well as their major and subsidiary occupations. Other includes information on structure and production pattern, quantities and acquisition of inputs such iron and steel, wood handle, fuels such as palm oil/kernel, water or some vegetable oil solution as well as material inputs viz; anvil, hammer, chisels, fuller amongst other and their economic life span, products produced and their value in Naira.

### III. ANALYTICAL TECHNIQUES

#### *Profitability of Blacksmithing in the Study Area*

Descriptive statistics such as frequency counts, mean, standard deviation, percentages, pie chart and tables were used to describe structure, socio-economic and demographic characteristics of artisanal blacksmith in the study area. Net income analysis provides the profit index and household income of the blacksmith in the study area. Profitability stimulates artisans to venture into risky business and also drives them to develop ways of cutting cost and adopting new technologies always in an effort to satisfy consumer interest. Profit maximization is the most important goal of artisan business. Profit is generally described as the difference between Total Revenue (*TR*) and the Total Costs (*TC*) as seen in equation 1 & 2. The total revenue is the blacksmith product or output sold and price while the total cost is divided into fixed and variable costs. Net income analysis forms an alternative basis for farm profitability analysis. It involves accurate collection of different costs of variable inputs and fixed assets and the gross income obtained from a particular enterprise in order to obtain the net returns.

Costs involved in blacksmithing operations are made up of total cost. Total cost consists of total variable cost (TVC) and total fixed cost (Equation 1 & 2). Total variable costs in blacksmithing depend essentially on the variable inputs. Unlike fixed costs, operating/variable costs depend on the volume of production, and they included cost of hired labour, imputed cost of family labour, fuel and lubricants expenses and maintenance charges while total fixed cost was made up of the depreciation costs or loss in value on fixed items as a result of their use in one production year. Items of fixed costs identified in the study included depreciation on open furnace with bellow, anvil, hammer, chisels, fuller, drift punches and interest charge on borrowed capital if any. Depreciation values were estimated using straight line method under the assumption that production facilities aforementioned were used for a period of 2 years before being scrapped without salvage values. Other fixed items such as simple open furnace with below and quenching bath are depreciated base on estimated life span suggested by blacksmiths. Blacksmith labour was standardized with adult male member of household having one labour day for working 6 hours while an adult female working for the same period was apportioned 0.75 labour day and grown up child, about 15 years was also assumed to have contributed 0.5 labour day for all kind of blacksmith operations (Oladimeji and Abdulsalam, 2013).

The Gross revenue (GR) consists of cash receipts from blacksmith products sold including the amount give away and used as household utensils or local weapons for hunting. The net income per blacksmith analysis was used to examine costs and returns in blacksmithing. The total variable and total fixed costs and total revenue were estimated. The difference between total revenue and total cost is the net income. The net income (NI) analysis was used with assumption that fixed costs though negligible in small scale farming (Olukosi and Erhabor, 2008), but play a prominent role in few artisan enterprise/trade including blacksmithing, and cannot be negligible. The net income per blacksmith analysis was expressed as:

$$NI = TR_{ij} - TVC_{ij} - TFC_{ij} \dots\dots\dots (1)$$

$$NFI (TN)^{-1} = (\sum_{i=1}^M TR_{ij}) (\sum_{i=1}^M TN_{ij})^{-1} (M_j)^{-1} - (\sum_{i=1}^M TC_{ij}) (\sum_{i=1}^M TN_{ij})^{-1} (M_j)^{-1} \dots\dots\dots (2)$$

Where, NI (bt)<sup>-1</sup> = Annual net income per blacksmith in the jth ADP zone (□); TR<sub>ij</sub> = Total sales revenue accruing to the ith blacksmith in the jth ADP zone (□); TVC<sub>ij</sub> = Total variable cost incurred by the blacksmith in the jth ADP zone (□); TFC<sub>ij</sub> = Total fixed cost incurred by the ith blacksmith in the jth ADP zone (□); TN<sub>ij</sub> = Products produced by the ith blacksmith in the jth ADP zone (tons) and M<sub>j</sub> = Total number of blacksmiths in the jth ADP zone.

#### *Model Specification and Estimation*

Estimation of the factors influencing net income of blacksmith involved the use of Ordinary Least Square (OLS) regression techniques and specified by equations:

$$\text{Log } NI_{ij} = \beta_0 + \beta_1 \text{LogFEX}_{1ij} + \beta_2 \text{LogNFF}_{2ij} - \beta_3 \text{LogCHL}_{3ij} - \beta_4 \text{LogCFL}_{4ij} - \beta_5 \text{LogDEP}_{5ij} + \mu_i \dots\dots\dots (3)$$

Where:

- NI<sub>ij</sub> = Net income of the blacksmith in the jth ADP zone (□);
- FEX<sub>1ij</sub> = Smith experience of the ith blacksmith in the jth ADP zone (years);
- NFF<sub>2ij</sub> = Number of forge and furnace owned by the ith blacksmith in the jth ADP zone;
- CHL<sub>3ij</sub> = Cost of hired labour by ith blacksmith in the jth ADP zone (□);
- CFL<sub>4ij</sub> = Cost of family labour by the ith blacksmith in the jth ADP zone (□);
- DEP<sub>5i</sub> = Depreciation of fixed inputs and cost of fuels used by ith blacksmith in the jth ADP zone (□);
- μ<sub>i</sub> = error term associated with data collection from the ith blacksmith in the jth ADP zone which was assumed to be normally distributed with zero mean and constant variance.
- β<sub>0</sub> is a constant
- β<sub>1</sub>- β<sub>5</sub> are regression parameters that were estimated.

### IV. EMPIRICAL RESULTS AND DISCUSSION

#### *Structure and socioeconomic characteristics of blacksmiths in Kwara State*

The artisanal blacksmith is an important age long artisan in the areas of study. At the onset of the rain, the bulk of blacksmiths prefer to retire to farming which accounted for 65% of their major or subsidiary occupation (Table I). Farming as a subsidiary occupation was low in zone C comprising Asa, Ilorin east, west and south LGAs because the bulk of the blacksmiths were able to venture into menial and government jobs due to proximity to urban centres and State capital.



Majority of the pooled blacksmith (94%) had subsidiary occupations which served the dual purpose of alternative income and job opportunities. Engagement in subsidiary occupation in the rural community implies that rural areas have diversified enterprise oriented economy (Olayide *et al.*, 1982 and Oladimeji, 1999).

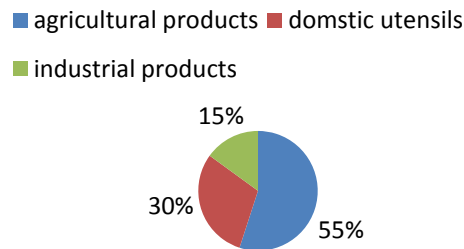
Artisanal blacksmith in the State rely heavily on the use family labour and the bulk was encouraged by their family antecedents to venture into blacksmithing. Blacksmithing like other artisans native to Nigeria rural areas, are family oriented business. The study was in line with Oke, 2011 and Oladimeji *et al.*, 2013. Further analysis showed that there is virtually no new entrance into the trade and most educated blacksmith family are shunning and shying away from the trade. This indicate that blacksmithing may soon fade out expect modern machines and inputs are injected into the trade to reduce the labour demand and improve the output to meet acceptable and international standard. Similar finding was documented by Oke, 2011.

**Table I: Subsidiary Occupations of Artisanal Blacksmithing Kwara State, Nigeria.**

Occupations	Frequency	Relative frequency (%)	Cumulative Frequency
Farming	52	65.2	-
Wood Carving/Carpentry	03	03.0	55
Govt. Employee	20	31.8	75
No subsidiary occupation	05	-	80
Total	80	100.0	-

Source: Field Survey, 2013

Results also showed the category of blacksmith products in Kwara State in figure 2. The bulk of blacksmiths output in the study area was agricultural products (55%) and domestic household utensils (30%) and others such as industrial products were estimated to be 15%. The finding was also in line with Oke, 2007. Therefore, it can be advisory that if blacksmithing is finance, developed and mechanized, its contribution will be felt by all area of human endeavours and this will improve the economy at large and increase rural household income and reduce poverty. In addition, the existence and development of blacksmith artisan will go a long way to employ the youth and adult and widening the industrial base of the State.



**Fig. 2: category of blacksmith products in Kwara State.**

The bulk of the blacksmith confirmed that given the opportunity and amazing potentials for sales of their products both locally and widening export base for their products in Kwara State. However, there are overwhelming constraints that retard and hampered their production in terms of quality and quantity and demand from customers. It was observed that the mode of manufacturing processes, workshops layout and the sources of raw materials, though were virtually the same in Nigerian blacksmith workshops, but such materials are sub standards and inappropriate compared to their counterpart in developed world. These production facilities include; open furnace without any temperature measuring instruments to help in reaching appropriate quenching birth and forging with the aid of hammer and anvil which absolutely stressful even below forging temperature.

The artisanal blacksmithing in the State are characterized by low capital investment and high labour intensive practices. For instance, the State investment in tools and facilities had a ranged of ₦10, 000.00 to ₦50, 000.00. The LGAs average for the workshop layout, furnace and forging materials are in the main unsophisticated comprising open furnace without any temperature measuring instruments to help in reaching appropriate quenching birth and forging with the aid of hammer and anvil which absolutely stressful even below forging temperature, fuels such as palm oil/kernel, water or some vegetable oil solution as well as other material inputs: chisels, fuller and drift punches. Both family and hired labours were used in blacksmithing operations in all the four zones of the State. Labour costs accounted for approximately 60% of average variable cost and 30% of Total cost. Hired labours were rewarded by cash and daily payment of ranged of ₦400 to ₦600 per labour day depending on volume of work done and output produced. However, hired labour was found to be scarce in zone C due to proximity to urban centre. Results also showed that sizeable blacksmiths received various amount of productive credit from their local blacksmith cooperative in their area and approximately 70% of sample blacksmith did not seek for any production credit. This result was in line with Oladimeji *et al.*, (2013), who affirmed that most artisans in Kwara State do not have access to production loan from formal credit institutions due largely to stringent and bureaucratic conditions offers by most formal lenders.

**Socio-economic Characteristics**

Analysis of socio-economic characteristics of the artisanal blacksmith is presented in Table II. The table indicates that males dominate the ownership of artisanal blacksmith venture in the State. Only 2 women (2.5%) of pooled blacksmiths owned and engaged in blacksmithing and the trade was inherited from their late husband. Therefore women do not usually engage in blacksmithing and other stressful rural artisans' operations, particularly when it involves actual production and manufacturing in the study area. Rather, women are engaged in sourcing for inputs and marketing of the output (Oladimeji, 1999 and Oladimeji et al., 2013). Further analysis revealed that bulk 75(94%) of the pooled blacksmith operate on a family unit bases that is, the blacksmith prefer sole proprietorship. This perhaps explained why most blacksmiths operate on a small scale basis in the study area. Table II also shows that the majority 84% of the pooled blacksmith had ages ranging from 38 to >57 years with the modal age interval being 48 to 57 years which accounts for 58% of the sample. Other things being equal, labour productivity is a function of age. It is believed that old people tend to adhere strictly to traditional methods of production while young people tend to be more willing to adopt new production methods in order to increase production. If old blacksmiths are defined as those who are above 48 years of age, 66% of blacksmith can be said to be old. In addition, if productive age group is defined as 18 - 57 years, the age distribution indicates that majority of blacksmiths (about 66%) fall the edge of unproductive age group and, therefore will not be able to imbibe new ideas and innovations to enhance increased productivity in the blacksmithing enterprise. Similar findings were documented by Oke, (2011).

The literacy rate was very low among the blacksmiths (Table II). The mean years of schooling of blacksmiths in the study area was 2.8 years. The estimated value fall below 2009–2012 UNDP mean education index of 5 years for Nigeria. In addition, more than Two-third (70%) of the pooled blacksmith did not have formal schooling while 21.3% attended primary school only. This implies that artisanal blacksmithing operations in the State were performed mostly by illiterate and semi-illiterate blacksmith. This could affect their chances of using improved and sophisticated machines which required skilled training and reading manuals to learn modern blacksmithing techniques. Low level of education can adversely affect success of small and medium scale enterprise and programmes because education and particularly training enhances adoption of technology and improved methods which are vital means of achieving higher productivity. Results are synonymous with Oladimeji et al., 2013 and Ajao and Oladimeji, 2013.

The marital status shows that majority 74 (92.5%) of the blacksmith are married while the residual 6 (7.5%) were single. Further analysis revealed that more than two-third of nuptial blacksmith (73%) had at least 2 wives while approximately 17.0% of had only one wife. Marrying more than one wife is common in rural setting either to ensure supply of additional family labour or to raise the status of the man in an illiterate setting. Findings were in line with Oladimeji et al., 2013. On the household size, the average number of persons per blacksmith was approximately 7 with 6-10 children as modal class. Table II shows that 7.5% of blacksmiths had no child, 45(56.3%) had household size of 6-10 children. The result shows that most of the population explosion occurs in rural areas. However, they are important in the supply of family labour after schooling hours particularly in blacksmithing and other households activities such as marketing of manufactured products.

**Table II: Socio-Economic Characteristics of Artisanal Blacksmith in Kwara State**

DISTRIBUTION	FREQUENCY	RELATIVE FREQUENCY (%)	CUMMULATIVE FREQUENCY
*Gender			
Male	78	97.5	-
Female	02	2.5	80
*Marital status			
Married	74	92.5	-
Single	06	7.5	80
*Age (years)			
18-27	3	04	-
28-37	8	10	11
38-47	16	20	27
48-57	46	58	73
Above 57	7	08	80
*Educational Level			
No Formal Schooling	56	70.00	-
Primary Education	17	21.25	73
Secondary Education	06	7.50	79
Tertiary Education	01	1.25	80
*Household Size(persons)			
None			-
1-5	20	25.0	20
6-10	45	56.3	65
11-15	10	12.5	75
>16	05	6.2	80

Source: Field Survey, 2013

**Estimate Costs, Returns and Economic benefits from blacksmith**

The net margin per blacksmith in the study area has shown that artisanal blacksmith is profitable. This is presented in Table III below. The AFC per blacksmith ranged between ₦5500.0 in zone A and ₦7800.0 in zone C giving an average of ₦6537.5 for the State. The table also shows that AVC per blacksmith had a range of ₦10500.0 in zone A to ₦13250.0 in zone D with a value of ₦11637.5 per blacksmith for the State. The standard deviations for AFC and AVC per blacksmith were ₦996.1 and ₦1255.2 respectively. The relatively high AFC/blacksmith in zone C was due to the fact that the blacksmiths operate in urban centres where the fixed and materials inputs are relatively costly. The fixed assets such as furnace, forging and heating equipments were acquired at relatively high price because of the prevailing high rate of inflation in the country. The standard deviation for the AVC per blacksmith was larger than that of the AFC because the former depended on the volume of production while the latter was invariant to the product produced. Table III also shows that the net return per blacksmith was highest, ₦27000.0 in zone C. Similarly, zone C blacksmith settlement recorded the highest NR/blacksmith because of their proximity to urban centre which enable them to have higher bargain for their product. The net return per blacksmith for the State was ₦24900.0 with a standard deviation of ₦1982.8. The revenue accrued to blacksmith was not only dependent on the product produced and price per product, but also dependent on the variable costs.

**Table III: Estimated Average Costs and Returns (₦) Per Artisanal Blacksmith in Kwara State, Nigeria**

Blacksmith settlements/Zones	Average Fixed Cost (AFC)	Average Variable Cost (AVC)	Average Total Cost (ATC)	Average Revenue (AR)	Monthly Return(NR) per smith*
A	5500	10500	16000	38350	22350
B	6050	10800	16850	41350	24500
C	7800	12000	19800	46800	27000
D	6800	13250	20050	45800	25750
Total	26150	46550	72700	172300	99600
Mean	6537.5	11637.5	18175	43075	24900
SD	996.1	1255.2	2052.8	3941.3	1982.8

SOURCE Data Analysis, 2013

**Estimated Factors Influencing Net Incomes of Blacksmiths**

Results showed that in study area, the postulated explanatory variables in equation 4 explained about 48.8% in the variations of net income of blacksmith. It also shows that the coefficients of all the variables included in the factors affecting blacksmith income carried *a priori* signs which supports the hypothesized that cost of family labour, hired labour, and depreciation of assets including fuels are expected to bear a negative sign with blacksmith income while years of experience and number of forging facilities and open furnace with bellow make positive contributions to the net income of blacksmith. Although, cost of hired labour carried the *a priori* sign, the variable was not statistically different from zero at the 5.0% level.

The F-test also revealed that the model was significant at 5.0%. However, the negative signs on the coefficients of Log CHL, CFL and DEP showed that an increase in the use of these inputs caused net income to declined, *ceteris paribus*. Small scale blacksmithing is labour intensive and every activity in the business, from forging and heating going to the molding and processing as well as marketing of the products required adequate amount of human effort. The F-test with a value of 11.50 revealed that the model was significant at the 5.0% level. Although all the estimated co-efficient carried the *a priori* signs, that of man-days of hired labour was not statistically different from zero at the 5.0% level (equation 4).

$$\text{Log } Y_i = 6.250^* + 0.0304 \text{LogFEX}_{1ij} + 0.006 \text{LogNFF}^*_{2ij} - 0.127 \text{LogCHL}_{3ij}$$

(0.155)      (0.082)                                      (0.018)                                      (0.065)

$$- 0.0550 \text{LogCFL}_{5ij} - 0.164^{**} \text{LogDEP}_{6ij} \dots\dots\dots(4)$$

(0.220)                                      (0.008)

$R^2 = 0.488; F=11.50^*$

\* and \*\* Indicates that estimated co-efficients were significant at 1% and 5% level respectively. The standard errors of the co-efficient are in parenthesis.

**Estimated Resource-use Efficiency of Blacksmith**

The results of the estimated resource-use efficiency were derived with respect to number of traditional forging and heating materials, family and hired labours and as well as depreciation of fixed assets in table IV. The table shows that Marginal Value Product (MVP) of each production input was less than its acquisition cost implying that each of the input in blacksmithing were over utilized. The excessive uses of labour resource in rural areas tend to be a common occurrence due to rather low opportunity cost for the inputs (Oladimeji, 1999 and Oladimeji et al., 2013). Family labour cannot sensibly be 'laid off'. For instance, in blacksmithing and artisan activities even when family labour is making a negative contribution because it still has to be catered for whether it is employed or not. Besides, the existence of disguised unemployment and under-employment of labour in rural areas of the country necessarily promote excess labour in blacksmithing, agriculture and fishing enterprises (Oladimeji et al., 2013). In addition, small scale blacksmithing is a rising enterprise in that under the

prevailing technology in the country, blacksmith production depend more on chances of available inputs and product demand than on mandays of labour employed.

However the MVP of all resources used are positive, hence they all contribute positively to total output. To maximize profit the ratio must equal one. When the ratio is less than one, it is an indication of over-employment of the resources beyond the point of optimum profit. Profit can be increased by reducing the rate of use of the resources. When the ratio is greater than unity, it indicates that the rate of utilization of the resources is too small; increasing the rate of use would increase profit.

From the results obtained it was clear that the optimization condition was not attained for the given level of technology in the blacksmithing production. The MVPs obtained are less than unity. Results are consistent with findings by Oladimeji, 1999 and Oladimeji *et al.*, 2013.

**Table IV: Estimated Resource-use Efficiency for Blacksmith in Kwara State**

Resources	MVP (□)	Unit price of inputs(□)	Efficiency ratio MVP/Unit Cost
Number of forge and furnace	008	400.0	0.02
Family labour (imputed)	45.6	400.0	0.12
Hired labour	67.9	600.0	0.11
Depreciation of fixed assets	116.5	120.8	0.96

Source: field survey, 2013

## V. CONCLUSION

The study examined the socio-economic characteristics and returns of rural blacksmithing in randomly selected four blacksmith areas of Kwara State, Nigeria. Although, the result showed that blacksmithing enterprise in the State is profitable. The estimated mean years of schooling of blacksmith in the study area was 2.8 years, fall below 2009–2012 UNDP mean education index of 5 years for Nigeria. This could have affected their chances of shifting from traditional blacksmithing to modern ones.

The result for access to credit shows that blacksmiths depend largely on personal saving and their cooperatives to procure inputs and adopt new technology and innovations because they lack the collateral demanded by financial institutions.

The marginal value product (MVP) of each production input was less than its acquisition cost implying that each of the input in blacksmithing were over utilized. This implies that the optimization conditions were not attained for the given level of technology in the blacksmithing production.

### Recommendations

Based on the findings of this study, it is recommended, therefore;

1. That blacksmiths in the study area should be given adequate training using community based informal education, to enable them imbibe mechanized blacksmithing techniques and acquired materials inputs that will translate into reasonable quantity and quality products. This will ensure proper understanding of modern equipments and adopt technology capable of increasing not only the profitability of the blacksmith enterprise but also make efficient use of resources.
2. Establishment of blacksmiths' co-operative association for annexing financial aids, marketing information and inputs from government and non-government organizations through poverty alleviation Agencies.
3. Creating a market channel that will take care of commensurate price for products of blacksmith enterprise.
4. Government at all levels should endeavor to stimulate blacksmiths to produce quality products by providing and subsidize if need be, necessary infrastructures and enabling environment which provide impetus that will ease people transition from traditional to modern blacksmith easy.

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