

## Determinants of Labour Use for Selected Tree Crops in Oyo and Ondo States, Nigeria

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**Abstract:** In spite of technological assimilation, manual labour remains central input in agricultural production in developing nations, and very few studies have been conducted to empirically substantiate this claim. Likewise, the determinants of labour use among tree crops farmers in Nigeria have not been validated. Hence, this study identifies determinants of labour use by tree crop farmers in Oyo and Ondo states Nigeria. Mean age of farmers was 51.2 years and 92.1% of them were married. Also, 57.0% had farm size above 5ha. Sources of labour used by TCF were: self 16.8%, family 12.6%, hired 66.8% and informal/exchange 3.7%. Average annual labour used by tree crop farmers was 62.7±21.6 man-days and significant difference ( $t=3.93$ ) existed in labour use among farmers in the two states. Labour used by farmers in Oyo state was significantly influenced by contact with extension agents ( $\beta=3.20$ ) and use of labour saving device ( $\beta=-1.95$ ). On the other hand, seven variables were significant predictors of labour used for tree crop production by farmers in Ondo state. These include family size ( $\beta=1.96$ ), farm location ( $\beta=2.89$ ) and contact with extension agents ( $\beta=2.29$ ), number of dependants ( $\beta=-2.85$ ), years of experience ( $\beta=-0.273$ ), membership of farmers association ( $\beta=-2.05$ ) and use of labour saving devices ( $\beta=-2.12$ ). Use of labour saving devices influenced labour use among tree crop farmers in the two states. Hence, development policy should focus on technology that saves labour and well suited for small scale farming for sustainable tree crop production.

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### 1. Introduction

Nigeria agriculture is faced with various problems that prevent reasonable development and cause decline in agricultural sector. This decline is due to the nature of its production and the problems underlying its improvement. However, labour is the most important input in Nigerian agricultural production; labour is required to carrying out farm activities such as land clearing, ploughing, weeding, fertilizer application, pesticide application, harvesting and other farming activities.

Despite the important of labour availability and use in agricultural production, little research has been carried out on various aspects of farm labour utilisation and its problems (Idachaba, 2006). Idachaba (2006) further opined that although small scale farmers account for 90 percent of the total food and fibre production in Nigeria but the situation will remain roughly in the next few years. However, due to urbanisation and development of oil sector in Nigeria, rural-urban economic imbalance is getting worsening with depletion of rural areas of agricultural labour. The rural-urban migration for economics purposes has also reduced labour availability and use for tree crops production in Nigeria.

Besides, Nigeria has an estimated cultivable land of 71.4 million hectares with a farming population of 38 million people (Kuta, 2004). In spite of this strength, there is widespread hunger and food

insecurity. UNESCO (2003) rated Nigeria among dependent nations and classified the country as food deficit. FAO corporate document repository of (2004) indicated slowing growth rates in tree crop production in Nigeria.

Tree crops are major cash crops of Nigeria and they include cocoa, kolanut and oil palm. Dry beans of cocoa contain 0.7 percent of sugar, 7.4 percent of starch, 1.7 percent of theobromine, 6.7 percent of protein and 50-57 percent pale yellow, nondrying fat known as cocoa butter. Cocoa is a raw material for manufacturing of chocolate, beverages and for drug preservation. Use of kolanut include preparation of liquour, laxative, cola type of beverages, dyeing of cloth and thread, preparation of choka cola in a suspension of kola and cocoa powder. Uses of processed oil palm include preparation of soap, butter and cooking oil (MANR, 1980).

Cocoa requires the greatest amount of labour. Areas surrounding seedlings must be hand weeded before using cutlass for subsequent weeding. Fertiliser application, pest control (spraying of pesticides), weeding, harvesting and processing of cocoa are still mostly done manually and it requires labour services. In contrast, production of kolanut requires the least amount of labour. Kolanut farms may be intercropped with food crops for the first few years to reduce labour for weeding. Oil palm plantations are usually established in areas of primary and secondary forests,

usually under bush where trees fall and dry plant materials are burnt. If directional felling is practised, cost of clearing plantation line may be reduced. Nursery operations of oil palm are also labour demanding and time consuming. In order to save labour, farmers may purchase matured nursery and plant it directly on the farm. However, huge amount of labour is required for harvesting and processing of oil palm, particularly, if it is done manually (MANR, 1980). Therefore, efficient utilisation of labour is necessary for increased production of tree crops. However, for sufficient production of these crops as food and raw materials, labour input must be increased (Federal ministry of agriculture and natural resources, 2009).

Up till now, a key feature of Nigerian agriculture is the dominance of small scale farms. And labour constitutes about 60 percent of the total cost of production (Babalola, 2002). Available labourers charge more than farmers could afford. The high cost of hired labour depresses labour use for rural production. High cost of labour also imposes limitation on crop types and cropping intensity on small holder farms. Most farmers are resource poor and cannot expand their farm size due to high cost of labour. High cost of labour is a major constraint towards expanding the scope of production of small scale farmers of southwestern Nigeria. Labour productivity in agriculture is extremely low particularly when measured in terms of food production per head. Asamao (2001) remarked that in most west African countries, labour productivity in agriculture is low. Similarly, Idachaba (2006) further noted low productivity per man-hour of labour in Nigerian agriculture. There is disproportionate reduction in production due to reduction in the amount of land under cultivation (Spore, 1999).

Similarly, the move to increase tree crops production in Oyo and Ondo states, Nigeria has been hindered by low availability of farm labour. Due to shortage and high cost of farm labour, each state has developed tree crop production under different labour utilisation systems. Labour use in the two states depends on several variables. Therefore, a proper examination of the determinants of labour use is essential. Empirical studies providing information on labour utilisation for productive activities performed by rural households are particularly important for policy makers to understand the effect of policy on individual welfare and level of living.

This study therefore, determines labour use for tree crops production farmers in Ondo and Oyo States, Nigeria where tree crop production is dominant with hope of minimising manual labour use and increase farmers production.

The specific objectives of the study are:

- Analyse the socio-economic characteristics of tree crop farmers in Oyo and Ondo States.
- Identify the sources of labour availability to farmers in the study areas.
- Identify constraints to labour use of tree crop farmers in the study areas.
- Examine factors that determine labour use for tree crop production in the study areas.
- Determine the labour use for tree crops in the study areas.

#### **Hypothesis of the study**

*H<sub>01</sub>*: There is no significant difference in labour used by tree crop farmers in Oyo and Ondo states.

#### **2. Material and Methods**

The study was conducted in Oyo and Ondo states Nigeria which lies between latitude 5°N and 9°N and longitude 20°E. Multi-stage sampling procedure was used to select respondents for the study. It involved sampling of states, zones, blocks, cells and registered tree crop farmers. Through simple random sampling procedure, two zones were selected from Oyo state while a zone was selected from Ondo state, representing fifty percent (50%) of the zones from both states. The second stage involved selection of ten percent (10%) of the blocks from the selected zones through simple random sampling. Two blocks were selected in Oyo state while a block was selected from Ondo state. The third stage involved sampling of twenty five percent (25%) of cells from each of the selected blocks constituting four (4) and two (2) cells from Oyo and Ondo states respectively. A cell densely populated with tree crop farmers was purposively chosen from each of the selected. Lastly, through simple random sampling, ten percent of the farmers were selected from each cell from the village extension agents' list. In all, two hundred and fourteen (214) farmers were selected for the study.

A structured questionnaire was designed and administered to the farmers in order to elicit information from them. The research instrument was subjected to face and content validity. Reliability of the instrument was determined through split-half technique and the result was  $r=0.95$  and  $r=0.66$  for Oyo and Owo zones of Oyo and Ondo states ADP respectively. Data were collected on socio-economic characteristic of the respondents namely; age, sex, marital status, family size, number of dependants, farming experience, farm size, number of farmland, educational qualification, residency and farmers' organization, sources of farm labour, use of labour saving devices, contact with the extension agent, labour availability, labour migration, sources of labour information, constraints to labour availability and utilisation. Information on labour cost, hours of work and labour use were also collected.

The data collected were analysed using descriptive statistics such as frequency distribution and percentages. Inferential statistics used include chi-square, Pearson Product Moment Correlation (PPMC), t-test and multiple regression. Labour use was expressed as man-days. The number of days and hours of daily work of men, women and children were calculated for farm operations using the Adult Male Equivalence (AME).

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + b_{10}x_{10} + b_{11}x_{11} + b_{12}x_{12} + b_u$$

$b$  = slope of the line

$b_u$  = Error term

$x_1$  = sex Male = 1, Female = 0

$x_2$  = age (years)

$x_3$  = Married = 1, Single = 0

$x_4$  = family size (exact number)

$x_5$  = number of dependants (exact number)

$x_6$  = Education: Formal education = 1, No formal education = 0

$x_7$  = Years of experience (years)

$x_8$  = Size of farm (hectare)

$x_9$  = Membership of farmers association: member of farmers' association = 1, not a member = 0

$x_{10}$  = hours of work (hours)

$x_{11}$  = Source of labour: Hired labour = 1, Others = 0

$x_{12}$  = Number of sources of labour information

$x_{13}$  = Contact with extension agents: Contact with extension agent = 1, No contact = 0

$x_{14}$  = Use of labour saving devices: Use = 1, Not used = 0

### 3. Results

Table 1 depicts that 37.2% of the tree crop farmers in Oyo state were within 40-49 years while 35.5% of the respondents from Ondo state were between 50-59 years. The age distribution of the respondents in the two states revealed that only 10.7 percent tree crop farmers were below 40 years of age, 29.0 percent were over 60 years of age and their mean age was 51.2 years. Male tree crop farmers constituted 53.7 percent while the remaining 46.3 percent were females in the two states. In Oyo state, 50.4% were females while 39.8% were female farmers in Ondo state. Furthermore, 47.2 percent tree crop had no formal education while 36.9 percent of them had primary education in the two states. In addition, 58.8 percent tree crop farmers had one farmland while 29.9 percent of them had two farmlands in the two states. None of the tree crop farmers from Oyo state had three farmlands. Only 11.2 percent had three farmlands cultivated with tree crops.

**Table 1.0 distribution of respondents on their socio-economic characteristics in Oyo and Ondo State, Nigeria**

Variables	States				Total	
	Oyo		Ondo		Freq	%
	Freq	%	Freq	%		
<b>Age &lt;30</b>	-	-	6	6.4	6	2.8
30-39	13	10.7	4	4.3	17	7.9
40-49	45	37.2	18	19.4	63	29.4
50-59	33	27.3	33	35.5	66	30.8
≥ 60	30	24.8	32	34.4	62	29.0
<b>Sex</b>						
Males	60	49.6	55	64.2	115	53.7
Females	61	50.4	38	39.8	99	46.3
<b>Marital status</b>						
Single	5	4.1	-	-	5	2.3
Married	114	94.2	83	89.2	197	92.1
Divorced	-	-	7	7.5	7	3.3
Widowed	2	1.7	3	3.2	5	2.3
<b>Family size</b>						
3-5	69	57.1	66	70.9	135	64
6-10	46	38.0	23	24.7	69	32.2
≥11	6	5.0	4	4.3	10	4.7
<b>Number of Dependants</b>						
1-5	121	100.0	87	93.6	208	97.2
6-10	-	-	6	6.5	6	2.8
≥11	-	-	-	-	-	-
<b>Educational status</b>						
No formal education	55	45.5	46	49.5	101	47.2
Primary education	47	38.8	32	43.4	79	36.9
Secondary	15	12.4	8	8.6	23	10.7
Tertiary	4	3.3	7	7.5	11	5.1
<b>Farm size</b>						
≤2ha	3	2.5	-	-	3	1.4
2-5	76	62.8	13	14.0	89	41.1
≥6	42	34.7	80	86.0	122	57.0

Source: Computed from field survey, 2011.

Table 2 shows that 38.8 percent of the farmers planted cocoa, oil palm and kolanut in Oyo state. Farmers planted various combinations of tree crops, for instance, 24.0 percent planted cashew and cotton alongside with cocoa, oil palm and kolanut. In addition, 20.7 percent of the farmers planted citrus, plantain and cashew alongside with cocoa and oil palm. However, in Ondo state, 51.6 percent tree crop farmers planted cocoa, oil palm and kolanut. Also, most (80.4%) tree crop farmers were resident farmers and their mean year of farming experience of tree crop farmers was 21.9 years. Moreover, 44.4 percent belonged to cooperative society while 32.7 percent belonged to credit and thrift society.

**Table 2.0 Distribution of respondents on their socio-economic characteristics in Oyo and Ondo State, Nigeria**

Variables	States				Total	
	Oyo		Ondo		Freq	%
	Freq	%	Freq	%		
<b>Years of experience</b>						
≤10	21	17.4	8	8.6	29	13.6
11-20	17	14.0	6	6.5	23	10.7
21-30	46	38.0	57	61.3	103	48.1
31-40	23	19.0	20	21.5	43	20.1
41-50	10	8.3	-	-	10	4.6
51 and above	4	3.3	2	2.1	6	2.8
<b>Membership of farmers' association</b>						
Farmers' cooperative	38	31.4	57	61.3	95	44.5
Credit and thrift	61	50.4	9	9.7	70	32.7
Both	14	11.6	-	-	14	6.5
None	8	6.6	27	29.0	35	16.4
<b>Residency</b>						
Absentee	13	10.7	10	10.8	23	10.7
Migrant farmers	18	14.9	1	1.1	19	8.9
Resident farmers	90	74.4	82	88.2	172	80.4
<b>Tree cropping patterns</b>						
Cocoa/ oil palm/kolanut	47	38.8	48	51.6	95	44.4
Oil palm/ cocoa/ citrus/ plantain/cashew	25	20.7	31	35.5	59	27.6
Cocoa/ kolanut/ oil palm/ cashew	29	24.0	5	5.4	33	15.4
Oil palm/cocoa/cashew	18	14.9	7	7.5	25	11.7
Cocoa/ kolanut/oilpalm/coffee	2	1.7	-	-	2	0.7
<b>Number of farm lands</b>						
1	114	94.2	13	12.9	126	58.8
2	7	5.8	57	61.3	64	29.9
3	-	-	24	25.8	24	11.2

Source: Computed from field survey, 2011

**Table 3.0: T-test statistics of difference in labour use for tree crop production in Oyo and Ondo States**

States (Labour use for tree crops production)	N	Mean	Std.deviatin	Std Error	Mean diff	t	df	F	P
Oyo	121	36.78	71.54	4.17	-43.78	-6.57	212	7.13	0.00
Ondo	93	80.56	65.72	5.19					

Source: Computed from field survey, 2011

**Table 4.0: Distribution of farmers by constraints faced on labour utilization in Oyo and Ondo States.**

CONSTRAINTS	OYO		ONDO		TOTAL	
	Freq	%	Freq	%	Freq	%
High cost of labour	46	38.0	11	11.8	57	26.6
Poor labour management/human relationship	3	2.5	8	8.6	11	5.1
Migration of labourers	18	14.9	21	22.6	39	18.2
High demand for labour during peak periods	37	30.6	28	30.1	65	30.4
Poor quality of work done	-	-	3	3.2	3	1.4
Excess demand for fringe benefit	-	-	2	2.2	2	0.9
Labourers work for few hours	15	12.4	13	14.0	28	13.1
Uncooperative attitude	2	1.7	7	7.5	9	4.2
Total	121	100	93	100	214	100

Source: Computed from field survey, 2011

**Table 5.0: Regression analysis on determinants of labour use for tree crop production in Oyo and Ondo states**

Variables	Labour use in Oyo State $\beta$ -values	t-values	Labour use $\beta$ -values	t-values
Constant	19.75	0.36	-54.65	-0.98
Gender	-11.0	-0.97	9.17	0.86
Age	0.17	0.38	0.49	1.26
Marital status	14.15	1.35	6.83	1.10
Family size	-2.56	-1.40	5.19	1.96*
Number of dependants	-0.64	-0.31	-6.06	-2.85*
Educational level	12.27	2.06*	6.55	1.12
Farm location	3.82	0.35	27.76	2.89*
Farm size	2.10	1.72	-1.95	-1.48
Years of experience	-9.31	-0.96	-19.15	-2.81*
Farmers association	-2.07	-0.38	-19.28	-2.05*
Residency of farmers	-3.83	-0.54	2.77	0.34
Source of labour	0.37	0.51	1.08	0.95
Source of labour information	-3.23	-0.34	-8.98	-0.78
Contact with extension agents	29.51	3.20*	25.31	2.29*
Labour cost	-7.65	-0.34	-6.26	1.32
Use of labour saving devices	-15.11	1.95*	-29.02	-2.12*

R	0.32	0.58
R <sup>2</sup>	0.10	0.34
Adjusted R	0.03	0.25
F	1.61	3.81
P	0.05	0.00

#### 4. Discussions

The results show that farmers in the two states are in their middle ages. Spore (2002) documented that Nigeria is one of the countries where there will be over two million elderly people by 2030. Having most farmers in the age category of those who have probably past their prime or productive years has far-reaching implication for optimum agricultural production.

Female involvement in tree crop production was more in Oyo than Ondo state. This could be ascribed to the state government's intervention programmes: tagged the Oyo state Youth Empowerment Scheme (O-YES) and Oyo State Agricultural Transformation Programme which allowed more participation of women in agricultural production in Oyo state, these programmes were not taking place in Ondo state.

Most of the respondents in the two states were married which implies that tree crop production support family welfare in the two states, this is because tree crop production is their major source of income. In Oyo state, none of the tree crop farmers was divorced while there were none unmarried farmer in Ondo state. Of the respondents, 64.0 percent had household size of between three and five people in the two states. However, the proportion of household size of 3-5 persons in Ondo state (70.9%) is higher than Oyo states (57.1%). This finding implies that farm labour

in Oyo state may depend more on family labour as they have relative large household members than farmers in Ondo state. Similarly, most (97.2%) tree crop farmers had between one and five dependants in the two states. In addition, none of the tree crop farmers had between 6-10 relatives living with them in Oyo state.

Most respondents had formal education. The high level of formal education among the respondents in the two states boosted their capacity to seek information that minimizes manual labour cost on their farms, which were located in different places. This remoteness was due to traditional land ownerships in the study areas that make them have small farm size in different location. Having farms in different location may increase cost of production because it will increase cost of transporting labourers as they move from one location to another. Supporting this finding, Agbelemoge, Adedoyin and Oladoyinbo (2001) stated that 55 percent of their respondents had farms located in more than one site.

Only 1.4 percent had less than two hectares, 41.6 percent had between two to five hectares of land while 57.0 percent had above five hectares of land in the two states. Corroborating this finding, Fasoranti (2008), Akanni and Dada (2012) documented that most farmers had less than five hectares of land. But most (86.0%) farmers in Ondo state cultivated more

than five hectares of land. This implies that farmers in Ondo state produce more tree crops than their counterpart in Oyo state. Farmers with large farm size may also need to use more labourers on their farms than small scale farmers.

Mixed cropping was the common cropping pattern among tree crop farmers in the two states. Therefore, labour use in the study areas may depend on their cropping patterns. In Ondo state, no one planted coffee but 35.5 percent of the farmers planted citrus and plantain alongside with cocoa and oil palm. In addition, only 5.4 percent farmers planted cashew and cotton alongside with cocoa, oil palm and kolanut. Most of the farmers in the two states belong to farmers' association; therefore, information that may enhance their farms' productivity may be passed to them through their various associations by extension agents.

The finding further revealed that few (12.6%) tree crop farmers used family labour solely but many used hired labour. In addition, very few used informal labour while none of them used mechanical labour. This corroborates the finding of Agbelemoge *et al* (2001) that more than half of their cocoa farmers used hired labour while just above a quarter of them used family labour.

Regarding labour availability, 73.4 percent of the farmers did not have enough labour while 15.0 did not have labour at all for their production activities. Only 11.6 percent have adequate labour in the two states. As most of the respondents did not have enough labour on their farms, this may negatively affect their production.

High cost of labour was a constraint to labour use by tree crop farmers in the two states. This constraint could be somewhat alleviated if capital was available to farmers to hire wage labourers to help cultivate their crops. Although as a paid component of labour input, hired labour constitute more serious constraint to agricultural production than family labour. Agricultural production in Nigeria does not only lack labour but there is corresponding high cost of few available ones (Rahji, 2005). Apart from high cost of labour, tree crop farmers also indicated that hired labourers worked for few hours. Moreover, some tree crop farmers indicated that high demand during peak period was a constraint to labour use while few of them identified migration of labour as a major constraint to labour use for tree crop production.

Total (annual mean) labour used was  $\bar{\chi} = 87.9 \pm 21.17$  man-days per hectare. It accounted for labour use in land preparation, ridge making, planting of maize (2-3 times in a year), weeding and harvesting of food and tree crops.

T-test result in table 3 shows that farmers differ significantly in labour use for tree crops in Oyo and Ondo state ( $t=-6.57$ ,  $p \leq 0.05$ ). Observed difference was due to different labour input of farmers from both states. Intensity of labour used for tree crops was more in Ondo state than in Oyo state. Most of the tree crop farmers in Ondo state are into large scale production that required a lot of human labour. Since most activities involved in tree crop production were not mechanised, more labour was required for efficient production.

From table 4, out of 16 independent variables, only three were significant predictors of labour use by farmers in Oyo state for tree crop production. Coefficients of education ( $\beta=2.06$ ), and contact with extension agents ( $\beta=3.20$ ) were positive and were significant predictors of labour use. But the coefficient of use of labour saving device ( $\beta=-1.95$ ) was negative though a significant predictor of labour use. On the other hand, seven variables were significant predictors of labour used by farmers in Ondo state for tree crop production. Coefficient of family size ( $\beta=1.96$ ), farm location ( $\beta=2.89$ ) and contact with extension agents ( $\beta=2.29$ ) were positive and were significant predictors of labour use for tree crop production. However, coefficient of number of dependants ( $\beta=-2.85$ ), years of experience ( $\beta=-0.273$ ), membership of farmers association ( $\beta=-2.05$ ) and use of labour saving devices ( $\beta=-2.12$ ) were negative but significant determinants of labour use for tree crop production in Ondo state.

In conclusion, farmers were small and medium scale producers who cultivate wide range of tree crops mostly in mixtures. Common sources of labour used by tree crop farmers were family, hired, informal and mechanical labour. Generally, intensity of use of labour for tree crops differs for the two states. Farmers in Ondo state used more labour for tree crop production than their counterpart in Oyo state. Increased use of labour-saving devices and other management practices such as crop rotation and cover cropping will make farming less tasking in the study areas.

Increase contact of extension agents with farmers will improve extension services delivery as well as improve farmers' technical knowledge in an efficient use of labour. Use of labour saving devices influenced labour use among tree crop farmers in the two states. Hence, development policy should focus on technology that saves labour and well suited for small scale farming for sustainable tree crop production. In addition, there is need to enhance farmers' access to available and needed information on effective use of labour.

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