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Labour Production Efficiency among Arable Crop Farm Households in Southwest Nigeria

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Abstract: Farm labour organizes and ensures the transformation of farm inputs into output. Scarcity of labour was due to drudgery and poor working conditions. Available labour force was mainly aged farmers leading to inadequate arable production. This study examined determinants of farm labour production efficiency to identify the factors required for farm expansion and efficient labour use. Multi-stage sampling procedure was used to select 300 respondents from four Agricultural zones in Southwest Nigeria through structured questionnaire. The data were collected through a cross-sectional survey and analysed using descriptive statistics and Stochastic Production Frontier. The results revealed that 57.7% of the farmers had extension contacts, average education was 8.47 years while 65.3% cultivated below 1.0 ha with cassava (51.0%) as main crop. Majority (85.3%) did not employ tractor services, 33.0% used fertiliser, and 34.0% used herbicides while 38.3% applied pesticides. Labour productive efficiency was significantly ($p<0.01$) influenced by farm size, improved seed/cuttings, fertilizer and herbicide. Active age ($p<0.01$), farming experience ($p<0.01$), extension contact ($p<0.01$) and credit ($p<0.01$) reduced labour inefficiency. Inherited land (1.4907) also increased labour inefficiency significantly ($p<0.01$) and reduce output per worker. Therefore, stakeholders should facilitate farmers' access to credit, regular extension services and adequate distribution of modern input at affordable prices in order to increase farm size and labour efficiency. Farmers should increase cultivable farm land and raise more credit through cooperative efforts to solve land tenure problem, and complement artificial fertiliser with organic manure. Agro-service centres should be provided to promote farm mechanization in the area.

Keywords: Arable crop, Efficiency, Farming, Farm household, Labour, Southwest

Introduction

Agricultural development has been identified as virile platform for pro-poor development agenda of developing nations based on the central role that the sector has played in food security, employment generation and poverty alleviation over the years especially in the rural sector (Olayide et al, 2009). The roles of agriculture remain significant in the Nigeria economy despite the strategic importance of the oil sector. However, the agriculture sector is dominated by small-scale farm holders leading to insufficiency local food production and a wide gap between food supply and market demand (Oyebanjo, 2017). Crop farming, which is mainly subsistence in nature, is the main source providing about 45.0% of rural households' income (Babatunde, 2008).

Presently, the country is faced with the problems of increasing food crops production to feed the rapidly growing population. The farmers have resolved to continuous cropping and the use of human labour as family size increase because households size and composition are closely associated with household income (Oyekale, 2007 and Tuyen et al., 2014). Income distribution determines how competitive prices affect production efficiency and aggregate output (Simhon and Fishman, 2011). However, the farming system is characterized by low capitalization and low yield per hectare leading to low income among the farm households. The small scale farmers were scattered over wide expanse of land area cultivating between 0.5 to 3.0 hectares. They attributed increase in food production mainly to expansion in cultivated land areas rather than productivity (Kolawale and Ojo, 2007).

According to Oluyole and Lawal (2010), human labour was the main source of farm labour available to small-holder farmers in Nigeria and most of them were aged farmers. The scarcity of labour within the active age was attributed to drudgery in farm activities, rural-urban migration, lack of social infrastructure, poor farm income and low life expectancy in the rural areas. Oyekale and Adepoju (2012) stated that the increase in incomes and improved economic conditions of the farmers could be sustainable only if farming practices could compensate for nutrient loss and environmental stress induced by improper use of land. These could be achieved by the use of modern inputs notably fertilizer and tractor among the farmers.

Oluyole et al. *(*2011) observed that scarcity of farm labour impacted negatively on planting precision, better weed control, timely harvesting and crop processing. The major barriers to finding paid farm workers are drudgery, long working hours and poor working conditions. Ugorji (2013) also reported that there was inadequate farm labour to facilitate expansion of yam farms and intensify already selected production area in Eastern Nigeria. The available labour forces were mainly aged farmers resulting to inefficient labour use and low farm output. This affects the production capacity of natural resources, accelerates environmental degradation and fails to address poverty and malnutrition (Ashley and Maxwell 2011). Kurt (2011) noted that increasing production efficiency is the solution to the problems of economic growth including income inequality and poverty. Access of farmers to adequate finance for farm operations is also germane to increasing resource productivity and production efficiency.

Against this background, the study was set to examine the factors affecting labour productive efficiency among arable crop farm households in the study area. The findings will provide adequate information about the characteristics of the farmers and their farming systems. It will help policymakers to formulate effective project interventions and the benefits that would trickle down to the farm households.

Review of Literature on Farm Labour

Many authors have shown concerns about the use of farm labour and labour efficiency in agricultural production on the premise that human labour activates other production factors and transforms those farm inputs into required outputs. Oluyole *et al*. (2011) reported that farmers complained about high use of crude technologies while scarcity of farm labour impacted negatively on planting precision, better weed control, timely harvesting and crop processing Ugorji (2013) and Olayide et al (2015) informed that Nigeria covers a land area of 923,768km^2. The agricultural land area is 83.6 million hectares of which 28.3 million hectares is arable land. In spite of the available land, there was inadequate farm labour to

facilitate expansion of yam farms in Eastern Nigeria. The rich endowment of natural, human and material resources of the nation has not been effectively harness to meet the food needs of the poor. Oyebanjo (2017) observed that farm labour was a major source of employment and income for the rural households. Inadequate farm labour supply resulted in low farm productivity which significantly influenced the poverty status of farm households.

Madaki and Adefila (2014) categorised livelihood activities into high-labour-productive activities that leads to high-income and low-labour-productive activities which is common among the poor only serving as residual source of income to the rural households. The study of Anim (2011) in South Africa showed that there was a decline of about 2.0% per year in agricultural labour supply. He suggested that capital intensive agricultural technology should be developed and diffused through extension services.

Oni *et al*. (2002) observed positive and significant relationship between extension services and farm labour supply. They affirmed that extension services helped farmers to reinforce the message and enhance the accuracy of recommended technologies. Ahearn *et al*. (2006) reported the negative attitude of farm operators towards technology adoption. The attitude had significant negative effects on farm labour supply among farmers who were slow in adopting recommended technology.

El-Osta and Ahearn (2004) also reported that wage rate and high number of elderly people in rural households had significant negative effects on farm labour supply while modern farm inputs and cultivation of larger farm size increased the supply of farm labour. They suggested that policy should ensure introduction of technology that will increase farm labour supply with potential for more profit and sustainable environment.

The findings of Isitor *et al.* (2017) on cassava production revealed that average farm size was low at 0.9 ha due to inadequate farm labour. Oduntan *et al.* (2017) found that farm size, labour quantity and agrochemicals were the major factors affecting cassava output. Ogunleye *et al.* (2017) reported that government-assisted cassava farmers were more efficient and they earned higher profit than the non-beneficiaries. Ogunleye (2018) also confirmed that cassava farmers (17.3%) who had access to microcredit were efficient and more profitable than 82.7% of them who did not obtain microcredit. This indicates that micro-credit enhanced the financial capacity of the farmers to procure required resources for increased farm production.

The study of Anyiro *et al*. (2013) revealed the complaints of farmers about unavailability and high cost of labour in yam farming which was labour intensive. Inadequate labour supply led to subsistent level of output. Hired labour constituted 36.7% while family labour and exchange labour provided the balance of 63.3%. Labour use efficiency was significantly affected by farm size 1.0%), fertilizer (1.0%), age (5.0%), education (1.0%), gender 1.0%), wage rate 1.0%) and household size 1.0%).

Materials and Methods

The Study Area

The study area is South-west geo-political zone of Nigeria. The Southwest zone lies between latitude N 9º 4.9199' to the north and longitude E 8º 40.5166' to the east. The zone comprises of six States namely; Lagos, Ogun, Oyo, Osun, Ondo, and Ekiti State and it covers about 114, 271 kilometres square or 12 percent of Nigeria's total land mass (Adepoju *et al*., 2011). The total population of the Southwest is 27,581,992 who are mainly Yoruba ethnic group and predominantly agrarian (National Population Census, 2007). The climate is characterized by wet and dry seasons with rainfall between 1211-1264 mm, temperature ranges from 18^0-24^0C during the rainy season and 30^0-35^0C during the dry season. As a result, the favourable climate enhanced the production of cassava, maize, yam, pepper, vegetables, legumes and cash crops including cocoa, cashew, oil palm, among others.

Primary data were collected from farmers that cultivated cassava, maize and yam either as sole or base crop. The data were collected in a cross-sectional survey using questionnaire which was administered through personal contact and interview. A multistage sampling technique was employed in the selection of the respondents. The first stage involved the selection of Oyo and Ogun States from the six States in the region. In the second stage, two (2) agricultural zones were selected from each of the two States. Precisely, Ibadan/ Ibarapa and Ogbomosho Agricultural zones were selected out of the four (4) designated Agricultural zones in Oyo State while Ikenne and Ilaro Agricultural zones were selected out of the four (4) Agricultural zones in Ogun State. Subsequently, two (2) Agricultural blocks were surveyed from each of the selected Agricultural zones while three cells i.e. farming communities/ villages were selected from each of the eight (8) Agricultural blocks. About fifteen (15) arable crop farmers/ respondents were finally interviewed by snowball sampling method.

The data were obtained on the socioeconomic characteristics of the farming households and their farming systems, labour supply to farm for various operations, production costs and income generation. Specific information on farming systems included input sources and costs, output and sales data, quantity and type of labour usage on farm and off-farm activities, method of input acquisition, sources of finance and amount of loan/ credit obtained as well as the challenges encountered in farm production among others. However, complete data from three hundred (300) respondents were used for the analyses after data screening.

Analytical Framework

Descriptive statistics was used to examine the socioeconomic characteristics of the farmers and the farming systems. The productive efficiency of labour was determined by the Stochastic Production Frontier (SPF). The quantities of maize and yam were converted to cassava equivalent for the purpose of data analyses because cassava was the dominant arable crop in the area. The production of the farm is defined as a function that relates maximum possible output to a given combination of inputs (Coelli, 1994). The frontier production function differs from the ordinary least square (OLS) estimation in the structure of the error term which is divided into two parts. The first accounts for measurement errors in output variable, weather and a combined effect of unknown inputs on output. The second is a non-negative random error associated with technical efficiency of production. The use of frontier in the estimation of technical efficiency is dated back to Farrel (1957). The approach was refined by Aigner *et al*. (1977), Meeusen and Broeck (1977), Battesse, and Coelli (1995). The frontier production technology of a farm is given as:

$$Y^* = f(X_i;\beta) + v - u \qquad (1)$$

Where Y^* is farm output, X_i is the vector of farm inputs, βis a vector of parameters to be estimated, $f(X_i;\beta)$ is the production function, v is the traditional error term, u is the stochastic error term which is assumed to be independently and identically distributed, N $(0, \sigma_u^2)$, mean μand varianceσ_u^2 =(| N $(\mu, \sigma_u^2|)$.

Following Jondrow *et al*. (1982), the technical efficiency estimation is given by the mean of the conditional distribution of inefficiency term u_i given ε_i as follows:

$$E(u_i|\varepsilon_i) = \frac{\sigma_v - \sigma_u}{\sigma}\left[\frac{f(\varepsilon_j\lambda/\sigma}{1-F(\varepsilon_i\lambda/\sigma} - \frac{\varepsilon_i\lambda}{\sigma}\right] \quad (2)$$

The maximum likelihood estimates (MLE) yield β, $\sigma^2 = \sigma_v^2 + \sigma_u^2$, and $\gamma = \sigma_u/\sigma^2 = \sigma_v^2 + \sigma_u^2$ as well as $\sigma_v/\sigma_u.\sigma^2 = \sigma_v^2 + \sigma_u^2$ while f and F represent the standard normal density and cumulative distribution function respectively, evaluated at $\varepsilon_i\lambda/\sigma$.

This stochastic production frontier (SPF) was adapted to measure the labour productive efficiency (LPE) in this study following Oluyole *et al*. (2011) and Anyiro *et al*. (2013) among other authors. The estimating equation is specified as;

$$\text{Ln LPE} = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + v_i - u_i \quad (3)$$

The inefficiency model u_i is specified as;

$$u = \partial_0 + \partial_1 Z_1 + \partial_2 Z_2 + \partial_3 Z_3 + \partial_4 Z_4 + \text{-------} + \partial_{15} Z_{15} + W_{it} \quad (4)$$

Where, μ_i is technical inefficiency factor, Z_r is a vector determining technical inefficiency, ∂ is a vector of inefficiency parameters to be estimated.Equations (3) and (4) were simultaneously estimated, where;

LPE = Output kg per hectare divided by man-day of labour,
X_1 = farm size per unit labour (hectare/ manday).
X_2 = quantity of seed per unit labour (kg/ manday)
X_3 = quantity of pesticide applied per unit labour (litre/man days).
X_4 = quantity of herbicide per unit labour (litre/ manday)
X_5 = quantity of fertiliser used per unit labour (kg /man day).
Z_1 = age of household head (years)
Z_2 = farming experience (years)
Z_3 = gender of household head ((1, if male; 0, otherwise)
Z_4 = educational Level (years)
Z_5 = primary occupation (1, if farming; 0, otherwise)
Z_6 = extension Contact (number)
Z_7 = used hybrid seed (1, if hybrid seed; 0, local seed)
Z_8 = distance to farm from home (km)
Z_9 = wage rate (naira)
Z_{10} = amount of credit obtained (naira)
Z_{11} = proportion of inherited land (size of inherited farmland divided by total farm size cultivated in ha)

Results and Discussion

The Socio-economic Characteristics of the Respondents

The socio-economic characteristics of the farmers are presented in Table 01. The result shows that 82.0% of the farmers were about 40 years old while the average age was 51.3 years showing that the farmers were relatively old or could retire in another few years. The result of marital status shows that majority (66.0%) were married, 12.0% were single while 32.0% were once married. Thus, majority of the respondents had family members who could supply farm labour. About 54.0% had a maximum of primary education while 46.0% had secondary education and above. An average farmer spent 8.47 years in school. This implies a low educational level which may negatively affect adoption of innovations/ modern technology.

The result revealed that an average farmer have been cultivating arable crops for 26.49 years while 75.3% had a farming experience between 20 - 40 years. This indicates that majority of the farmers understand their farm settings. Furthermore, farming was the major occupation for 63.3% while 31.7% were engaged primarily in non-farm livelihood activities.

Table 01: Distribution of Respondents by Socio-Economic Characteristics (n=300)

Characteristics	Variable	Frequency	%	Mean
Age (years)	< 30	5	1.7	
	30 -< 40	49	16.3	
	40 -< 50	97	32.3	
	50 -< 60	56	18.7	51.3
	≥ 60	93	31.0	
Marital status	Single	36	12.0	
	Married	198	66.0	
	Divorced	7	2.3	
	Widowed	22	7.3	
	Separated	37	12.3	
Education (years)	No formal education	43	14.3	
	Primary education	119	39.7	
	Secondary education	94	31.3	8.47
	Tertiary education	44	14.7	
Farming experience	< 10	11	3.7	
(years)	10 - < 20	20	6.7	
	20 – < 30	144	48.0	**26.49**
	30 - < 40	82	27.3	
	≥ 40	39	13.0	
Primary occupation	Farming	205	63.3	
	Non-farming	95	31.7	

Source: Computed from field data, 2015

Characteristics of the Farming System

The farm characteristics are described in Table 02. The result shows that 65.3% of the farmers cultivated below 1.0 ha, 34.7% cultivated above 1.0 ha while the average farm size was 1.4 ha. This indicates small level of farm holdings. Local varieties of seed/ cuttings were cultivated by 49.7% of the farmers while 50.3% adopted improved varieties. Majority 67.0% of the farmers did not apply fertiliser while 33.0% used an average of 133.8 kg of fertiliser.

The result shows that 63.0% of the farmers did not apply herbicide while 37.0% applied an average of 6.3 litres of herbicide which was low despite that it could reduce cost of weeding or labour. Likewise, majority 61.7% did not apply pesticide probably due to low pest attack or low fund while 38.3% applied an average of 1.95 litres of pesticide.

The findings revealed that acquisition of farmland by inheritance, purchase and rent/ lease were 47.0%, 15.3% and 25.4% respectively while 12.3% borrowed their farmland. Thus, largest proportion of the farmland was controlled by

indigenous families indicating high level of land tenure system. Majority (85.3%) of the farmers employed human labour while 14.7% combined human labour with tractor services showing low level of farm mechanisation. About 72.7% of the farm households trekked up to 3km to their farms while 27.4% went more than 3km away, maybe by transportation to the farm. Distance from home to farm may affect the man-day of labour and cost of transportation or production cost.

The result shows that 42.3% of the respondents were not contacted by extension agent in the last one year, 30.7% was visited 1-5 times while 27.0% was visited more than 5 times. The low count of extension contact with the farmers implies low dissemination of farm innovations, which could be attributed to inadequate number of extension agents. However, 51.0% of the respondents cultivated cassava, 30.3% cultivated maize while 18.7% cultivated yam indicating that cassava was the major arable crop in the area. Inadequate finance/ investible capital (60.3%) was the major constraints against arable crop production followed by hash climatic condition or drought (44.3%) and lack of fertiliser (31.3%). Although, high cost of labour (27.7), attack of cattle or pest/diseases (9.0%), and theft/ pilferage (8.0%) also contributed to low farm output.

Table 2: Distribution of Respondents by Farming System (n= 300)

Characteristics	Variable	Frequency	%	Mean
Farm size (ha)	Below 1.0	196	65.3	
	1.0-<2.0	82	27.3	**1.4**
	2.0 and above	22	7.4	
Seed/ cuttings planted	Local varieties	149	49.7	
	Improved varieties	125	41.7	
	Both varieties	26	8.6	
Fertiliser applied (kg)	None	201	67.0	
	< 100	38	12.7	
	100 - < 200	37	12.3	**133.8**
	200 and above	24	8.0	
Herbicide applied (litre)	None	189	63.0	
	< 5	73	24.3	**6.3**
	5 - < 10	29	9.7	
	10 and above	11	3.7	
Pesticide applied (litre)	None	185	61.7	
	< 1.5	80	26.7	
	1.5 - < 3.0	31	10.3	**1.95**
	Above 3.0	4	1.3	
Ownership of farmland	Purchased	46	15.3	
	Inherited	141	47.0	
	Borrowed	37	12.3	
	Rented/ leased	76	25.4	
Type of Labour Used	Family labour only	27	9.0	
	Paid labour	229	76.3	
	Tractor service and labour	44	14.7	
Distance to farm	< 1.5	149	49.7	
	1.5 - < 3.0	69	23.0	**2.7km**
	3.0 - < 4.5	38	12.7	
	4.5 and above	44	14.7	
Extension visit per year	None	127	42.3	
	1 – 5	92	30.7	
	6 – 10	51	17.0	
	11 and above	30	10.0	
Major crops cultivated	Sole cassava and based farms	153	51.0	
	Sole maize and based farms	91	30.3	
	Sole yam and based farms	56	18.7	
Farming constraints	Climatic change/ drought	133	44.3	
	Theft/ pilferage on farm	24	8.0	
	Lack of fertilizer	94	31.3	
	Inadequate finance/ capital	181	60.3	
	Cattle/ pest attack	27	9.0	
	High cost/ scarcity of labour	83	27.7	

Source: Computed from field data, 2015

Determinants of Labour Productive Efficiency in Arable Crop Farming

The estimates of the stochastic production frontier for the labour productive efficiency (LPE)are presented in Table 03. The regression parameters i.e. sigma (σ^2_v), log likelihood function (301.6438) and Wald chi-square (1.05E+10) were significant at ($p < 0.01$) showing that the SPF model has significant explanatory power of the study data.

The coefficients show that farm size (0.1625) significantly promoted labour productive efficiency and output per worker at $p < 0.01$. Thus, farm size should be increased. Seed quantity (0.6892) had a significant positive relationship with labour efficiency at $p<0.01$. This indicates efficient utilization of seed by labour. Pesticide (0.0114) significantly increased labour productive efficiency at $p<0.01$ meaning that additional man-hour spent in spraying pesticide had increasing effect on output per labour. Thus, pesticide should be adopted in arable crop farming to ensure increased output. Similarly, fertilizer (0.1433) had significant increasing effect on labour productive efficiency at $p< 0.01$ implying that fertilizer should be

distributed adequately to the arable crop farmers since natural soil fertility depletes in a short time. However, herbicide (-0.0413) caused a significant decline on output at p<0.01 perhaps due to wrong application or overutilization. This indicates that the farmers should be educated on chemical applications.

Meanwhile, the variables with negative coefficients in the inefficiency model had reducing effects on inefficiency. These include age (-0.0902) which had negative relationship with labour inefficiency at p<0.01 implying the farmers performed efficiently because they were young and active relatively at 51.3years old. Farming experience (-0.1334) reduced labour inefficiency significantly at p<0-01. This could be attributed to the good understanding of the farm settings by the farmer. Primary occupation (-1.188) had significant reducing effect on farm labour inefficiency at p<0-05 implying that majority of the farmers were actively involved in farming as main source of livelihood than non-farm activities. Extension contact with farmers (-1.8877) significantly declined labour inefficiency at p<0-01 meaning that extension service is critical to increasing labour productive efficiency. Thus, it must be more effective and expanded with adequate distribution of modern inputs. Credit (-9.04E-06) also reduced labour inefficiency significantly at p<0.01. Perhaps, it enhanced the financial capacity of the farmers and timely utilization of required resources by labour leading to increased output per worker.

In contrary, those variables with positive coefficients in the inefficiency model had increasing effects on inefficiency. Thus, gender (0.8315) promoted labour inefficiency significantly at p<0.01. Maybe, a large proportion of female were involved as hired or family labour. Male farmers can work or supervise farm work efficiently than female farmers. Seed variety (0.1765) significantly contributed to labour inefficiency at p<0.01 indicating that output per farm worker declined perhaps due to the use of local seed variety/cuttings. Distance to farm (0.0385) increased labour inefficiency at p<0.01 possibly due to dissipation of energy by trekking to farm. Thus, farmers should go to farm through commercial transportation like motorcycles/ okada which is common in the study rural areas. Furthermore, inherited land (1.4907) also increased labour inefficiency significantly (p<0.01) indicating that the control of farmland by family reduced cultivated farm size and output per worker. This confirms that land tenure system is a problem to agricultural development. It can hinder farm mechanization and labour productive efficiency in the area.

Table 3: Estimates of the Stochastic Production Frontier (n=300)

Explanatory variables	Coefficient	Standard error	t-value
Constant	32.6582***	8.3739	3.90
lnFarm size (ha/ man-day)	0.1625***	0.0044	36.77
lnSeed (kg/ man-day)	0.6892***	0.0032	21.27
lnPesticide (litre/ man-day)	0.0114***	0.0019	6.05
lnFertiliser (kg/ man-day)	0.1433***	0.0053	8.56
lnHerbicide (litre/ man-day)	-0.0413***	0.0012	-35.84
Inefficiency variables			
Constant	5.9506***	1.8104	3.287
Age of farmer (years)	-0.0902***	0.0302	-2.99
Farming experience (years)	-0.1334***	0.0206	-6.47
Gender (dummy)	0.8315***	0.2829	2.94
Education (years)	-0.0043	0.0217	-0.20
Primary occupation (dummy)	-1.1881**	0.5391	-2.20
Extension Contact (number)	-1.8877***	0.3461	-5.45
Used hybrid seed (dummy)	0.1765***	0.0016	111.81
Farm distance (km)	0.0385***	0.0086	4.49
Wage rate (naira)	0.34527	1.2818	0.27
Amount of credit obtained	-9.04E-06***	2.31E-06	-3.92
Proportion of inherited land	1.4907***	0.4794	3.69
Variance parameters			
Sigma v	8.10E-08	3.38E-06	
Log likelihood	301.6438***		
Wald chi-square	1.05E+10		
Mean Efficiency	0.8544		

Source: Computed from field data, 2015 ***p<0.01 **p<0.05

Classification of Farms by Efficiency Estimates

The farms were distributed by the labour productive efficiency estimates in Table 04. The results revealed that only 50.7% of the farms had efficiency gains of 0.90-0.10. About 34.0% of the farms had a range of 0.70-0.90 labour productive efficiency while 15.3% of the farms performed below 0.70 of the efficiency level. At least, 32.3% of the farms performed below the mean efficiency level of 0.85. This is 85.0% efficiency level implying that an average farm has

the opportunity to increase its labour productive efficiency by 15.0% to attain optimum level of production.

Table 04: Distribution of Farms by Efficiency Estimates (n=300)

Class of Efficiency	Farm (%)	Mean Efficiency
≤ 0.60	6.0	
0.60 - 0.70	9.3	
0.70 - 0.80	17.0	
0.80 - 0.90	17.0	0.8544
0.90 - 1.00	50.7	
Total	100.0	

Source: Computed from field data, 2015

Socioeconomic Status and Labour Productive Efficiency

The labour productive efficiency (LPE) estimates of the farms were assessed with respect to the socioeconomic status of the farmers as presented in Table 05. The finding shows that the range of labour productive efficiency is 0.50 - 0.10. The mean estimates revealed that labour productive efficiency was lowest among households engaging in non-farm activities as their main source of income (0.77), among the female farmers (0.83), on farm size below 1.0 hectare (0.79) and among farmers who did not attend school (0.75). Meanwhile, it was observed that the farm-based households, the male farmers, farm size between 1 - 2 hectares and those farmers with tertiary education had higher labour productive efficiency of 0.87, 0.86, 0.88 and 0.91 respectively. In contrary, farm size above 2 hectares had a lower labour productive efficiency of 0.81 which could be attributed to the traditional method of farming.

Table 05: Distribution of Labour Productive Efficiency by Socioeconomic Status

Characteristics	Minimum	Maximum	Mean	Std. Error of Mean
Average Farm	0.50	1.00	0.8544	0.0077
Main Income Source				
Farm	0.60	1.00	0.8671	0.0071
Non-farm	0.50	1.00	0.7740	0.0316
Gender of Farmer				
Male	0.50	1.00	0.8584	0.0082
Female	0.60	1.00	0.8336	0.0212
Farm size cultivated				
Below 1Ha	0.50	1.00	0.7992	0.0182
1-2Ha	0.60	1.00	0.8811	0.0082
Above 2Ha	0.70	0.92	0.8072	0.0198
Farmer's Education				
No formal education	0.50	0.98	0.7535	0.0266
6 years	0.62	1.00	0.8927	0.0098
12 years	0.60	1.00	0.8257	0.0133
≥ 15 years	0.72	1.00	0.9109	0.0127

Source: Computed from field data, 2015

Conclusions

The findings revealed that arable crop was cultivated predominantly by small scale farmers. Farm labour was more efficient (88.0%) on 1-2 ha while it was less efficient (81.0%) on more than 2ha due to low level of farm mechanisation. The mean efficiency of 85.0% indicates that there is opportunity to increase the present level of labour productive efficiency by 15.0%. However, socioeconomic characteristics of the farmers, farm credit, and inadequate supply of fertiliser and low level of extension services affected the labour productive efficiency among other factors. The cost of labour was high indicating labour scarcity in the area. Meanwhile, the farm-based households were more labour efficient (0.8671) than those who were primarily engaged in non-farm activities (0.7740). In addition, labour efficiency was lowest among illiterate farmers in the area. The study concluded that adequate distribution of modern inputs/ fertiliser, regular extension contact with farmers, proper implementation of policy that will ensure expansion of cultivated farmland are germane to increasing labour productive efficiency on the arable crop farms.

Therefore, adequate extension services should be provided to enhance modern farm practices. Modern inputs including fertiliser should be distributed adequately to farmers at affordable prices. Farmers should increase cultivable farmland and raise more credit through cooperative efforts and complement artificial fertiliser with organic manure. Government should promote farm mechanization through well-equipped agro-service centres in the area

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Conflict of Interest

We declare that there is no conflict of interest this work. It is an original research work.

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