

Productivity of Rural Labour Employment in Small-holder Food crop Farming in Nigeria

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Abstract

The rate of unemployment of school leavers in urban areas and cities is continually rising fast over the years; talk less of the situation with the less privileged rural communities which must be worst hit. However, the rate and type of unemployment of labour in such rural communities are unknown. Also, the measurement of labour input in the input-output functions of farms has some inherent problems in that what should be required is a measure of labour actually utilized during a production period and not a measure of total labour available whether used or unused, more so when the family labour constitutes a greater proportion of total farm labour. The need to find solutions to these problems provided the rationale for this study, thus, appropriate analytical techniques were applied to estimate labour employment situation and the respective productivities of each component of the farm labour among the small-holder food crop farmers in the study area. Findings revealed that the rate of unemployment among rural small-holder farmers is approximately 29 percent (or 0.29) a case of disguised underemployment rather than disguised unemployment or full employment. Family labour is less productive than hired labour and its further increase in total farm labour could have a depressing effect on value of total farm output. Appropriate improvement measures were suggested.

Key words: Productivity, rural labour employment, small-holder, inhibition to labour mobility, political will and zeal

INTRODUCTION

Among the four recognized factors of production required for sustained economic growth, human capital (labour) constitutes the most indispensable resource in that it is the human element that identifies the non-human resources, plans for their use, allocates them and executes the necessary production activities. Unfortunately, not much data are available on the real availability, use and effectiveness of these labour resources most especially on small holder farms. Thus, if the recent development strides being taken by rural areas would succeed, there is a need to know the current state of several institutions towards increasing the level of employment particularly in the rural sector so as to determine the magnitude of labour that are potentially releasable to fill the proposed increased labour demand vacancies. Also, adequate planning for effective utilization of labour in developing nations calls for the generation of data on how many people that are really unemployed, employed or underemployed on small holder farms.

For this study, Pigou's idea on employment is adopted. According to him "the volume of employment in any occupation (such as agriculture) over assigned period can be defined unambiguously as the number of man-hours of work performed during that period" [Pigou,1949]. Therefore, employment could be related to the proportion of the total population in the labour force since the higher the number of man-hours used in any economy, the higher the national output [Igben,1988]. In general therefore, the terms employment and unemployment refer to the absolute quantities of used and unused available labour time respectively. In estimating the rate of employment/unemployment therefore, account should be taken of non-employment figures indicating the number of hours (men) socially excluded from productive works. Such hours include those used for social, recreational and religious activities and work hours by under-aged children and the aged.

The rate of unemployment particularly among school leavers in urban areas is considerably high, let alone the less privileged rural communities that constitute the main stay in Nigeria economy. However the state of employment in the latter is unknown and yet to be determined and without an understanding of this rural employment market, such policies that could help in effective re-allocation of existing farm labour in order to enhance its productivity could not be formulated.

Family labour constitutes the major source of farm labour on rural small-holder farms. Labour is hired only occasionally during the peak labour demand periods. Thus these two types of labour need be measured explicitly in order to get an accurate analysis with regards to labour availability and use. Such measurement is not done in production function analysis, since what is required is a measure of labour actually used in deriving the given production and not a measure of total labour utilized and unutilized but available during the production

period. However, such details become necessary in dealing with other sophisticated analytical tools like linear programming and sensitivity studies. While the former technique involves imputation of costs to family labour on the basis of equivalent magnitude of hired labour, a technique that rests on the assumption that productivity of both family and hired labour are equal, the latter requires detailed knowledge on number of hours of labour put in by individual (family or hired), the type of work done and the volume of work accomplished over a specific time period. Such a detailed study would enable us to know the relative productivity of each of the sources of farm labour and formulate reliable policies on real resource employment situation and allocation over a reasonable period of time. However, such information could only be obtained, if accurate and detailed records are kept by farmers.

In this paper, using data from farm survey conducted in typical rural small-holder farms, an attempt is made to achieve the following objectives:

- a) To investigate the nature and magnitude of labour employment among rural small-holder food crop farmers.
- b) To test the productivities of family and hired labour used on the farms.
- c) To investigate the differences between these two productivities, if any and
- d) To suggest appropriate policy recommendations for improving the existing situation for a better performance.

The study draws its evidence from typical rural farms with a lot of extension input hence results obtained can be used to modify situations in similar farms that are less privileged with extension facilities.

MATERIALS AND METHODS

The quantitative method employed in measuring the state of employment in this study involves estimating the excess labour supply; given the data on labour supply and labour demand situation.

The rate of unemployment can then be estimated as the relative proportion of excess labour on the supply situation, that is:

$$Ur = \frac{Ls - Ld}{Ls} \quad \text{----- (1)}$$

Where Ur	=	Unemployment rate
Ls	=	Labour supply
Ld	=	Labour demand

Flow rate approach in which time is the most relevant in estimating the quantity of labour supplied or demanded is employed and is based on the assumptions that, first, aged men (above 60 years) and children (below 16 years) are excluded from active farm work and a woman was assumed to contribute 75 percent of a man [Norman, 1969]. Second, only 150 and 112 man-day equivalents were the available labour (supply) for men and women respectively per year. Although these figures are lower than those by previous authors [Norman, 1969; Buck, 1930; Roseintin-Rodan, 1957; Cho, 1963; Norman, 1972], they appear reasonable given an average of 5 days working week of 6.0-6.5 hours per day of work in the study area as compared with 7.5-8 hours work per standard man-day, and the multifarious non-farm duties and social functions engaged in by both men and women all the year round. Thus hired labour man-day is assumed to be 7.5 hours.

On the labour demand side, efficiency units long established through work studies are relied upon to calculate the actual labour man-day equivalent required for various sizes of farms.

In order to separate out the productivity's of family and hired labour and investigate their differences, the idea of Kanbur and Mukerji [1975] is considered appropriate. According to them, in a situation where because of limited capital, the major portion of the farm labour is supplied by the farm family and labour is only hired when the family is not able to cope with the quantum of work, thus making labour hiring a function of available family labour and capital at the disposal of the farmer, such a farm management decision must rest principally on the maximum use of family labour.

A single equation production function is considered inadequate since the basic production function needs to be expanded into a system of equations to reflect some of the steps involved there in. Kanbur and Mukerji suggested a recursive model constructed as a chain of causation to be more relevant to the situation. It is defined as follows:

$$\text{Log } Y = a + b \log X_1 + c \log X_2 + d \log X_3 + e \log X_4 + U \dots \dots \dots (2)$$

$$\text{Log } Y = a_1 + b_1 \log X_1 + c_1 \log X_2 + d_1 \log X_3 + U_1 \dots \dots \dots (3)$$

$$\text{Log } X_2 = a_2 + b_2 \log X_1 + c_2 \log X_3 + U_2 \dots \dots \dots (4)$$

$$\text{Log } X_1 = a_3 + b_3 \log X_3 + U_3 \dots \dots \dots (5)$$

$$\text{Log } X_3 = a_4 + U_4 \dots\dots\dots (6)$$

Where:

- Y = value of aggregate farm product
- X₁ = value of capital services including land service
- X₂ = value of hired labour service
- X₃ = value of family (includes farmer and his wife) labour service
- X₄ = number of family workers (men)

U₁, U₂, U₃, U₄, are error terms independently distributed of each other with zero means.

The first two equations (2 and 3) are production function equations, the third one (4) is a labour draft equation and the fourth (5) is a kind of capital and land acquisition equation. The fifth equation (6) states that log X₃ is randomly distributed.

Empirical Analysis

The Data

The information used for this analysis were obtained from reports of farm surveys on Isoya Rural Development Project (IRDP) provided by the sponsoring Agricultural Extension and Rural Sociology Department of Obafemi Awolowo University, Ile-Ife, over a twelve-year period (1976-88) when the first survey was carried out. This was supplemented by responses had from questionnaire schedule administered on 200 cooperating farmers between October 1999 and January 2000 in 10 out of the 13 villages that make up the IRDP. The information obtained then was later up-dated between July 2009 and March 2010 to constitute the data used for the current report.

IRDP was conceived in part as a means of extending practical knowledge acquired from the university research activities to neighboring rural communities hence the study area has had the privilege of enjoying systematic and continuous extension service for a period of time well above three decades.

The data obtained on agricultural production were grouped into output, capital and labour. For example, labour items were classified into number of hours put in by both hired and family labour in specific farm operations separately; capital items were sub-divided into seeds, fertilizers, repairs on equipment, rent and depreciation. It should be noted that information collected were grouped by type of farm enterprise area rather than by type of farming.

RESULTS

Information obtained from the analysis of data on 200 sampled farmers were fitted into equation 1 to estimate the state of labour employment and for the evaluation of relative productivities of family and hired labour, a recursive model (equations 2-6) is fitted.

The results of the empirical analysis are presented in tables 1 and 2:

Table 1: Farm (enterprise) size and Labour employment situation among small-holder farms in Ife south Local Government Area of Osun state, Nigeria

Enterprise (abbreviation)	Average Farm size (hectares)	SS	DD	SS-DD	<u>SS-DD</u> SS	<u>SS</u> TSS	Weighted Surplus Labour
Maize	0.83	123	44	79	0.64	0.06	0.04
Cassava (CSS)	0.53	79	38	41	0.52	0.04	0.02
Yam (YM)	0.03	45	38.5	6.5	0.14	0.02	0.01
Cocoyam (CC)	0.24	36	27.5	8.5	0.24	0.02	0.01
Banana (Bn)	0.47	139	98	41	0.29	0.06	0.03
MZ/CSS	0.91	135	73	62	0.46	0.06	0.01
MZ/YM	0.58	86	74	12	0.14	0.04	0.02
MZ/CC	0.54	80	40	40	0.50	0.04	0.02
CSS/YM	0.69	103	94.5	8.5	0.08	0.05	0.01
CSS/CC	1.58	235	152	8.3	0.35	0.11	0.04
YM/CC	0.45	67	60	7	0.10	0.03	0.01
MZ/CSS/YM	2.13	316	328	-12	-0.04	0.15	-0.01
MZ/CSS/CC	4.86	722	481	241	0.33	0.33	0.11
Total(T)	14.11	2,166	1,548.5	617.48	3.75	1.01	0.32
Mean	1.09	166.62	119.12	47.50	0.29	0.8	0.02

Note: SS means Labour Supply (man days available) for each activity.
 DD means Labour required for the observed enterprise.
 SS-DD means Labour supply Less Labour demand for each enterprise.
 TSS means Total Labour available for all the activities.

Source: Computed from survey data

DISCUSSION

Table 1 shows the total labour supply and demand as well as the methods employed to estimate the rate of under-employment among small-holder farmers. The average labour supply and demand was approximately 167 and 119 man-days equivalent respectively (see columns 3 and 4). This shows an excess labour supply of 48 man days for the average household farm with a range of less than zero to 241 man days.

However, the facts that about 10 of the 13 enterprise-farms considered had labour supply below the average labour supply for the sample and some (maize/cassava/yam enterprises) even had deficit supply of up to 12 man days per farm are suggestive of insufficient availability of labour for farming work in the study area. This may limit the size of holding to an uneconomic size.

The rate of underemployment among individual enterprise farmers as shown in column 6 of the table ranges from 8 percent to 64 percent for the maize/cassava/yam farmers who still require 12 man days (or 4% of available labour) per annum to cope with the labour demand. The average rate of “disguised underemployment” or “surplus labour” among food crop farmers is 29 percent. Also, 54 percent of the enterprise farmers had average or below average rate of disguised underemployment while 46 percent had higher rates of surplus labour. Viewed on a wider scale, disguised underemployment at the macro-aggregate level is shown as equivalent to 32 percent among the enterprise farmers sampled (column 8). These rates, 0.29 and 0.32 are greater than zero (or full employment) but less than 1 (or full unemployment). This shows that the situation at hand is that of underemployment.

However, since the figures obtained from this study is closer to zero, the situation with the small-scale food crop farmers is almost a full employment one and labour is not all that surplus. This could be the result of some technical and social factors. Such technical factors include inadequate inputs, small farm sizes resulting from low farms’ capital base, prevalence of mixed cropping system of production and seasonality of farming coupled by the absence of off-farm job opportunities provided by non-farm sectors, while some of the contributing social factors include immobility of family labour resulting from inalienability of farmers to ancestral lands and the customs and beliefs of the people which forbid population control.

Table 2: Recursive Model Analysis Results

$$\begin{aligned}
 (1) \quad & \text{Log } Y = 2,366 + 0.748\text{log } X_1 + 1.138\text{log } X_2 - 0.989\text{log } X_3 + 1.138\text{log } X_4 \\
 & \qquad \qquad \qquad (0.013) \qquad \qquad (6.462) \qquad \qquad (0.097) \qquad \qquad (0.631) \\
 & \qquad \qquad \qquad R^2 = 0.94 \\
 (2) \quad & \text{Log } Y = 2,061 + 0.751\text{log } X_1 + 1.421\text{log } X_2 + 1.07\text{log } X_3 \\
 & \qquad \qquad \qquad (0.096) \qquad \qquad (0.151) \qquad \qquad (0.082) \\
 & \qquad \qquad \qquad R^2 = 0.93 \\
 (3) \quad & \text{Log } X_2 = 4.98 + 0.59\text{log } X_1 - 0.37\text{log } X_3 \\
 & \qquad \qquad \qquad (0.31) \qquad \qquad (0.12) \\
 & \qquad \qquad \qquad R^2 = 0.99 \\
 (4) \quad & \text{Log } X_1 = 3.01 - 0.55\text{log } X_3 \\
 & \qquad \qquad \qquad (0.03) \\
 & \qquad \qquad \qquad R^2 = 0.85 \\
 (5) \quad & \text{Log } Y = 1.33 - 0.59\text{log } X_3 \\
 & \qquad \qquad \qquad (0.24) \\
 R^2 = 0.74 \\
 (6) \quad & \text{Log } Y = 1.16 - 0.29\text{log } X_4 \\
 & \qquad \qquad \qquad (0.24) \\
 R^2 = 0.69
 \end{aligned}$$

Note: In all the equations above, the logarithms are taken to base e. The figures in brackets represent the standard errors of each regression coefficient. Variables Y_1 , X_1 , X_2 and X_3 are in Naira (₦) per average size of enterprise farm and X_4 is the numerical strength of family workers (men) available for farm work.

If we compare the statistical result of table 2, we find that the coefficient of $\log X_3$ in equations (1), (3), (4) and (5) is significant and negative. This means that more and more capital substitutes for less and less labour. In other words, there exists a substitution of capital for labour at a diminishing rate. The same relation could be expected of hired labour and family labour. In equation (2), the coefficient of $\log X_3$ is significant and positive, with high value of multiple correlation coefficient R^2 and the coefficient of $\log X_4$ in equation (1) is also significant and positive with 0.94 R^2 value. These indicate that the productivities of hired labour services are different from imputed family labour services. If that were not so, then the number of family workers should not have any impact on the output once the family labour services have been included in the total labour services.

However, the coefficient of $\log X_4$ in equation (6) is negative though of very weak significance and R^2 is as high as 0.69. One could interpret this as indicating a negative impact of increasing family labour on value of total farm output.

From the results of the analyses above, it could be observed that disguised underemployment and low relative productivity of family labour prevail among the small-holder food crop farmers in the study area. These observations could be the result of one or any of the following:

- (a) The number of hours reckoned with for a man-day of labour per family worker may be less than its hired labour equivalent. In other words, family labour may appear to be fully employed on subsistence farms but in the real sense, may be surplus or disguisedly unemployed.
- (b) The productivity of hired labour over a specified period of time may be higher than that of the family labour, or
- (c) The apparent productivity of capital coefficient may have included the productivity of time used by family labour in supervision and maintenance of the capital itself, thus overvaluing the real productivity of capital.

The significant co-efficient of $\log X_3$ may however indicate differences in productivity of hired and family labour services while the negative co-efficient of $\log X_4$ may indicate the situation of disguised underemployment of family labour on small-holder food crop farms. It is however interesting to note that the coefficient of $\log X_4$ in equation (1) is significant and positive though with a high standard error, the value of their services on the aggregate value of farm output as indicated the coefficient of X_3 is negative. This implies that as the family labour component of total farm labour increases, farm revenue decreases.

CONCLUSION AND IMPLICATIONS

As far as the question of employment situation is concerned the current analysis broadly indicates that disguised underemployment of labour rather than either full employment or full unemployment is peculiar with small-holder food crop farmers. Also, as the situation is tending towards a full employment one, labour is not all that surplus and an expansion of size of each enterprise farm by 50 percent of the current size could absorb all the currently "surplus" labour.

As for the productivity, the analysis indicates that hired labour services are more productive than those of imputed family labour services although the exact quantitative relationship between them is difficult to ascertain because the relative need for, and therefore the contribution by either of them vary, not only from one enterprise to another but also from one system of agriculture to another.

In order to improve the current state of under-employment and productivity of labour among small-holder farmers, the practice of sole cropping in preference to mixed cropping and an expansion of current size of farms which is achievable through an increased access to modern farm inputs and finance could serve as short-term measures while for long term, a widespread emphasis and enforcement of family planning especially in rural areas and a conscious removal of all political inhibition to labour mobility could serve as saviours. All these are however attainable through a strong political will and zeal.

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