Research Article/Araştırma Makalesi

Factors Determining Choice of Conventional Labour among Yam Producers in Benue State of Nigeria

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Abstract: The present research empirically determined the factors that influenced the choice of combined labour for efficient yam marketable surplus in by a structured Benue State of Nigeria. 2016 cropping season cross-sectional data elicited by structured questionnaire complemented with interview schedule from a total of 120 farmers chosen through a multi-stage sampling technique was used. The instruments used for data analysis were descriptive and inferential statistics. The empirical evidence showed that decision for efficient combined labour supplemented by paid labour for efficient yam marketable surplus was affected by low yam productivity and low income, which largely owed to poor proceeds from product marketing. Gender stereotypes due to culture and religious barriers affected women's access and control to productive access, thus hindering women active involvement in yam entrepreneurship as they cannot carter for paid labour. Therefore, for farmers to be able to harness combined labour efficiently for a good marketable surplus, thus better wellbeing for farmers, farmers need technical guide on potential yield; provision of buffer stocks for a remunerative price normalization; and breaking the jinx of gender inequality through tacit sensitization in the studied area.

Keywords: Labour, Choice, yam, farmers, Benue state, Nigeria

Nijerya'nın Benue Eyaletindeki Yam Üreticileri Arasında Konvansiyonel İşçi Seçimini Belirleyen Faktörler

Özet: Mevcut araştırma, Nijerya'nın Benue Eyaletinde verimli yam pazarlanabilir fazlası için birleşik emek seçimini etkileyen faktörleri ampirik olarak belirledi. Çok aşamalı bir örnekleme tekniği ile seçilen toplam 120 çiftçiden görüşme programı ile tamamlanan yapılandırılmış anket ile elde edilen 2016 mahsul sezonu kesit verileri kullanılmıştır. Veri analizi için kullanılan araçlar, tanımlayıcı ve çıkarımsal istatistiklerdi. Ampirik kanıtlar, verimli yam pazarlanabilir fazlası için ücretli emekle desteklenen verimli birleşik emek kararının, büyük ölçüde ürün pazarlamasından elde edilen düşük gelirlere borçlu olan düşük yam verimliliği ve düşük gelirden etkilendiğini gösterdi. Kültür ve dini engellerden kaynaklanan toplumsal cinsiyet klişeleri, kadınların üretken erişime erişimini ve denetimini etkileyerek, kadınların ücretli iş gücü taşıyamadıkları için yam girişimciliğine aktif olarak katılmalarını engelledi. Bu nedenle, çiftçilerin iyi bir pazarlanabilir fazlalık için birleşik emeği verimli bir şekilde kullanabilmeleri ve böylece çiftçiler için daha iyi refah için, çiftçilerin potansiyel verim konusunda teknik rehberliğe ihtiyacı vardır; ücretli bir fiyat normalizasyonu için tampon stokların sağlanması; ve incelenen alanda zımni duyarlılık yoluyla cinsiyet eşitsizliği uğursuzluğunu kırmak.

Anahtar Kelimeler: Emek, tercih, tatlı patates, çiftçiler, Benue eyaleti, Nijerya

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1. Introduction

In comparison to the developed world, agricultural production in Nigeria tends to be labour intensive. More than 90 percent of the population are small-scale farmers, farming less than two hectares, and using unpaid labour as a major agricultural labour source (Arikpo et al., 2009). One of the remote causes of the failures of past

agricultural development programmes initiated by successive Nigerian governments is our inability to develop and use the nation's manpower resources effectively and efficiently, especially in the rural sector (Bassey et al., 2014).

In order to have sustainable agricultural growth, it is important to make effective use of the fundamental factors of production, including labour, land and capital (Bervidova, 2001; Anyiro et al., 2013). Human labour stimulates other factors of production and transforms the necessary outputs into other farm inputs. The only significant labour source available to smallholder yam farmers in Nigeria is human labour (Anyiro et al., 2013).

The scarcity of farm labour had negatively impacted planting precision, improved weed control, timely harvesting and crop processing (Oluyole et al., 2011; Anyiro et al., 2013; Kadurumba et al., 2020). However, several factors have restricted the supply and use of this labour, such as decreasing share of family labour, enterprise form and nature, age at which children are considered potential labour, farm size as well as rural-urban drift, resulting in labour shortage and increasing labour wage rate in the farm sector (Bassey et al., 2014).

Ugorji (2013) noted the shortage of agricultural labour to encourage the expansion of yam farms and intensify the already chosen area for yam production in Nigeria's yam-producing regions. Empirical evidence has shown that, to the exclusion of men and women within the active working age, the available labour force consisted mostly of aged farmers. This has had a negative effect on yam productivity (Oluyole and Lawal, 2010; Kadurumba et al., 2020). Drudgery in farm activities, rural-urban migration, lack of social infrastructure in rural areas, as well as low farm income and low life expectancy in rural areas could be due to the growing absence of people under active age (Anyiro et al., 2013; Kadurumba et al., 2020).

According to Anyiro et al. (2013), farm labour supply research has shown that total labour supply depends on population size, age distribution, and institutional factors. Ajibefun et al. (2000), Anyiro et al. (2013), Kadurumba et al. (2020) reported that hired labour accounted for 88.0% of overall farm labour use, highlighting its value in agricultural activities. Family labour and exchange labour are other forms of labour that could be employed.

There has recently been a sharp decline in the supply of labour for agricultural production in the area. This is due to a number of factors, such as rural-urban migration, increased school enrolment, increased employment opportunities associated with industrialization, urbanization and increased off-farm employment. There is a great concern that agricultural growth and development could be delayed, and any attempt to reduce hunger and achieve self-sufficiency by 2050 will be a mirage because of the increased involvement of labour in off-farm activities, thus resulting in a shortage of farm labour and increasing labour wage rates. Therefore, efforts should be geared towards ensuring the effective allocation of choices and the use of the available agricultural labour force. A number of socio-economic factors decide the option of labour for crop production. Hence, knowledge of such variables must also be understood in order to be able to assess their degree of effect.

Thus, in view of the foregoing, the need to identify the idiosyncratic factors that influenced the choice of farm labour among yam farmers in Nigeria's Benue State was conceptualized as literature showed no evidence of related research in the studied area. However, the only related research focused on cassava farmers, and it was conducted in Akwa-Ibom State of Nigeria. The study's specific objectives were to describe the respondents' socio-economic characteristics; determine the factors that influenced the exclusive choice of family or hired labours; and, factors that influenced the mutual choice of family and hired labours.

2. Material and Method

With an estimated total population of 4.780.389, the study area is situated in Nigeria's North central part (NPC, 2006). The coordinates of the state are latitude 6°25ʹN and 8°8ʹN; and, longitude 7°47ʹE and 10°0ʹ E Greenwich meridian. The state has an estimated landmass of 5.09 million hectares, out of which about 3.8 million hectares are arable. The state has a tropical climate, with around 1723 mm of rainfall annually and an average temperature of 27.2°C. With more than 70 percent of the population mainly engaged in arable crop farming, agriculture is the main occupation of the natives. In contrast, others are engaged in fishing, cloth weaving, white collar work, businesses, arts and crafts, and Ayurvedic medicine.

A multi-stage sampling design was used to collect cross-sectional data from 120 selected active yam farmers. The first stage involved the convenient selection of Otukpo Local Government Area in Benue State, given that yam is produced in all the state's agricultural zones. The second stage involved a random selection of four (4) villages *viz.* Upu-Entekpa, Otada, Okpanehe and Ogodumu villages. The last stage involved the random selection of thirty (30) active yam producers from each of the selected villages, giving a total sampling size of one hundred and twenty (120) farmers. A well-structured questionnaire complemented with an interview schedule was the instrument used for data collection. The questionnaire's content validity was pre-tested in a pilot survey composed

of 20 farmers. The reliability tested result gave a Cronbach's Alpha coefficient higher than 0.60 cut-off suggested by Churchill (1979) to be appropriate for exploratory research. Therefore, the estimated value indicates the stability and consistency with which the questionnaire measures the concept and helps assess the goodness of the measure. With the aid of block extension agents, ex-post data of the 2016 yam cropping season were collected during 2016/2017. Objective I, II, and III were achieved using descriptive statistics, bivariate probit, and multinomial logit regression models.

2.1. Model specification

2.1.1. Bivariate probit model

A bivariate probit model considering the possibility of contemporaneous correlation in the decision of family and hired labours for efficiency management is given below:

$$Y_{ij} = X_{ij}\beta_j + \varepsilon_{ij} \qquad (1)$$

Where Y_{ij} $(j = 1, \ldots, m)$ represent the choice of a labour type (m=2) faced by the ith farmer (i=1,......, n), X_{ij} is a $1 \ast k$ vector of observed variables that influence the choice of a labour type. β_j is a $k \ast 1$ vector of unknown parameters to be estimated and ε_{ij} is the stochastic term. In this specification, each Y_j is a binary variable. Thus equation 1 is actually a system of m equations to be estimated:

$$Y_1^* = \alpha_1 + X\beta_1 + \varepsilon_1 \qquad (2)$$

$$Y_2^* = \alpha_2 + X\beta_2 + \varepsilon_2 \qquad (3)$$

Where Y_1^* and Y_2^* are two latent variables underlying each decision of labour type, that $Y_j = 1$, if $Y_j > 0$; otherwise 0. Y_1^* and Y_2^* are family and hired labour, respectively. The ε_{ij} of likely will experience a stochastic dependence. This dependence among the elements can be considered by assuming ε_{ij} that is multivariate normally distributed (Ullah et al., 2016). Thus, in the bivariate probit model, the stochastic term is assumed to have multivariate normal distributions with a mean equal to zero.

2.1.2. Multinomial logit model

In this case, the choice set is the possible combinations of labour type for efficient management and below is the specified model:

$$Y_i^* = \alpha + X\beta + \varepsilon_i \qquad (4)$$

$$Y_i^* = \alpha + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + X_5\beta_5 + \ldots + X_n\beta_n + \varepsilon_i \qquad (5)$$

Where: Y_i^* = represents choice of labour (1= family labour, 2= hired labour, 3= combine labour). Combine labour encompasses family and hired labour.

X_1= Profit (Naira); X_2= Total factor productivity (index); X_3= Gender (male=1, otherwise=0); X_4= Age (years); X_5= Marital status (married =1, otherwise = 0); X_6= Education (years); X_7= Household size (number); X_8= Experience (year); X_9= Operational holding (hectare); X_{10}= Farm acquisition (owned =1, otherwise =0); X_{11} = Seed variety (improved =1, local =0); X_{12}= Non-farm income (yes =1, otherwise = 0); X_{13}= Co-operative membership (yes = 1, otherwise = 0); X_{14}= Credit access (yes = 1, otherwise = 0); X_{15} = Extension visit (number); X_{16}= Income (in Naira); X_{17}= Yield (kg); β_0 = Intercept; β_{1-n} = Vector of parameters to be estimated; and, ε_i = Stochastic term.

3. Results and Discussion

3.1. Socio-economic profiles of yam farmers

A perusal of Table 1 depicted an active, economic and productive yam farming population as evident from the mean age of 50 years (SD±13.44). The implication of having an economically viable farming population would lead to a sustainable increase in yam production in the study area. This age category is expected to be more responsive to new agricultural technologies. The enterprise is dominated by male farmers (68.3%). This is connected mainly to gender stereotype due to culture, which hinders women access and control to productive resources and not the characterized laborious nature of yam production alleged by literature. People with family responsibility, i.e. married men, dominated (77.5%) yam enterprise, thus suggesting a marketable surplus-led yam production in the studied. The literacy rate among the farmers is high (85.8%), thus implying a farming population that will be receptive to yam technologies for enhanced productivity. Education serves as a vehicle or catalyst that accelerates the rate of adoption and diffusion of farm innovations-technologies. Most of the farmers maintained large household (average of 9 persons), thus an asset if composed of able-bodied people viz. access to free labour, otherwise a liability if the dependency ratio is high. A large household composed of able-bodied people will provide a farmer with free labour, which is virile, given the intensive nature of yam production. Likewise, a large household characterized by a high independency ratio stands the chance of utilizing proceeds to finance hired labour for high yam productivity. However, a large household composed of weaker people is a liability as the household head stands to contend with excessive

Table 1. Socio-economic profiles of the yam farmers

Variables	Frequency	Percentage	X ± SD	χ² test statistic
Age				
≤ 29	9	7.5		
30-39	14	11.7		
40-49	37	30.8		24.92***
50-59	34	28.3		
≥ 60	26	21.7		
Total	**120**	**100**	**50 ± 13.44**	
Gender				
Male	82	68.3		16.13***
Female	38	31.7		
Total	**120**	**100**		
Marital status				
Married	93	77.5		
Single	10	8.3		105.95***
Widower	17	14.2		
Total	**120**	**100**		
Educational level				
Informal	17	14.2		
Primary	42	20.0		13.27***
Secondary	37	35.0		
Tertiary	17	30.8		
Total	**120**	**100**		
Household size				
≤ 3	2	1.7		
4-6	23	19.2		53.00***
7-9	56	46.7		
≥ 10	39	32.5		
Total	**120**	**100**	**9 ± 4.18**	
Farming experience				
≤ 3	10	8.3		
4-6	13	10.8		166.20***
7-9	6	5.0		
≥ 10	91	75.8		
Total	**120**	**100**	**21 ± 14.01**	
Land acquisition				
Inheritance	84	70.0		
Purchase	1	0.8		
Borrowed	3	2.5		606.00***
Rent	2	1.7		
Communal land	1	0.8		
Multiple sources	29	24.2		
Total	**120**	**100**		
Extension contact				
Yes	-	-		-
No	120	100		
Total	**120**	**100**		
Co-operative membership				
Yes	15	12.5		67.50***
No	105	87.5		
Total	**120**	**100**		
Access to credit				
Yes	1	0.8		116.03***
No	119	99.2		
Total	**120**	**100**		
Non-farm activities				
Yes	77	64.2		9.63***
No	43	35.8		
Total	**120**	**100**		

Yam sett variety			
Hybrid	-	-	
Improved	97	80.8	45.63***
Local	23	19.2	
Total	**120**	**100**	
Agricultural holding			
Small scale (< 2)	4	3.3	
Medium scale (< 4)	32	26.7	82.40***
Large scale (≥ 4)	84	70.0	
Total	**120**	**100**	**7.06 ± 5.53**
Operational holding			
Small scale (< 2)	49	40.8	
Medium scale (< 4)	49	40.8	12.15***
Large scale (≥ 4)	22	18.3	
Total	**120**	**100**	**2.37 ± 1.82**
Labour source			
Family labour	22	18.3	
Hired labour	19	15.8	
Family and hired labour	72	60.0	132.75***
Family and communal	6	5.0	
Hired and communal	1	0.8	
Total	**120**	**100**	

consumption expenditure. The mean year of experience been 21 years suggests that most of the farmers had the requisite experience for managerial efficiency in yam production. Inheritance has been the predominant (70%) source of land acquisition, thus suggests the tendency of large scale, cash crop cultivation and mechanized farming to be unlikely due to susceptibility of farmlands to fragmentation, thus a threat to yam food security due to poor productivity. As household size increases, there will be more pressure on land as every adult member of the family would want to have a share of the land. The extinct of extension services delivery suggests the likelihood of innovative yam technologies been beyond the reach of the farmers. This has a far-reaching consequence on yam food security as the farmers are inundated with old farm practices. There is poor utilization of social capital due to poor participation of farmers in social organization (12.5%), thus suggesting that most of the farmers had no access to pecuniary advantages *viz*. input bulk discount, output marketing bargaining power and credit access either in cash or kind. Most of the farmers are faced with capital constraints required for efficient resource mix, as evidenced by a lack of access to credit (0.8%). Most of the farmers (64.2%) are into enterprise diversification *viz*. participation in non-farm activities as a risk coping mechanism. Despite poor access to extension service delivery, most (80.8%) of the farmers used improved variety, thus indicating globalization of a farming population with a market-led dimension. However, the preference for improved variety may be connected with past experiences. Mean farm size of 2.37 showed a pre-entrepreneurial farming population with a greater opportunity to produce beyond just mere survival. At this level, the farmers are not entrepreneurs in a true sense; neither are they truly market-oriented. The mean

agricultural holding of 7.06 hectares implies that most farmers had large agricultural holdings but cultivated yam on a small-scale, thus suggesting that most of the farmers engaged in farm diversification as a coping strategy against risk and uncertainty. A combined labour *viz*. family and hired labour is the most common kind of labour used in yam production. This may be connected to the unavoidable absence of farm family members either due to school, gainful employment and rigorous, energetic task that characterized yam operations.

3.2. Factors determining choice of family and hired labours

The significance of the Wald Chi^2 test statistic at 1% probability level indicated that the bivariate probit model best fit the specified equation, and the parameter estimates included in the model are different from zero at a 10% degree of freedom (Table 2). Therefore, it can be inferred that the chosen model is reliable for future prediction with efficiency, certainty and consistency. Besides, the LR Chi^2 test statistic being within the plausible margin of 10% implies that the response variables are dependent, i.e. correlated. Thus, it can be inferred that the decision to use one labour type will also lead to the use of the alternative.

A cursory review of the results showed total factor productivity (TFP), household size and yield to be the common variables that influenced both the decision to use family and hired labours exclusively as evidenced by their respective estimated coefficients, which were within the plausible margin of 10% probability level. The variables that exclusively influenced the decision to employ family and hired labour were education and

income; and age, gender, operational holdings, seed variety and non-farm income, respectively, as indicated by their respective parameter estimates, which were within the acceptable margin of 10% significant level.

The negative significance of TFP implied that farmers with high TFP neither use family nor hired labours exclusively, but rather both labour types were mutually employed in yam production. Poor labour productivity of family labour owing to the limitation in harnessing it efficiently as it is offered free and the need to minimize incurred cost on paid labour, thus affected the exclusive use of neither family labour nor hired labour. Thus, for a unit increase in TFP, the chance of not using family and hired labours exclusively would be 3.62 and 10.63%, respectively.

The household size coefficient's significance depicts that large households with less value for western education employed family labour, which is free. In contrast, large households with high priority for education used paid labour due to the unavoidable absence of children in school during the farm work. Also, a household composed of able-bodied men engaged in income-earning activities is likely to resort to hired labour for its farm operation. Therefore, a unit increase in a household will increase the chances of a farm family with less educational priority to use family labour by 0.17% and less likely to use hired labour by 0.52%.

The yield coefficient's positive significance revealed that high yam productivity encouraged small-scale farmers to opt for family labour as it is free with little or no cost associated. Likewise, high productivity, which translates to high-income turnover, *ceteris paribus*, encouraged

enterprise farmers to exploit paid labour for high labour productivity, thus yielding high yam marketable surplus. Thus, the chances of using family and hired labours exclusively for a unit increase in yield would be 0.005 and 0.012%, respectively. In the same vein, the probability of using family labour for a unit increase in income will be 0.59%.

The negative sign and significant of the education coefficient showed that educated farmers' are less likely to use family labour exclusively as they are entrepreneurship-focused on yam production. Also, been literate, they would not compromise their family members' education for farm work, as the school will make their children unavoidable absent for farm operations. Therefore, the probability of educated farmers not employing family labour for a unit increase in educational level will be 0.14%.

The positive sign and significant of the age coefficient implied that, because aged farmers are not energetic enough to undertake numerous difficult tasks involved in yam production due to tediousness and high energy requirement, they opted for hired labour. Also, the use of hired labour is more common among aged headed households as they have large operational holdings. Thus, the chance of using hired labour for a unit increase in age will be 0.082%.

Lack of access and control to productive resources due to gender stereotypes affected women farmers to use hired labour as indicated by the negative significance of gender coefficient. Thus, gender inequality has made women farmers to operate on the marginal farm, thereby making

Table 2. Bivariate probit regression for the choice of family and hired labours

Variable	Family labour		Hired labour	
	Coefficient	t-stat	Coefficient	t-stat
Intercept	−7.3915(3.7444)	1.974**	−10.094(6.6935)	1.508^{NS}
Profit	3.45e-7(1.19e-6)	0.289^{NS}	1.62e-6(1.73e-6)	0.936^{NS}
TFP	−3.6171(0.9905)	3.652***	−10.633(1.8237)	5.830***
Age	−0.0370(0.0272)	1.359^{NS}	0.0816(0.0431)	1.894*
Gender	0.4219(0.4098)	1.029^{NS}	−1.1292(0.5802)	1.946*
Marital status	−0.3705(0.4210)	0.880^{NS}	−0.7483(0.5468)	1.368^{NS}
Education	−0.1379(0.0492)	2.803***	0.0905(0.0840)	1.076^{NS}
Household size	0.1742(0.0679)	2.565**	−0.5209(0.1433)	3.633***
Experience	−0.0202(0.0245)	0.824^{NS}	−0.0266(0.0274)	0.969^{NS}
Operational holding	0.1035(0.2694)	0.384^{NS}	1.1940(0.4394)	2.717***
Farm acquisition	0.1621(0.4444)	0.364^{NS}	−0.5847(0.6094)	0.959^{NS}
Seed variety	1.1941(0.7747)	1.541^{NS}	1.3600(0.8160)	1.667*
Non-farm income	−0.4940(0.5198)	0.950^{NS}	2.0120(0.9147)	2.200**
Co-op. membership	−0.0624(0.6382)	0.097^{NS}	0.0621(0.7336)	0.084^{NS}
Credit access	0.1183(0.4993)	0.237^{NS}	−0.0361(0.5097)	0.070^{NS}
Extension visit	0.1435(0.4203)	0.341^{NS}	−0.5402(0.5755)	0.938^{NS}
Annual income	0.5940(0.2744)	2.165**	0.4708(0.4382)	1.074^{NS}
Yield	0.0053(0.0017)	3.153***	0.0117(0.0031)	3.703***
Wald Chi²	56.19[0.0097]***			
LR Chi²	12.26[0.0004]***			

Source: Field survey, 2017

Note: *** ** * &^{NS} imply significant at 1%, 5%, 10% & non-significant, respectively.

Figures in ( ) and [ ] are standard error and probability level, respectively

household physical energy the only accessible labour for their yam production. Therefore, the probability of a woman farmer not using hired labour will be 1.13%.

The positive sign and significant of the operational holding coefficient revealed that large scale farmers used hired labour in their yam production. The scale of production targets the markets and not only or majorly household food security, which is common among smallholder farmers. Thus, the probability of employing hired labour for a unit increase in farm size will be 1.19%. The seed variety coefficient's positive sign and being significant implied that farmers who adopted improved variety used hired labour for their yam production to maximize labour productivity to achieve the potential yield, which is indispensable to off-set incurred farm cost. Thus, the possibility of farmers who adopted improved seed variety to employ hired labour will be 1.36%. The non-farm income coefficient's positive significance revealed that farmers with a stream of incomes other than the on-farm income produced yam majorly for household food security, thus used hired labour due to labour-shift to non-farm business. Therefore, the probability of earning non-farm income will increase the chances of employing hired labour by 2.01%

3.3. Factors determining choice of combined labour

Owing to the proof of dependence between family and hired labours as evidenced by the significance of LR Chi2 statistic of Bivariate probit model, the multinomial logit regression was applied to determine the factors that influenced the choice of combined labour *viz.*family and hired labours. A perusal of Table 3 showed the

multinomial probit regression model to be fit for the specified equation as indicated by the LR Chi^2 test statistic, which is within the plausible margin of 10% degree of freedom. In addition, the significance of the LR Chi^2 test statistic implies that the estimated coefficients in the model are different from zero at the 10% probability level. The empirical evidence showed the absence of multicollinearity as indicated by the variance inflation factors of the explanatory variables within the acceptable margin of 10.0. Thus, with the foregoing proves, it can be inferred that the estimated parameters of the chosen model are reliable for prediction with accuracy and efficiency.

A cursory review of the results showed that the choice of combined labour was influenced by TFP, education, household size, operational holding, yield and annual income. The positive sign and significant of the TFP implied that farmers that achieved high TFP in resource allocation opted for combined labour so as to maintain optimum farm efficiency that translates into a high-income turnover ratio. Thus, the likelihood of using combined labour for a unit increase in TFP will be 12.67%. Apart from the entrepreneurship-focus, most highly educated farmers are gainfully employed in non-farm activities, so they are less likely to have time for farm activities, thus using combined labour to rationalize cost and maximize output as indicated by the positive sign and significant of the education coefficient. In the same vein, poor labour productivity of family labour owing to the limitation in harnessing it efficiently as it is offered free and the need to avoid high cost on paid labour, thus affecting farm optimization, made farmers to supplement the able-bodied family labour with cost-efficient paid

Table 3. Multinomial logit regression for hired and combined labours

Variable	Hired labour		Combined labour		VIF
	Coefficient	t-stat	Coefficient	t-stat	
Intercept	−14.402(12.709)	1.133[NS]	17.922(9.6988)	1.848*	
Profit	−4.09e07(2.66e-6)	0.153[NS]	−8.35e-7(3.08e-6)	0.270[NS]	8.986
TFP	−9.6884(3.1161)	3.109***	12.670(4.8857)	2.593***	4.450
Age	0.2900(0.1166)	2.487**	0.0803(0.0738)	1.089[NS]	6.539
Gender	−2.2960(1.4251)	1.611[NS]	−1.0761(1.1497)	0.936[NS]	1.456
Marital status	−2.0290(1.5481)	1.311[NS]	0.4317(0.9346)	0.462[NS]	1.350
Education	0.5295(0.2261)	2.341**	0.2884(0.1236)	2.334**	3.843
Household size	−0.8622(0.2957)	2.916***	−0.3408(0.1703)	2.002**	1.449
Experience	−0.0506(0.0779)	0.650[NS]	0.0511(0.0698)	0.731[NS]	5.749
Operational holding	1.9168(0.7934)	2.416**	−0.9428(0.4639)	2.032**	7.001
Farm acquisition	−1.4871(1.5415)	0.964[NS]	0.2594(1.1213)	0.231[NS]	1.324
Seed variety	0.3117(1.7858)	0.174[NS]	−2.5719(1.8490)	1.391[NS]	1.215
Non-farm income	3.5999(2.2174)	1.623[NS]	0.3376(1.3299)	0.253[NS]	2.437
Co-op. membership	−0.6617(2.3031)	0.287[NS]	0.0367(1.7342)	0.021[NS]	1.304
Credit access	0.8303(1.2491)	0.664[NS]	−0.1968(1.0857)	0.181[NS]	1.133
Extension visit	0.1757(1.9933)	0.088[NS]	−0.1078(0.7936)	0.135[NS]	1.144
Annual income	−0.1310(0.8523)	0.153[NS]	−1.2891(0.7834)	1.646*	1.474
Yield	0.0126(0.0062)	2.01**	−0.0205(0.0058)	3.500***	3.677
LR Chi²	120.75[0.000]***				

Source: Field survey, 2017
Note: *** ** * &[NS] imply significant at 1%, 5%, 10% and non-significant, respectively.
Figures in ( ) and [ ] are standard error and probability level, respectively. Family labour is the base outcome

labour rather than the exclusive use of one particular kind of labour in yam production. Therefore, the likelihood of employing combined labour for a unit increase in educational level will be 0.29%.

The negative sign and significant of the household size coefficient showed that large households composed of out of school members, i.e. have less priority for education, didn't opt for combined labour as it is not cost-wise efficient. Still, instead, they relied exclusively on family labour which is free and in abundance. Thus, the probability of not using combined labour for a unit increase in household size will be 0.34%. The operational holdings' negative significance implied that farmers with small operational holdings didn't opt for combined labour. This may be attributed to diseconomies of scale, and such farmers produced mainly for household consumption so as to cope with household food security and not for the market. In another vein, farmers with large operational holdings but faced with diseconomies are likely to rely on free labour *viz.* family and borrowed labours, so as to cut-cost rather than supplementing family labour with hired labour. Thus, the probability of not using combined labour for a unit increase in operational holding will be 0.94%. Likewise, the probability of smallholder farmers not choosing combined labour will be 0.94%.

The negative sign and significance of yield coefficient revealed that farmers with low yield would not prefer combined labour as it amounts to cost-inefficient to supplement free labour with paid labour. Thus, the probability of farmers with a low yield not employing combined labour will be 0.021%. The negative sign and significant of the annual income coefficient showed that farmers with low income would not prefer combined labour. They relied on social capital because they lack economic capital to improvise for paid labour as a supplement. Therefore, the probability of farmers not using combined labour if income is low will be 1.29%.

4. Conclusion

Based on the findings, it was observed that the exclusive use of either family labour or hired labour was affected by high TFP. Also, gender stereotype due to cultural factor affected women access and control to productive resources, thus hindered the use of paid labour for market-focused yam production. On the other hand, it can be inferred that high TFP that translates into high-income turnover encouraged the use of combined labour. However, poor business going concern due to poor yield and low-income level affected farmers' decision to use combined labour that is hired labour supplemented. Therefore, for farmers to be able to harness combined labour efficiently for a good marketable surplus, thus better wellbeing for farmers, farmers should be guided technically on how to achieve potential yield. Besides,

imperfections in the market due to poor remunerative price which characterized seasonal cropping need to be addressed by stakeholders *viz.* maintaining buffer stocks, thus enhancing farmers market turnover ratio. Also, gender inequality, whereby gender stereotype denied women access and control to productive resources, needs to be tackled to achieve growth and development in the studied area.

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