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Farm Level Assessment in Use of Labour-Saving Technologies on Cocoa Farms in Nigeria

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Abstract
The drudgery of farm operations on cocoa production is the bane of poor productivity and a major cause of the non-involvement of youths in the cocoa business in the country. Labour Saving Technologies (LSTs) are the devices that reduce labour input thereby reducing the energy expended and overall cost of production on cocoa among farmers along the value chain and at the same time improving production. Data were collected from the three high cocoa-producing states in Nigeria using a well-structured questionnaire; two cocoa producing Local Government Areas (LGAs) were selected per state, 120 farmers were interviewed thus making a total of 360 respondents. The major objectives of the study were to identify the existing labour-saving devices among farmers and to find the determinants of the use of LSTs among cocoa farmers. The data collected were analyzed using descriptive and inferential statistics. Results of the analysis revealed that 77.5 percent of the cocoa farm household heads were male, the mean age of the household head was 44.97 ±14.84 years, household size was 8 ±3 persons, Farm size is 5.33 ± 3.94 hectares, mean age of cocoa trees was 18.71 ±11.56 years, year of experience at 28.15 ±14.41years. Mainly 78.4 percent of the farming households use hired labour on their farms, 14.7 percent use family labour and only 56.9 percent of the farming households claim to use labour saving technologies on their farms. The majority of farmers use pump sprayers (86.5 %), motorcycles are owned by only a few 38%, and Wheelbarrows is owned by 42.3%. The regression result shows that the use of labour saving technologies is determined by access to credit, years of cocoa farming experience($p < 0.01$), access to extension services and age size of cocoa farms ($p < 0.05$)among cocoa farming households. Most of the cocoa farmers see land clearing and weeding as the most laborious and costly of all labour activities on the cocoa plantation. Labour usage on cocoa farms showed that hired labour between ages 18-30 years is mostly used on cocoa farms in Nigeria and dissociates Nigeria from the widespread understanding of child labour issues on cocoa farms. The findings call on governments to create an enabling environment to promote appropriate mechanization for small-scale farmers and suggest motorized hand grass cutters/land slather for land clearing; also suggested the fabrication of an auto bus-like dryer for drying operations which has been a problem to farmers to reduce the drudgery of cocoa production.

Keywords: Labour saving, cocoa, child labour, Nigeria

Introduction

Labour saving technologies are the devices that reduce labour input thereby reducing the energy expended and overall cost of production on cocoa among farmers along the value chain. Barrett and Browne (1994) found that women's access to labour saving technology saves time and energy which enables them to be useful in other spheres of life. There are some labour-saving devices being used by the farmers in the area of production, processing and marketing of their produce in order to reduce the cost and time spent on cocoa production along the value chain. The study identified the devices through interaction with the farmers, determines the need for the development of other labour-saving technologies to augment the existing ones, and also determined the factors that influence the use of labour saving technologies among cocoa farmers in Nigeria. The objectives are therefore to identify the existing labour-saving devices among farmers and find the determinants of the use of Labour Saving Technologies among cocoa farmers.

Methodology

In order to properly capture cocoa farmers in Nigeria, three cocoa producing states were surveyed. In each State, two cocoa producing Local Government Areas (LGAs) were selected while one hundred and twenty respondents were interviewed from each LGA selected

thus making a total of 360 respondents used for the study. The data collected were analyzed using descriptive and inferential statistics.

Results and Discussion

In Tables 1 and 2, the results show that 77.5 percent of the respondent cocoa farm household heads were male. The mean age of the household head was 44.97 ±14.84 years showing cocoa farmers are getting old and the need to encourage the youths and women into the business of cocoa. The mean household size was 8 ±3.0 persons per household this indicates a large household size in the study areas. The mean Farm size was 5.33± 3.94 hectares this shows that most of the cocoa farms are small holdings. The mean age of cocoa trees in the study areas was 18.71 ±11.56 years, indicating that there are younger cocoa trees or new planting in the study areas; the year of experience at 28.15 ±14.41years. About 72.4% of the cocoa farming household heads are married. About 38.20 percent of the household heads have secondary education. About 49.0 percent of the respondents inherited the land on which they planted cocoa, and only 59.8 percent are not members of any farmers' association or socio-economic group; the majority of those with membership belong to cooperative societies while only 10.5 percent belong to the farmers' associations. Most of the cocoa farming households in the study area practice the owner-managed system of cocoa farming (95.1 percent). Mainly 78.4 percent of the farming households use hired labour on their farms; with this figure, the farmers will be expending a fortune of the income from cocoa to maintain the farm; and of which nothing may be left for them to survive on till the next harvest season thereby exposing the households to income shock. Only 56.9 percent of the farming households claim to use labour saving technologies on their farms while the remaining 43.1percent do not use any form of labour saving techniques.

Existing devices and labour savers used on cocoa farms

From Table 3, only cutlasses, hoes, heavy sprayers, motorcycles, wheelbarrows, metal files for sharpening, bowls, baskets and go-to-hell are in use now. Which are still crude and may not be attractive to youth for considering taking up cocoa as a business. **Cutlass:** About 88.2 % of the farmers claim they use cutlass; the mean price of cutlass purchased by cocoa farmers was N731.86 ($2.044) ± 117.27. **Hoe:** Most of the farmers, 58.8% make use of hoe while about 41.2% do not use the hoe for their farm work. It is bought for the average price of N612.94 ($1.71) ±439.5 **Sprayers:** Majority of the farmers' use the sprayers (86.5 %) of which is bought at a mean price of N9, 335. 23($26.08) ± 2,925.04. The motorcycle which serves as a mode of conveyor for the farmers and their produce are owned by only a few of about 38.3% while the majorities do not have any. For those that have one, the average cost of a motorcycle is N95, 282.05($266.15) ± 10, 999.88. Wheelbarrows are meant for carrying produce and other planting materials on the cocoa farms. It is owned by 42.3% of the respondents, the mean price of a barrow is N7, 000($19.55). Most of the farmers own metal files for sharpening their cutlasses and knives, bowl for watering and other activities on the farms, baskets for transplanting, carrying pods and beans for fermentation and go-to-hell for harvesting cocoa pods. These results reveal a much higher demand for use of labour saving devices than previously found by macroeconomic analyses, and point to a problem of access rather than demand. For cocoa farming households in Nigeria, the demand is high for the labour saving devices to help improve production, reduce drudgery and increase productivity.

Cost of labour on cocoa farms

The results showed that majority of the cost on cocoa farming goes to land clearing and weeding. Land clearing is done by 80.8% of the respondents with the mean cost spent at N43, 989.13($122.87) ± 13,115.29. The farmers suggested development of hand carried mower with sharp blades to cut down shrubs and small trees which invariably will minimize the use of cutlass, time and the energy expended on the operation. Planting operations: All the respondents do planting on their cocoa farms either to gap up or rehabilitate or establish new plantations. The mean cost of planting spent by a cocoa farmer is N12, 320.75($34.41) ±2, N708.77. **Weeding:** About 53.9% do manual weeding of their cocoa farms; the average cost of weeding is N 44, 100($123.18)± 22,865. The cocoa farmers suggested that government should ensure there are no fake chemicals for cocoa in the open markets. **Herbicide use:** only 45.2 % use herbicides on cocoa farms using pump sprayers while the remaining does not use herbicides. For those that use, they spend a mean amount of N 26, 000 $72.63)±4, 663.69. **Drying:** All the respondents do drying and the majority of those involved in this operation are women. Most of them dry their cocoa after fermentation on the veranda or drying slab in front of their houses. They therefore, suggested a drying shed like an auto bus with many slabs made of tarpaulin or matting opening on each of its sides at different heights like a set of drawers whereby each drawer receives sunshine independent and undisturbed by another and can be slid under the roof after each day drying.

Labour usage on cocoa farms

Analysis of data further showed that the majority of work done on cocoa plantations in areas surveyed was done by paid hired labourers for clearing operations hired labour numbered (27) as against (5) family labour, weeding (19)against (0 zero) family labour, harvesting(10) against (6), pod breaking(10) against (4)family labour, parasite removal (8 against 2), watering and bagging (4each), all labourers were in the age range of 18-30 years. It is only for fermentation that hired labour of age group 13 to 18 years are engaged while older family labour greater than 50 years is used to support. The result of this study is in consonance with the study of Baudron *et al*. (2019) who also found in a study of the eastern and southern African regions that

the majority of farming households in the region hire labor to complete agricultural tasks and challenges the common view of Africa being dominated by family farms which, according to FAO, rely mainly on the labour of family members and that African farming households may be far more dependent on labor markets than commonly assumed and debunks the myth that child labour is widely used on cocoa farms, this report is most specific to Nigeria.

Factors influencing the use of Labour Saving Technologies among cocoa farmers

As shown in Table 4, Access to credit is significant and positive at 1 percent level of probability this result means that an increase in access to credit facilities among cocoa farmers will influence their use of labour-saving technologies. This is implied because with more credit facilities, the farmers can purchase desired equipment and machines to make their cocoa farming business less tedious to achieve, and less time consuming and this can also attract more youths, women and other people to take up cocoa farming as a business. This result corroborates other studies that reported that increased credit access enhances the adoption of new technologies such as the results of Dartanto and Nurkholis (2010) and Lawal (2016). It also implies that access to credit is paramount for the welfare, and expansion of the cocoa business because if the farmer has access to credit he can break new ground, and adopt more profit-yielding varieties and technologies(LSD) to improve his/her livelihood for better welfare. This result is also in line with the finding of Johnson (1905) who noted that the ultimate effect of labor saving is invariably to increase the real income of the working classes in this case which is the cocoa farmers. Also, cocoa farming experience is both positive and significant at 1 percent and this implies that the experience that the cocoa farmer had gathered over the years will also influence them to take up other tools and equipment that can reduce the drudgery of cocoa farming. This result is in consonance with the result of Awolala (2006). Access to extension service is significant at 5percent level of probability implying that the technical advice and demonstration of use of labour saving devices by the extension experts can positively influence the use of labour saving technologies and devices. This result corroborates the findings of Ayinde (2008) and Lawal (2016), who opined that the more the farmers have news, training and information on new technologies, or even knowledge of research results to better their production; the rate of adoption of new technologies increases.

The age of cocoa farm/ plantation has a negative influence on use of labour saving technologies, this implies that the higher the age of the cocoa farm the lesser the influence to use the labour saving technologies. This is because the canopy of the plantations would have been covered and the trees matured and may not give opportunity for ease of movement in the plantations. But the increase in use of labour saving devices may be a positive effect if the machine was meant for processing because that will increase the efficiency of the machine to reduce time spent on time consuming operations. This result also corroborates the findings of Ezeh and Ezeh (2019) and Akpoko (2007) on the factors influencing preference for Labour Saving Devices and adoption of intermediate farm tools and equipment in Semi-Arid Nigeria respectively.

Conclusion

This study used extensive field survey to illustrate current patterns of labour-use on cocoa farms. It is important to note that most of the cocoa farmers see land clearing and weeding as the most paramount of all labour on the cocoa plantation, the operations are also costly and laborious and mostly done twice yearly. The farmers still currently rely on crude tools such as cutlasses and hoes to achieve land clearing operations, only a few use the motorized equipment, few use herbicides due to paucity of funds, majority only spray fungicides and sometimes insecticideson25 litres sprayer which also is a form of drudgery to them. Labour usage on cocoa farms showed that hired labour of between ages 18-30 years are mostly used for land clearing, weeding, parasite removal, harvesting, pod breaking, bagging and transportation of cocoa beans in Nigeria and debunks the myth that child labour is widely used on cocoa farms. While on the other hand, family labour is mostly used for planting operations and fermentation. The farmers suggested the responsible use of chemicals in automatic sprayers not more than 8 litres per load as against manual weeding. The findings call on governments to create an enabling environment to promote appropriate mechanization for small-scale cocoa farmers. For land clearing, motorized hand grass cutters were suggested as against the use of heavy machinery which is not feasible in cocoa plantations. Also for drying operations which has been a problem to farmers, they have suggested the fabrication of an auto bus-like dryer which they feel will reduce their labour, help dry more beans and will be easy to manage by any member of the cocoa farming household. There is need therefore, for an automatic sprayer of not more than 8litres capacity be fabricated for the ease of chemical application on cocoa farms so that cost of hired labour can be reduced; Also that motorized hand-grass cutter be also fabricated for ease of weeding and land clearing in cocoa plantations to reduce the number and cost of hired labour used for land clearing. Also, motorized hand-grass cutters be also fabricated for ease of weeding and land clearing in cocoa plantations to reduce the number and cost of hired labour used for land clearing. Auto bus-like dryers with many drawers be fabricated for use on the cocoa estates in varying sizes depending on the level of production in such areas.

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Table 1: Socio-economic characteristics of cocoa farming households in the study area

Variables	Mean	Standard Deviation
Age	44.97	±14.84 years
Household size	8	±3.5 persons
Farm size	5.33	± 3.94 hectares
Age of cocoa trees	18.71	±11.56 years
Year of experience	28.15	±14.41years

Source: Field survey, 2018

Table 2: Frequency of Socio-economic characteristics of Cocoa farming households in the study area

Variables	Percentage	
Gender		
Male	77.5	
Female	22.5	
Marital status		
Married	72.4	
Single	14.6	
Divorced	13.0	
Educational status		
a.No formal	17.6	
b.Primary	17.6	
c.Secondary	38.2	
Land tenure system		
a.inherited	49.0	
b.land community	19.6	
c.purchased	18.7	
d.rented	12.76	
Membership of association		
Yes	59.8	(cooperative 49.3; farmers' association 10.5)
No	40.2	
System of farm management		
a.owner managed	95.1	
b.sharecropping	2.9	
c.leasehold	2.0	
Labour usage		
a. hired	78.4	
b.family	14.7	
Labour saving devices		
Yes	56.9	
No	43.1	

Source: Field survey, 2018

Table 3: Existing Devices in Use on Cocoa Farms

Devices	Yes	no	cost/unit(N)	Mean cost/unit (N)	No of units owned	lifespan(years)	No of month used	Days/month	Hr of use/day	No of labour
Cutlass	88.2%	11.8%	700(50%)	731.86±117.27	4(31.4%)	1(46.1%)	10.25±3.14	30 days (50%)	8hrs	3(29.4%)
			650 (32.4%)	2(22.5%)						
			1000 (14.7%)							
			800-900()							
Hoe	58.8%	41.2%		612.94±439.5	3	1	5 to 6	22± 2.8	5	4
Sprayer	86.5%			9, 335.23±2 924.04	2	7	6	12	7	2
Motorcycle	38.3%			95 282.05±10 999.88	1	6	8	30	5	1
Wheelbarrow	42.3%			7 000	2	3	7	30±14	4	2
Chainsaw			Rented	(Cost of Ownership is Very High)						
File										
Bowls										
Baskets										
Go- to –Hell										

Source: Field survey, 2018 ; **($1==N358)**Other suggestion: automatedPruners (in place of manually operated type)

Table 4: Factors influencing the use of Labour Saving Technologies among cocoa farmers

Explanatory Variables	Regression coefficients	T-Ratio
Age of farmer (years)	-0.221	-2.695**
Access to credit yes-1 no-0	0.878	10.288***
Cocoa farming experience(Years)	0.816	5.610***
Access to Extension ser (Yes -1 No-0)	0.258	3.497**
Age of cocoa farm (years)	-0.202	-2.812**
Size of cocoa farms(hectares)	0.816	
Intercept	-7.296***	
R	0.968	
F-Ratio	100.004***	

Source: Field Survey data, 2018
Significant at ***1%, **5% and *10%