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Research Article

Impacts of Scattered Farm Plots on Rubber Production in Edo and Delta States, Nigeria

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Abstract

Background and Objectives: There are contradictory viewpoints of impacts of scattered farm plots on agricultural productivity. On one hand, there are viewpoints which consider scattered farm plots to harm agricultural productivity. On the other hand, there are counter viewpoints which view scattered farm plots as positive situation, which allows farmers to cultivate many environmental zones, minimize production risk and optimize the schedule for cropping activities. Present study examined the causes and effects of scattered rubber farm plots on rubber productivity in Edo and Delta states of Nigeria. **Materials and Methods:** This study used data collected from 120 randomly selected rubber smallholders in Edo and Delta states of Nigeria. The data collected were analyzed using ordinary least square regression procedure and descriptive statistics. **Results:** The results revealed that risk factors such as fire outbreak, flooding and other climatic factors by rubber small holders were the main reason for cultivating more than one farm plots. In addition, population pressure was another cause of scattered farm plots. The results also indicated that the average farm size was 6 ha while the incidence of scattered farm plots was found not to be inefficient as widely assumed. This then implied that land fragmentation should not always be considered as defective. **Conclusion:** It was concluded that scattered farm plots was not as inefficient as widely assumed. Therefore, policy makers should not overlook the advantages of land fragmentation from the farmers' perspective and they should focus on whether consolidation programs lead to significant productivity that makes farmers better off or not, before issuance of policy on consolidation.

Key words: Scattered farm plots, rubber productivity, consolidation programs, agricultural productivity, land consolidation

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

The economics of all countries of the world, no matter their level of development depends on the exploitation of land resources in one form or the other. Nigeria economy is not an exception because agriculture which depend on land, occupies a key position in her economy, judging by its critical roles in employment and income generation.

Nigeria has a land mass of about 923,768 km² (approximately 92.4 million ha) of which only about 27.3% are cultivable for the production of food and tree crops, while about 38.8% consist of open woodland that can be used as grazing land and resources¹.

Scattered farm plots, in other words known as Land fragmentation is defined as the situation in which a single farm or ownership consists of numerous spatially separated plots². Likewise³, land fragmentation refers to farmers operating two or more geographically separated tracts of land, taking account of the distances between those parcels. The rationale use of agricultural land is influenced by land use limitations. One of the obstacles for agricultural development is land fragmentation^{4,5}. Dominant problem associated with land fragmentation is the small size, irregular shape and dispersion of parcels⁶. However, fragmented land with different biophysical conditions allows farmers to reduce risks such as draught, flood, fire, diversity crop mixtures and ease seasonal labour bottlenecks.

There are contradictory considerations regarding whether land fragmentation is a problem or not. Firstly, there is a view point that sees land fragmentation as a source of ineffective agriculture⁷⁻¹⁵. This view point considers land fragmentation as a major threat to efficient production system. According to this view point, land fragmentation is said to harm productivity in a number of ways: Fragmented land holdings can increase transportation costs if the plots are located far from homestead and far from each other; management, supervision and securing of scattered plots can also be more difficult, time consuming and costly, scattered plots waste land area; hindering of economics of scale and farm mechanization; finally, it discourages the development of infrastructures.

The counter view point sees land as a positive situation under which farmers can cultivate many environmental zones, minimize production risk and optimize the schedule of cropping activities². One of the benefits of land fragmentation is the variety of soil and growing conditions that reduce the risk of total crop failure by giving the farmer a variety of soil and growing conditions. Many different plots allow farmers access to land of different qualities when it comes to soil, slope, micro-climatic variations etc.

This study however, evaluated the effects of scattered farm plots on rubber productivity in Edo and Delta states of Nigeria.

MATERIALS AND METHODS

Data collection: The data used for this study were essentially from primary sources. The data were collected from 120 rubber farmers on whom well-structured personal interview schedules were administered in Edo and Delta states of Nigeria in 2018. Purposive sampling technique were used in selecting the rubber farmers based on prevalence of scattered plots of farmland. Sixty rubber farmers were randomly selected from each state making a total of 120 respondents.

Data analysis: Descriptive statistics were used to analyze the socio-economic variables of the respondents. Multiple regression techniques were also used to determine the effects of scattered farm plots on rubber production. The model was presented implicitly as follows:

$$GFI = f(TF, TP, AD, AI, FE, AF, FL, HL, \epsilon_i)$$

Where:

- GFI = Gross farm income (₦/year)
- TF = Total farm size (ha)
- TP = Total number of scattered plots cultivated
- AD = Average distance of plots from home (km)
- AI = Amount invested (₦)
- FE = Farming experience (Years)
- AF = Age of farmers (Years)
- FL = Family labour (Man days)
- HL = Hired labour (Man days)
- ϵ_i = Error term

RESULTS AND DISCUSSION

The socio-economic characteristics of the respondents were summarized in Table 1. The farmers were middle aged and had a considerable experience in rubber farming. The total size of farmland cultivated to rubber ranges from 1-8 ha with the average of about 3.2 ha. The average number of plots cultivated by the respondents was about 3. The average plot distance from home was about 6 km indicating that the plots were generally far from home. The gross farm income earned by respondents ranged between ₦280,000 and ₦1,650,000 with an average of ₦343,156.20.

Table 1: Summary statistics for the socio-economic characteristics of respondents

Parameters	Minimum	Maximum	Mean	Mode	Median
Age (years)	34	65	45.00	48.00	37.00
Farming experience (years)	8	42	13.00	13.00	11.00
Number of plots cultivated	1	5	3.00	2.00	2.00
Total farm size (ha)	1	8	3.20	3.00	3.00
Average plot distance (km)	4	10	6.00	6.00	6.00
Gross farm income (₦)	280,000.00	1,650,000.00	343,156.20	350,000.00	320,000.00

Table 2: Method of farm land acquisition and average travelling time to farm plots

Parameters	No. of respondents	Percentage
Method of land acquisition		
Purchase	18	15.0
Inheritance	54	45.0
Lease	3	31.7
Gift	10	8.33
Average distance (km)		
1-3	26	21.67
3.1-5	21	17.50
5.1-8	58	48.33
8.1-10	15	12.50

Table 3: Total number of scattered farm plots and reasons for cultivating more than one plot of farm land

Parameters	No. of Respondents	Percentage
No. of farm plots cultivated		
Only 1	32	26.67
2-3	71	59.17
4-5	14	11.67
6-7	3	2.50
>7	-	-
Reasons		
Economic	36	30.00
Social		
Traditional	18	15.0
Ego boosting	21	17.50
Environmental	45	37.50

Table 4: Regression results on the effects of scattered farm plots on rubber production

Parameters	Coefficient	t-statistics
In total farm size (ha)	0.314	2.571*
In total number of plots cultivated	0.614	2.830*
In average distance of plots from home (km)	-0.041	0.350
In average amount invested (₦)	0.421	2.614*
In farming experience (Years)	0.382	2.583*
In age of farmers (Years)	0.297	2.416*
In family labour (Man days)	-0.016	0.281
In hired labour (Man days)	0.032	0.311

R² = 0.63, Adj R² = 0.61, F = 18.24, *Significant at 5%

The frequency distribution of method of farmland acquisition by the respondents was presented in Table 2. It showed that about 45% of the respondents acquired their farm plots through inheritance while 31.7% of the respondents acquired their farm plots through lease.

The Table 2 presented the distribution of average distance travelled by farmers from homestead. The greater the

number of scattered farm plots, the greater the average distance to be travelled by the farmers. Majority of the respondents travelled about 5.1-8 km from their home to farm.

The data in Table 3 showed the distribution of total number of scattered farm plots cultivated by the respondents. Majority of the farmers (59.17%) cultivated between two and three plots of rubber farms, while 11.67% of the farmers cultivated between four and five plots of rubber farms. About 37.5% of the respondents cultivated more than one plot of farmland as a means of mitigating environmental risks such as fire outbreak, flash flood and other climatic factors.

The results on the effects of scattered farm plots on rubber production (Table 4) revealed that the regressors accounted for about 61% of the variability in the gross farm income realized by the farmers in the study area.

The data in Table 4 also revealed that the total farm size and the scattered farm plots were positively significant at 5%. This means that the rubber farmers could increase their gross farm income by cultivating more farm plots and such practices was efficient in increasing aggregate rubber production in the study area. The amount invested on the farms, farmers age and the farming experience were also significant at 5%. As the farmers age increases, the experience in the cultivation of rubber increases and this had positive effect on production and the attendant farm income. This implied that scattered farm plots should not always be considered as defective. The results was in conformity with the study of Kadigi *et al.*¹⁶, Blarel *et al.*¹⁷ and Awotide and Agboola¹⁸ which concluded that land fragmentation should not be considered as undesirable and should also not be viewed as purely originating from and/or made persistent by the influences of only a single type of factor (e.g., population density-a supply side factor) but as a result of interaction between both the supply and demand-driven factors. The results was also in conformity with the study of Gashaw *et al.*⁵ which concluded that policy makers should not overlook the advantages of land fragmentation from the farmers' perspective and they should focus on whether consolidation programs lead to significant productivity that makes farmers better off or not, before issuance of policy on consolidation. The effects of agricultural land fragmentation parameters (distance of parcels, number

of parcels owned and average size of parcels) have to be considered separately so as to take proper measure on each of them. Conversely, Obasi¹⁹, Chen *et al.*²⁰, Matchaya²¹ and Tamel²² revealed a positive relationship between land size and productivity in Nigeria

CONCLUSION

The results of the study found that there was a positive relationship between scattered plots and productivity. The three causes of scattered plots among rubber farmers in the study area were categorized into economic, social and environmental. However, environmental risks such as fire outbreak, flash flood and other climatic factors were ranked by the respondents as the most common causes of land fragmentation. This is an indication of optimizing behavior of the farmers in the study area.

SIGNIFICANCE STATEMENT

Scattered farm plots is not as inefficient as widely assumed but serve as a means of mitigating risk factors such as fire outbreak, flooding and other climatic factors. Therefore, policy makers should not overlook the advantages of land fragmentation from the farmers' perspective and they should focus on whether consolidation programs lead to significant productivity that makes farmers better off or not, before issuance of policy on consolidation. The effects of agricultural land fragmentation parameters (distance of parcels, number of parcels owned and average size of parcels) have to be considered separately so as to take proper measure on each of them.

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