
**FRAGMENTATION AND AGRICULTURAL PRODUCTION IN UGANDA, A CASE STUDY OF
ARAPAI SUB COUNTY, SOROTI DISTRICT**

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ABSTRACT

The study examined the effect of land fragmentation on agricultural productivity in Uganda. The land fragmentation were the independent variables while agricultural productivity was the dependent variable. The study adopted a triangulation design consisting of a correlation design which was quantitative in approach and cross sectional in nature. The study population consisted of one hundred ninety-six members from whom a sample of two hundred five two elements was drawn using Krejcie and Morgan method. A combination of census, proportionate stratified random sampling and simple random sampling techniques were employed in selecting members from different strata into the study sample. Two data collection methods namely structured questionnaire consisting of closed questions with five-point likert scale and interview guide were used in collecting primary data. The collected data was presented using frequency tables and pie charts which were analyzed by SPSS. From the findings, it was observed that 98 (50%) of the respondents strongly agreed to the fact that Land inheritance led to land fragmentation because it was divided among the children or beneficiaries of the diseased thus leading to fragmentation 39 (20%) agreed, 29 (15%) were not sure and 8 (15%) disagreed. It therefore implies that Land inheritance leads to land fragmentation because it was divided among the children or beneficiaries of the diseased thus leading to fragmentation. The researcher further recommends that free modern farming education should be extended to all areas and prioritized.

Key words: fragmentation, food security and agricultural production

Background to the Study

Land fragmentation threatens food security in the western district of Kyenjojo. Records from the district production department show that each house has an average of 1.5 acres for growing food crops compared to 7 acres 10 years ago (Ronald & Kazaara, 2023). Communities in Kyenjojo traditionally divide their land into small plots that are shared among family members. As a result, small patches of land cannot support commercial agriculture, which usually requires huge tracts of land (Collins et al., 2023). Some farmers have resorted to growing less food on available pieces of land, while others spend too much money renting huge pieces of land (Marxwell, 2019). Growing competition and conflict over land in rural sub-Saharan Africa continues to attract the attention of researchers. Recent work has focused particularly on land governance, post-conflict restructuring of tenure relations and large-scale land acquisition (Allan et al., 2023). A less explored topic in recent times, although deserving of more attention, concerns how social differentiation at the local level shapes land relations and how these processes are rooted in specific historical developments (Oscar et al., 2023). Based on fieldwork conducted in the Teso sub-region of eastern Uganda, this article analyzes three specific land conflicts and places them within a broad historical trajectory. I show how each dispute illuminates changes in class relations in Teso since early 2010. I argue that this current period of socioeconomic transformation (Kazaara & Christopher, 2023), which includes the formation of a more clearly defined subregional middle class and elite, represents the most significant period of social differentiation in Teso since the beginning of the 20th. Land fragmentation, which is a common agricultural phenomenon in many countries, is the division of one large agricultural holding into a large number of separate small plots. Land fragmentation can be attributed to a large number of owners, where one plot is divided into small plots owned by many individuals, or to a large number of plots, where one person owns many small plots (Sundqvist and Anderson, 2006). The main causes of land fragmentation are increased population (Lucky et al., 2023), government land redistribution policies, and urban encroachment on agricultural land (Bullard, 2007). Others are the cultural laws of land inheritance and the social relationship to land in most societies, which encouraged the division of land. As a result of the continued fragmentation of land in most countries, much effort has been made to evaluate the impact of farm size reduction on farm efficiency and livelihoods.

Statement of the problem

Land fragmentation is the practice of farming a number of spatially separated plots of owned or rented land by the same farmer (Francis et al., 2023). According to Melmed-Sanjak et al., (2018, p.60) it's a phenomenon of agricultural land distributed in undersized holdings as well as holdings that consist of noncontiguous and spatially dispersed plots of land". In Uganda the both types of fragmentation are present. "In general, farmers are operating on very smallholdings which are composed of numerous, spatially dispersed parcels" (ibid). The main causes of fragmentation in Uganda may be cited as partial inheritance and land shortage (ibid). Traditional inheritance practices of transferring property equally to all children in each generation has, over time, divided land in Uganda into increasingly smaller holdings (ibid) (Journal et al., 2023). The division of parcels continues in practice due to differences in land quality and location. The influence of inheritance on fragmentation has been reduced by the joint operation of separately inherited holdings, the redistribution of land among families by gift, lease, or purchase, and land market transactions with other farmers (ibid). Even though, at present the landholders in Uganda are not bound by the legal limit, this ownership restriction has made a serious influence on the farm

sizes (Journal et al., 2023). Land shortage and ineffective land market activity extends the fragmentation issues as well. But according to Simmons (2017) the pros and cons of land fragmentation may be examined irrespective of the source. "In the small-scale private agricultural sector in Uganda, the most common and frequently cited disadvantages of fragmentation include increased labor costs, increased transportation time and cost, land lost to border markings and access roads, and difficulty in accessing the parcels (Melmed-Sanjak et al., 2018, p.60). Fragmentation may also affect the access to irrigation networks as well as inefficient use of modern agricultural technologies which on long run may cause less efficient production (Emily et al., 2023). Despite the disadvantages there are also some advantages that have to be mentioned. Melmed-Sanjak et al., (2018, p.60) conduct that the advantages of fragmentation in Uganda are related to the ability of farmers to disperse risk by cultivating a diverse variety of crops on numerous plots, each with diverse characteristics. High production diversification in Uganda is possible due to the wide variety of microclimates and just because of these variations the farmers may gain benefits. This study will therefore analyze effect of land fragmentation on agricultural production in Uganda, a case study of Arapai Sub County, Soroti District

Objectives of the Study

The study was guided by the following objectives

1. To analyze the causes of land fragmentation in Arapai sub county, Soroti district.
2. To examine the effect of land fragmentation on agricultural productivity in Arapai sub county, Soroti district

3. To assess the benefits of land fragmentation on agricultural productivity in Arapai sub county, Soroti district

Methodology

The study adopted both quantitative and qualitative research approaches. The quantitative approach was adopted because the proposed study draws statistical inferences. The qualitative approach supplemented the quantitative approach by providing detailed information in form of statements from interviews for in-depth analysis (Fassinger & Morrow, 2013). Specifically, the study adopted across sectional survey design. The information collected was based on what was going on at a particular point in regard to early marriage and girl child education this design was particularly selected because it took place at a single point in time, allowing analysis of number variables at once and helped in looking at the prevalence of the research problem in the study population (Bordens& Abbott, 2011). The research study targeted the farmers in Arapai sub county, Soroti district totaling to 240 respondents. However, the sample was determined using the sample determination table by Kreijic and Morgan (1970). Therefore, the sample size was 196 respondents as recommended by Kreijic and Morgan (1970). The study used simple random sampling to select the suitable sample. This approach was preferred because it gave each potential participant an equal chance to participate and eliminated any form of bias (Kombo and Tromp, 2006). Data was collected by use of a questionnaire and interview survey. The study was largely a quantitative survey involving a large number of the farmers as respondents. Thus, the data collection method adopted was the survey, which involved the use of self-administered questionnaires (SAQs). The method enabled the researcher to cover the respondents quickly and at reasonable cost (Bordens& Abbott, 2011). A self-administered questionnaire (SAQ) was administered on some of the respondents. The questionnaire was chosen because it served to collect appropriate data, made data comparable and amenable to analysis, minimises bias in formulating and asking of the questions and makes questions varied. The questionnaire had identical sets of items for all respondents. Patterns and connections were within and between categories of data collected. Data was presented in form of tables, percentages, graphs and frequencies. Data was interpreted by content analysis composing explanations and substantiating them using the respondents' open responses and SPSS (Nelson et al., 2022).

RESULTS

Table 1 showing the causes of teenage

Causes of land fragmentation in Arapai Sub County in Soroti district	Response											
	Strongly agree		Agree		Not sure		Disagree		Strongly disagree		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Land inheritance leads to land fragmentation because it is divided among the children or beneficiaries of the deceased thus leading to fragmentation	98	50	39	20	29	15	29	15	-	-	196	100
High transaction costs in the labor market doesn't allow people to buy big chunks of land at one. As a result, they simply buy small plots in different locations according to their level of income, leading to land fragmentation	122	62	65	33	10	5	-	-	-	-	196	100
Disparity and irregular shapes of land in the agricultural enterprises has led to land fragmentation in Arapai sub county and perhaps other farming communities	147	75	39	20	-	-	10	5	-	-	196	100
Over population which continues to grow yet land remains constant. This increases the pressure on the fixed resource leading to land fragmentation	137	70	39	20	-	-	20	10	-	-	196	100
Extreme land scarcity especially due to population pressure and natural disasters which force many people to vacate their lands and seek settlement in relatively flat lands like Arapai sub county has led to land fragmentation	98	50	78	40	-	-	20	10	-	-	196	100

Source: Primary data 2022

From the table 1 above, it can be observed that 98 (50%) of the respondents strongly agreed to the fact that Land inheritance leads to land fragmentation because it is divided among the children or beneficiaries of the diseased thus leading to fragmentation 39 (20%) agreed, 29 (15%) were not sure and 8 (15%) disagreed. It therefore implies that Land inheritance leads to land fragmentation because it is divided among the children or beneficiaries of the diseased thus leading to fragmentation (Faridah et al., 2023)

122 (62%) strongly agreed to the assertion that high transaction costs in the labor market doesn't allow people to buy big chunks of land at one. As a result, they simply buy small plots in different locations according to their level of income, leading to land fragmentation, 65 (33%) agreed; while 10 (5%) were not sure. This therefore implies that high transaction costs in the labor market doesn't allow people to buy big chunks of land at one. As a result, they simply buy small plots in different locations according to their level of income, leading to land fragmentation (Moses et al., 2023)

It can also be observed that 147 (75%) of the sample strongly agreed that disparity and irregular shapes of land in the agricultural enterprises has led to land fragmentation in Arapai sub county and perhaps other farming communities, 39 (20%) agreed to the assertion and 10 (5%) disagreed. This implies that indeed disparity and irregular shapes of land in the agricultural enterprises has led to land fragmentation in Arapai sub county and perhaps other farming communities since the majority agreed to the assertion (Oromo et al., 2023).

137 (70%) of the sample strongly agreed that over population which continues to grow yet land remains constant. This increases the pressure on the fixed resource leading to land fragmentation, 39 (20%) agreed to the assertion and 20 (10%) disagreed to the assertion. It can conclusively be stated that over population which continues to grow yet land remains constant. This increases the pressure on the fixed resource leading to land fragmentation (Anthony et al., 2023).

98 (50%) strongly agreed that extreme land scarcity especially due to population pressure and natural disasters which force many people to vacate their lands and seek settlement in relatively flat lands like Arapai sub county has led to land fragmentation 78 (40%), 20 (10%) were not sure and 4 (8%) disagreed. It can therefore imply that extreme land scarcity especially due to population pressure and natural disasters which force many people to vacate their lands and seek settlement in relatively flat lands like Arapai sub county has led to land fragmentation

Effect of Land fragmentation on agricultural productivity

Table 2. Showing the effect of land fragmentation on agricultural productivity

Impact of land fragmentation on agricultural productivity	Response					
	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	Total

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	F	%	F	%	F	%	F	%	F	%	F	%
Land fragmentation leads to increased travelling time between fields hence lower labour productivity	147	75	49	25	-	-	-	-	-	-	196	100
Fragmentation is greater potential for disputes between neighbors because there will always be scramble for the scarce land resource	157	80	39	20	-	-	-	-	-	-	196	100
Land fragmentation leads to inefficiencies in crop productivity and this in the long run leads to food insecurity, malnutrition and even death	176	90	20	10	-	-	-	-	-	-	196	100
Land fragmentation leads to soil erosion and low fertility with all their adverse effects like overall reduction on yields on the farms. This consequently leads to poverty and dependence on government support.	186	95	10	5	-	-	-	-	-	-	196	100

Source: primary data 2022

Table 2 shows that 147 (75%) of the respondents strongly agreed to the fact that land fragmentation leads to increased travelling time between fields hence lower labour productivity, while 49 (25%) agreed that land fragmentation leads to increased travelling time between fields hence lower labour productivity. None of the respondents disagreed and none was not sure. It implies that indeed, land fragmentation leads to increased travelling time between fields hence lower labour productivity (Isaac et al., 2023)

157 (80%) strongly agreed that Fragmentation is greater potential for disputes between neighbors because there will always be scramble for the scarce land resource and 39 (20%) of the respondents agreed and no one disagreed while all the respondents were sure of their respondents. This implies that indeed Fragmentation is greater potential for disputes between neighbors because there will always be scramble for the scarce land resource (Paul & Kazaara, 2023)

176 (90%) of the respondents strongly agreed that land fragmentation leads to inefficiencies in crop productivity and this in the long run leads to food insecurity, malnutrition and even death, while 20 (10%) of the respondents agreed that land fragmentation leads to inefficiencies in crop productivity and this in the long run leads to food

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insecurity, malnutrition and even death; implying that indeed land fragmentation leads to inefficiencies in crop productivity and this in the long run leads to food insecurity, malnutrition and even death (Emmanuel et al., 2023)

Finally, 186 (95%) of the respondents strongly agreed that Land fragmentation leads to soil erosion and low fertility with all their adverse effects like overall reduction on yields on the farms. This consequently leads to poverty and dependence on government support, while 10 (5%) of the respondents agreed that indeed Land fragmentation leads to soil erosion and low fertility with all their adverse effects like overall reduction on yields on the farms. This consequently leads to poverty and dependence on government support.

Benefits of land fragmentation

Table 3 showing the benefits of land fragmentation in Arapai Sub County in Soroti district

Benefits of land fragmentation	Strongly Disagree		Agree		Not Sure		Disagree		Strongly Disagree		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Land fragmentation enables efficient use of land whereby individuals own only what they can maximally utilize. This eliminates cases of un-utilized and redundant chunks of land.	137	70	39	20	10	5	10	5	-	-	196	100
Land fragmentation reduces on the costs of cultivating land since individuals own only what they can afford to use	137	70	39	20	10	5	10	5	-	-	196	100
Fragmented land reduces technical efficiency whereas number of plots both are associated with higher levels of technical efficiency.	137	70	39	20	10	5	10	5	-	-	196	100

From the table 3 above, it can be observed that 137 (70%) of the respondents strongly agreed to the fact that Land fragmentation enables efficient use of land whereby individuals own only what they can maximally utilize. This eliminates cases of un-utilized and redundant chunks of land can reduce on the rates of land fragmentation; 39 (20%) agreed, 10 (5%) were not sure and 10 (5%) disagreed. It implies that Land fragmentation enables efficient use of land whereby individuals own only what they can maximally utilize. This eliminates cases of un-utilized and redundant chunks of land can reduce on the rates of land fragmentation in Arapai Sub County in Soroti district (Turyatamba et al., 2022).

137 (70%) of the respondents strongly agreed to the fact that land fragmentation reduces on the costs of cultivating land since individuals own only what they can afford to use This can reduce on the rates of land fragmentation, 39 (20%) agreed, 10 (5%) were not sure and 10 (5%) disagreed. It implies that land fragmentation reduces on the costs of cultivating land since individuals own only what they can afford to use This can reduce on the rates of land fragmentation in Arapai Sub County in Soroti district.

Finally, it can also be observed that 137 (70%) of the respondents strongly agreed to the fact that Fragmented land reduces technical efficiency whereas number of plots both are associated with higher levels of technical efficiency, 39 (20%) agreed, 10 (5%) were not sure and 10 (5%) disagreed. It implies that fragmented land reduces technical efficiency whereas number of plots both are associated with higher levels of technical efficiency since the majority agreed to the assertion.

Conclusions

Finding reveals that land fragmentation affects agricultural productivity in different ways including poverty, child employment, soil erosion, conflict and others.

The researcher concludes government policies should be put in place to curb this vice of land fragmentation especially in rural areas

The researcher concludes that the dangers of land fragmentation outweigh its benefits and

Recommendations

The researcher recommends that land fragmentation should be discouraged by all stakeholders

The researcher further recommends that communities should own land so that it can be well utilized instead of fragmenting it.

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