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## Land Fragmentation and Socio-Economic Wellbeing

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### Abstract

Land fragmentation results in reduced agricultural productivity, lack of efficiency, and diminished viability of the land. This study investigates land fragmentation's causes and socio-economic impacts, aiming to develop a conceptual model. Thematic analysis was employed to undertake a systematic literature review using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method. The findings indicated that land fragmentation resulted in disorganization regarding location and space. This study guides land authorities and urban planners in providing fundamental knowledge to improve land management practices.

Keywords: Land Fragmentation; Socio-Economic Wellbeing

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### 1.0 Introduction

Land fragmentation seems widespread in many countries worldwide, including China, Ukraine, Eastern, and Central Europe, Vietnam, and other developing countries, and Malaysia is not excluded. In addition, it often occurs in post-communist states due to industrialized experiences. Land fragmentation is defined as the main parcel of land consisting of a tiny and separate parcel (J. Dorosh's, 2011; Binns, 1950; King & Burton, 1982). It also has been defined as dividing land into many distinct plots (Dovring & Dovring, 1960). The distinct plots to use as a subdivision, residential development, infrastructure, expansion, and urban areas. Cities expansion always required additional development of rail construction and other types of infrastructure, consequently contributing to small plots where tiny parcels tend to create land fragmentation. Land fragmentation is vital to address as it causes lowering food productivity and simultaneously increases poverty. It has the most significant impact on agricultural land, resulting in agricultural production, the condition of the land, and disorganization in terms of location and space. This situation subsequently threatens the socio-economic wellbeing of landowners by bringing down their sense of belonging and capabilities to drive economic prosperity. In addition, land fragmentation is becoming a critical issue because it has significant implications for agricultural sustainability and the quality of life of hundreds of millions of people, particularly for small farmers who rely on agriculture for a living (Niroula, G S and Thapa G B, 2005). This plays a vital role in the increasing global population pressure and leads to higher poverty. Each country and region is considered a unique case to assess land fragmentation and its impacts depending on nature, politics, demographics, and socio-economic conditions.

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Furthermore, limited studies on land fragmentation are conducted primarily in rural areas. Hence, this study was initiated to investigate land fragmentation's causes and socio-economic impacts with the ultimate aim of developing a conceptual model. Thematic analysis was employed to undertake a systematic literature review using the PRISMA method. This study will assist land authorities and urban planners in providing fundamental knowledge to improve land management practices.

## 2.0 Literature Review

Land fragmentation is defined as the situation in which a single land consists of numerous separate plots.

### 2.1 Types of Land Fragmentation

According to Van Dijk (2003) and Demetriou, D (2014), there are four types of land fragmentation: fragmentation of land ownership, land use, internal fragmentation, and separation of ownership and use. The number of landowners who use a specific parcel is called the fragmentation of land ownership. The number of users who are also tenants of the land is referred to as land use fragmentation. Internal fragmenting emphasizes the number of parcels exploited by each user, and common aspects of parcel size, shape, and distance are often the main issues. Finally, the situation in which there is a significant difference between ownership and use is called the separation of ownership and use.

### 2.2 Problems of Land Fragmentation

The problem of land fragmentation is unique to each country and region, which exhibits certain features. It depends entirely upon the political, legislative, social, economic, natural environment, and demographic of places. Hence, there argue that land fragmentation is a problem or brings benefits. Some people perceive land fragmentation brings a positive side in which land owners can foster numerous environmental zones, minimize production risk, and enhance cropping activity schedules. However, many environmentalists recognize it brings more disadvantages resulting in environmental effects on nature and even social-economic effects on landowners. A wide range of studies supports these arguments. For instance, Volodymyr, Petro, Vyacheslav, and Sergij (2017); Latruffe and Piet (2014); Looga, Jurgenson, Sikk, Matveev, and Maasikamae (2018) recognized that land fragmentation contributes less effective and increases production costs which consequently results in a decrease in agricultural profitability and efficiency. T. Cikor et al. (2009) also added that land fragmentation is a crucial problem in Albania's agriculture. It is highlighted that land fragmentation is a small parcels of land are dispersed over a large area. Small plots of land fragmentation might cause difficulties in growing certain crops and hinder landowners from cultivating high-profit crops. This is because profitable crops such as fruit crops need larger plot of land areas (Sundqvist and Andersson, 2006). In addition, small plots of land may request additional land for walkways, roads, fences, and border building. Conflicts between neighbours could potentially arise as a result of this. This situation then impedes landowners' socioeconomic well-being by bringing down their sense of belonging and ability to drive economic prosperity. These studies, on the other hand, were primarily geographical. Although land fragmentation has benefits and drawbacks, it is noted that land fragmentation brings a significant issue in agriculture in many countries around the world. These latter aspects have yet to be addressed so far. Hence, land fragmentation must be thoroughly examined concerning the causes of land fragmentation and how it impacts landowner's socio-economic wellbeing. This study guides land authorities and urban planners in providing fundamental knowledge to improve a better land management practice with a holistic approach by incorporating socio-economic well-being.

### 2.3 Socio-Economic Wellbeing

According to Teghe and Rendell (2005), wellbeing is commonly described from the perspective of the self (of individuals), referred to subjective wellbeing, such as quality of life, happiness, and life satisfaction. Keyes (1998) defines social wellbeing as the personal evaluation of one's personal life circumstances and social functioning. It is related to developing and maintaining positive interactions with others and local and global communities. Besides that, economic wellbeing was defined as establishing a community member's through economic prosperity, stability, resilience, and good macroeconomic outcomes that allow for long-term wellbeing investments (OECD, 2019). In the socio-economic wellbeing context, the landowners play a significant role at the community levels to contribute to social and economic development by participating in income generation and unleashing the potential and vibrant land sources.

## 3.0 Methodology

Thematic analysis was used to conduct a systematic literature review using PRISMA method to establish a conceptual model. Systematic literature review was used with systematic ways to collate and synthesize findings of land fragmentation. PRISMA is a standard peer-reviewed methodology in a systematic review that employs a guideline checklist, which strictly contributes to the revision process's quality assurance and replication. A review protocol consists of formulating the research questions, the systematic searching strategies practiced (identification, screening, eligibility), the quality appraisal, data extraction, and analysis.

### 3.1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

PRISMA is a framework for conducting a systematic literature review that ensures methodological rigor and quality. The PRISMA guide, which includes a checklist and flowchart, is evidence-based. It also entails developing research questions to begin systematic research, identifying inclusion and exclusion criteria, and using an extensive database of reputable journals (M.J Page et al., 2021). In this study, PRISMA will thoroughly investigate the causes of land fragmentation and how it affects landowners' socio-economic wellbeing.

### 3.2. Formulation of Research Questions

To begin the review, establish a suitable research question that will guide the entire systematic literature methodology. Because the primary goal of this article was to conduct a systematic review of the existing literature on the causes of land fragmentation and their impacts on socio-economic wellbeing, the research question arises: what are the causes of land fragmentation, and how does it affect the socio-economic wellbeing of landowners? The socio-economic impacts concerned landowners' perspectives because land represents a right to owners and prestige; thus, land fragmentation potentially influences owners' wellbeing.

### 3.3 Systematic Searching Strategy

The searching strategy was divided into three stages: identification, screening, and eligibility.

#### 3.3.1. Identification

Identification is a process that is used to boost the main keywords that are used. This is significant because the identification process assists in obtaining more articles for their review. The related terms and synonyms for the main keywords using an online thesaurus. Table 1 shows the search string used. The search was conducted using two databases: Scopus and Web of Science. The search was carried out in January 2023. The researchers created a comprehensive search string to look for related articles in Scopus and Web of Science. In addition, the authors conducted manual searches, selecting relevant articles from Scopus and Web of Science. During this process, 1068 potential articles were identified, and 3 duplicated articles were later excluded, resulting in the 1065 remaining articles being included in the study.

Table 1. The Search String

Databases	Search String
Web of Science	((ALL=(causes of land fragmentation)) OR ALL=(factors and impacts of land fragmentation to socio-economic wellbeing)) OR ALL=(causes of land fragmentation and effects to socio-economic wellbeing)
Scopus	TITLE-ABS-KEY ("causes of land fragmentation" OR "factors and impacts of land fragmentation to socio-economic wellbeing" OR "causes of land fragmentation and effects to socio-economic wellbeing" )

(Source:) Author

#### 3.3.2. Screening

The screening process was then carried out on the 1065 articles chosen through the identification process by the researchers. The screening criteria for the process included the type of literature, language, and year of publication. Journal articles were selected as the primary type of literature for this review because they provide primary data, which is essential for a systematic review study. In addition, articles in English were mostly referred to because they would aid the authors' comprehension and understanding of the articles' content. Finally, the study chose an eight-year time frame (i.e., articles published between 2015 and 2023).

Table 2. The Inclusion and Exclusion Criteria

Criterion	Eligibility	Exclusion
Timeline	2015-2023	≤2014
Literature Type	Research Articles	Book Chapter, conference paper, book, editorial documents
Language	English	Non-English

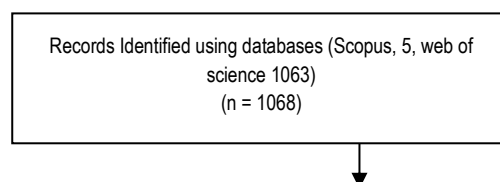
(Source:) Author

#### 3.3.3. Eligibility

The third phase of the systematic review process was concerned with eligibility. The second screening process ensured that all remaining articles from the screening process met the criteria. The articles were rechecked for suitability for the review during this process, based on title and abstract. After careful review, 1046 articles were eliminated because they did not focus on land fragmentation and socio-economic wellbeing and were published before 2015. The remaining 19 articles were then ready for quality control.

### 3.4. Appraisal of Quality

As the review relied on qualitative methods, the quality of the selected articles was evaluated by two reviewers (principal author and co-author). The clarity of the research questions, confidence in the assessment of the research question, and suitability of the thematic analysis performed to achieve the objective were used to evaluate the quality of the selected articles. Furthermore, the reviewers examined how data in the articles were interpreted and the presentation of results, discussion, and conclusion. The quality was determined based on quality control, with determining for low-quality, moderate, and high articles. The reviewers then recognized 6 articles as having high quality due to all these articles were recent and relevant publications from reputable journal databases.



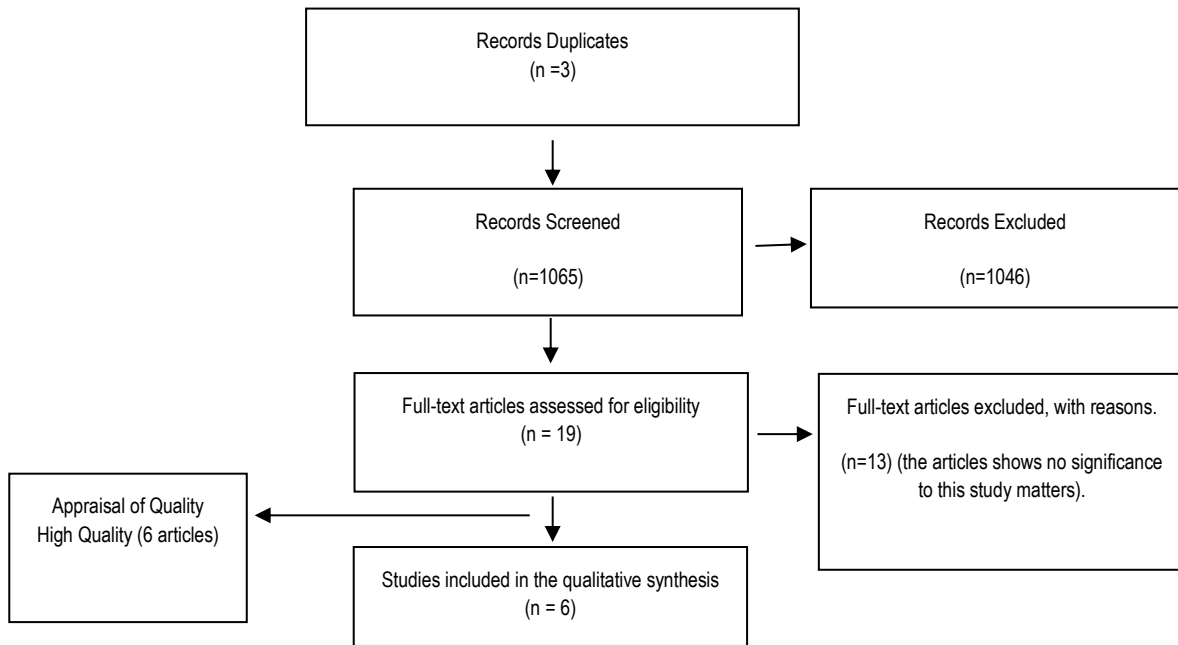


Fig 1. Flowchart selected articles through a systematic literature review (Source:) Author

### 3.5. Data Extraction and Analysis

The remaining 6 articles were evaluated and analyzed. Before proceeding to the other sections to search for related information, the authors scan the three relevant sections in these articles: the abstract, results, and discussion. All extracted data were placed in a table to facilitate the synthesis process. Land fragmentation-related themes were identified using thematic analysis. Thematic analysis is a technique for identifying, analyzing, organizing, describing, and reporting on themes found in extracted data (Braun V; Clarke V, 2006).

### 4.0 Findings

The review identified two main themes and 17 subthemes related to land fragmentation causes and its impact on socio-economic wellbeing. As previously stated, the two main themes were causes of land fragmentation (7 subthemes) and impacted socio-economic wellbeing (social wellbeing: 5 subthemes; economic wellbeing: 5 subthemes). The outcomes are shown in Table 3. The findings provide a comprehensive analysis of the causes and impact on socio-economic wellbeing of land fragmentation.

Table 3. Analysis of Literature (The Themes & Subthemes)

Author s	Types of Land Fragmentation	Causes of Land Fragmentation							Impacts: How Land Fragmentation Affected									
		FM= Food Market	LO= Land Ownership	LA= Land (including's Land Tenure)	PL=Policy	DP= Demographic Profile	RA= Risk Aversion	SE= Self Employment	Social Wellbeing					Economic Wellbeing				
									US= Unproductive Space	AP= Accessible Problems	LSR= Loss Sense Responsibility	SDT= Social Disadvantage	CF= Conflicts	US= Unproductive Space	LT= Land Tenure	LS= Land Structure	YP= Yield Productivity	LD= Land Degradation
Sklenicka, P (2016)	Fragmentation of land ownership							/	/	/	/	/				/	/	
Nthinyurwa et al (2020)								/	/		/	/	/			/		
Asiama, K et al (2019)	Internal Fragmentation & Separation of ownership and use of fragmentation			/												/		

Song, XQ (2020)			/											/				
Dogaru, D et al (2019)		/	/	/	/	/								/	/	/	/	/
Boliani, N (2017)							/	/										

(Source:) Author

The Themes and Subthemes Elaborations:

Causes of Land Fragmentation: LO = Land Ownership; LA= Land (including's Land Tenure); PL= Policy; DP=Demographic Profile, RA= Risk Aversion, FM=Food Market, SE= Self Employment

Impacts of Land Fragmentation to Social Wellbeing: US= Unproductive Space (unproductive passage); AP=Accessible Problems; LSR=Loss Sense Responsibility; SDT=Social Disruption; CF=Conflicts

Impact of Land Fragmentation to Economic Wellbeing: US=Unproductive Space (fragmented and small size farms); LT=Land Tenure; LS=Land Structure; YP=Yield Productivity; LD=Land Degradation

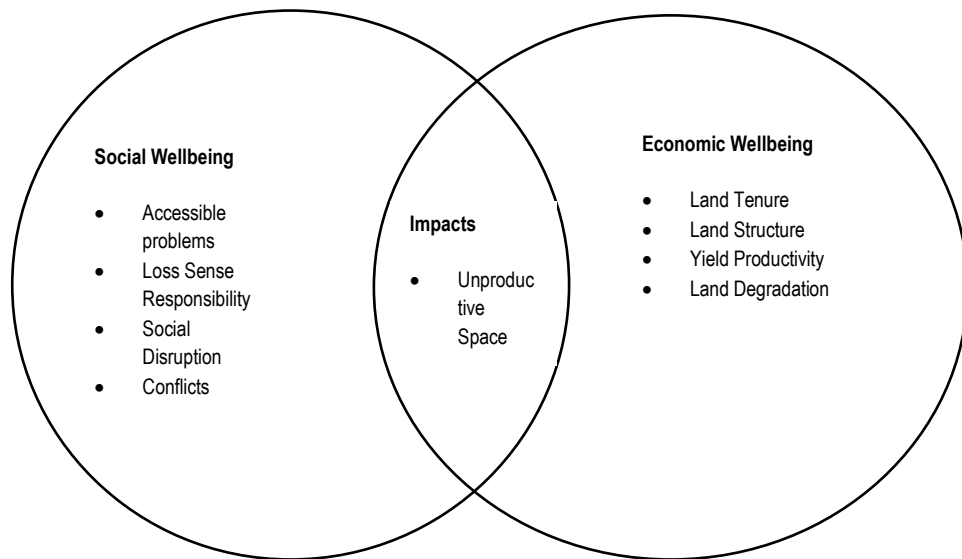


Fig 2. Conceptual Model on Socio-Economic Wellbeing Impacts of Land Fragmentation (Source:) Author

Based on Table 3, the review findings indicated that land ownership and other features of the nature of the land, such as land tenure, were the leading causes of land fragmentation. When taking into account the primary causes of ownership of parcels, which predominantly affect small plot size, types of fragmentation such as fragmentation of land ownership, internal fragmentation, and separation of ownership and use of fragmentation were found for this study. Regarding land fragmentation, the effects on social wellbeing are much less severe than those on economic wellbeing. Furthermore, as illustrated in Figure 2, land fragmentation is becoming a significant hindrance to increasing land productivity and sustainability due to the social and economic wellbeing impact provided by unproductive space. This provision poses a more significant threat due to small-scale plots and causes issues with yield productivity. On the other hand, the uneven distribution of these small lot parcels over a large area produced additional social tension issues that impacted the wellbeing of the landowners and local community.

## 5.0 Discussions

### 5.1 Causes of Land Fragmentation

Although the causes of land fragmentation differ from country to country and region to region, the primary causes of this land fragmentation are primarily due to land ownership (inheritance) and the nature of land matters (including land tenure). The nature of land for inheritance purposes often has multiple ownership. In this context, land fragmented in ownership will subdivide the holdings into

smaller portions with a single owner per plot. Consequently, the land market could be crowded with several small lot proprietors, leading to land fragmentation. This situation is unfavorable to loan financing or other investment purposes for agricultural activities.

Furthermore, land aspects (i.e., land tenure), particularly in the agricultural system of customary lands, land held was reflected in socio-cultural and spiritual bonds among generations. The primary agricultural method used on customary lands, shifting cultivation, enables plots to be cultivated one at a period, gradually resulting in land fragmentation. Other causes contributed to land fragmentation, such as agricultural policy, food demand, the demographic profile of places, risk aversion, and self-employment. For instance, a change in government policy results in a breakdown of standard property systems and could lead to land fragmentation. Meet the growing urban food demand, which is difficult with small, dispersed farms, results in less optimal productivity and shifting cultivation. This necessitates dealing with the issue of land fragmentation. Land fragmentation also depends on demographic places due to different policies, legal measures, and cultural experiences. Additionally, a small plot helps with self-employment, distributing, and lowering risk, as well as encourages to occurs land fragmentation. According to McPherson (1982), the supply-side and demand-side factors contribute to land fragmentation. Supply-side causes of land fragmentation are caused by external forces such as population growth and cultural systems and generally result in negative impacts on socio-economic. On the other hand, demand-side causes result from farmers' choices due to the positive impacts of land fragmentation (Asiama et al., 2017).

### *5.2 Impacts of Land Fragmentation of Socio-Economic Wellbeing*

In terms of impacts, economic wellbeing impacts much more affected rather than socio wellbeing impacts. These provisions threaten the plot's small size and bring problems of yield productivity. This is because small plots of land fragmentation also cause difficulties in growing certain crops, hinder landowners from cultivating a high-profit crop, and affect yield productivity. This is because profitable crops such as fruit need larger land areas (Sundqvist and Andersson, 2006). This situation then impedes landowners' socio-economic wellbeing by bringing down their sense of belonging and ability to drive economic prosperity. In addition, landowners who are farmers may suffer their yield productivity due to the ongoing fragmentation of land caused by traditional land tenure systems or the transfer of ownership through buying and selling. Due to the severe fragmentation of landholdings among household heirs, each small plot is fractured with different types of land parcels, such as irrigated and non-irrigated, with substantial effects on land degradation.

When agricultural lands were spatially distributed without first considering land management aspects, the parcels that owners received were either too small or poorly shaped. This brings further social tension problems in the accessibility of land for surrounding lots and provides unproductive passage. Even worse, the situation creates a social disruption and conflicts among neighbours and, much worse, a loss of sense of responsibility and affects land tax collection. Small land parcels are scattered across a vast area and produce unevenly ordered outcomes at various spots throughout an area is highlighted as a fundamental rural spatial problem. If the plots are located far from the house and one another, it is a waste of time for the landowners to go between them and the house. Dispersed plots can also be more challenging, expensive, and time-consuming to manage, monitor, and safeguard. Small and scattered plots lose land and demand more space to develop walkways, roads, fences, and boundary structures. As a result, disputes between neighbours may worsen. Additionally, this might make neighbour disputes more likely. The consequences of land fragmentation also lead to changes in the land structure. For instance, in the provision of irrigation system functioning.

## **6.0 Conclusion & Recommendations**

Each country and region is treated as a separate case to assess land fragmentation and its consequences. The benefits and drawbacks of land fragmentation are entirely dependent on the local economy and natural environment. Furthermore, limited studies on land fragmentation are conducted primarily in rural areas. Hence, this study was initiated to bridge the knowledge gap to investigate the causes and socio-economic impacts of land fragmentation, aiming to develop a conceptual model. Thematic analysis was employed to undertake a systematic literature review using PRISMA method. This study will assist land authorities and urban planners in providing fundamental knowledge to improve land management practices. Although the abundance of land fragmentation studies, efforts to conduct a systematic literature review of these studies still need to be made. This paper will focus on two objectives: to investigate land fragmentation's causes and analyze how it impacts socio-economic wellbeing. This is a foundation for understanding and establishing knowledge about land fragmentation. The research identified land ownership and land aspects (land tenure) are primary causes of land fragmentation. In terms of impacts, economic wellbeing impacts much more affected rather than socio wellbeing impacts. This provision significantly threatens small plot sizes and causes yield productivity issues. On the other hand, the uneven distribution of these small lot parcels created additional social tension issues that impacted the landowners' and local community's wellbeing. The research findings are based on brief reviews of the available articles; therefore, more thorough reviews are required. Extending the study to include multidimensional data sources will validate the issues. However, the brief findings will benefit sustainable land management practices and potential strategies to deal with land fragmentation. This research will help land authorities and urban planners by providing fundamental knowledge to improve land management practices. Future research could focus on possible strategies for creating efficient land management, particularly in specific regions.

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## Paper Contribution to Related Field of Study

This article seeks to fill a knowledge gap in land fragmentation. This is critical for understanding and establishing knowledge about the causes of land fragmentation and the socio-economic wellbeing impacts of land fragmentation. Furthermore, this study will aid in sustainable land management practices for land fragmentation.

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