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The Erasmus logo is a stylized, cursive script of the word "Erasmus" in black.

**Food security struggles in Rwanda:  
a case study of Land Use Consolidation policy.**

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## **Abstract**

This research paper critically examines The Land Use Consolidation (LUC) policy in Rwanda and its effects on food security, agricultural production, and farmer nutrition. It explores the goals of the policy, how it was implemented, and how it has affected the country's agricultural system. The research studies the shift from varied intercropping techniques to mono-cropping systems, analyzing the levels of food production before and after LUC. Additionally, this study looks at the impact of input subsidies and soil conservation on food security in Rwanda.

## **Relevance to Development Studies**

The Land Use Consolidation policy in Rwanda, implemented as part of the Crop Intensification Program, demonstrates a government initiative aimed at transforming the agricultural sector to alleviate poverty, enhance food security, and promote sustainable agriculture. The policy's emphasis on encouraging crop specialization and consolidating small farms has an impact on both food production and rural development. By critically examining the effects of such policies on small-scale farmers, food security, and the larger socioeconomic landscape, this study advances the field of development studies.

An in-depth analysis of food security is provided, with a focus on the fact that an increase in food production alone does not ensure food security. It draws attention to the difficulties faced by small-scale farmers who, despite making a substantial contribution to agriculture, may find it difficult to obtain a varied and nutrient-dense diet because of market dynamics and restrictions brought on by policies.

To sum up, this study adds to the field of development studies by providing an in-depth study of Rwanda's LUC policy and its varied impacts on the daily lives of farmers, agricultural practices, and food security. Comprehending these processes is essential in order to establish policies that prioritize the welfare of vulnerable populations and are in line with sustainable development goals.

## **List of Acronyms**

LUC: Land Use Consolidation

SHF: Small Holders Farmers

SPAT: Strategic Plan For Agriculture Transformation

MINAGRI: Ministry Of Agriculture And Animal Resources

NAP: National Agriculture Policy

CIP: Crop Intensification Program

LUC: Land Use Consolidation

NISR: National Institute Of Statistics

RAB: Rwanda Agricultural And Animal Resources Board

## **Keywords**

Food security, Crop intensification program (CIP), peasants, and land use.

## CHAPTER 1. INTRODUCTION

As a young woman, my first experience with this policy was when I heard that the government was violating farmers' rights, punishing them by removing crops from their land because of an abstract policy, Leaving with a lasting impression on my consciousness. I continued to think about this aspect as I progressed in my career and personal life, ultimately coming across different examples of farmer mobilization to advocate for their rights and wellbeing. This comparative perspective led me to reflect on the situation in Rwanda to collectively advocate for better policies and more rights similar to those of farmers in other countries. In the course of this exploration, I came across the LUC, the very policy that so clearly infringed upon farmer's rights but yet was claimed as a success.

Intrigued by the contradiction between the policy's apparent impact on farmers' rights and its perceived success, I embarked on a journey to understand the 'true cost' of the LUC policy. In addition to the numerical data in reports and the more general economic measures like GDP, my research aims to explore the human cost, especially among smallholder farmers. Through an examination of the complex consequences on both persons and communities, my goal is to reveal all the angles of the effects of the LUC policy and offer a thorough knowledge of how it affects the same farmers that the policy is supposed to help.

Rwanda is a landlocked country often referred to 'the country of 1000 hills' because of its scenic landscape, mainly made of high mountains with steep slopes with a population density of 525 per Km<sup>2</sup>, with 83% of the population living in rural areas, and the majority being smallholder farmers (SHF) cultivating crops on very small plots of land which are less than one hectare and surviving from mainly on subsistence rain-fed agriculture done in a very fragmented way where every farmer owns multiple scattered plots of land, and due to the difficult landscape mentioned above, the land is highly susceptible to soil erosion risking the loss of soil fertility (Nsabimana et.al., 2021). However difficult the conditions, farmers in rural areas and small-scale farmers play a big role in producing a significant portion of the national food supply. Despite the government's efforts to improve farming conditions and output with programs like the Land Use Consolidation policy in 2008, achieving food security remains a challenge in Rwanda. For a country like Rwanda, with significant portions of the population engaged in agriculture and food production, how is it that Rwanda continues to suffer high cases of malnutrition and food insecurity. How solid policies like

LUC policy realized under Crop Intensification Program (CIP), a program that was even reported to have been successfully? Well, in this study we will see what was reported as success of this policy and critically review what causes the high cases in nutrition insecurity. According to World Vision (2012), poverty is one of the main causes of food insecurity in Rwanda, which causes a significant challenge and the Rwandan food security survey indicated that ‘poor households simply cannot afford to access enough nutritious food to live a healthy active life or to invest in their livelihood’. Poor households are far more susceptible to market fluctuations and experience greater difficulty during periods of inflation and shortages. Without a financial cushion to support them during disasters like droughts, floods, sickness, crop issues or erosion hits their farm.

To address these ongoing food security issues, from 2004 to 2008 the Rwandan government has sought to stimulate agricultural transformation to boost agricultural productivity per worker, leading to more marketable surplus of farm goods (Timmer, 1988). Such a transformation seeks to move away from varied and subsistence-focused farming towards more specialized and market-driven production. In 2008, Among the agricultural transformation programs introduced by the Rwandan government during this period, the government introduced the Crop Intensification Program (CIP), part of the implementation of the Land Consolidation Policy. Aiming to change agriculture by boosting productivity and making sure Rwandese have enough food and according to Nsabimana et al. (2021) CIP sought to intensify prioritized crops, mandating each farmer in the zone cultivate one crop at a time every season (monocropping) and promoting the commercial cultivation of six key crops: maize, wheat, rice, beans, cassava, and white potato. To facilitate the transformation process from subsistence farming to commercialized agriculture, the CIP made sure farmers could get subsidies fertilizers, better types of seeds, extra help for sector agronomists through extension services, and warehousing to handle and store crops after harvest. Small and big farmers alike joined in, with specific areas focusing on growing a particular crop intensively (Nsabimana et al.2021). However, while the program experienced high rates of participation, helping to achieve the government’s objectives, with fewer land available and monocropping taking place in larger regions, rural communities have experienced less access to a diverse diet and in certain cases (malnutrition). The rapid rise in rural population has led to an increase in subsistence-oriented farming, which has in turn led to a reduction in the accessibility of farmlands. Further, the dominance of specific crops in each region leads to

over-consumption of that single crop, complicating efforts to achieve dietary balance, and hindering their ability to maintain health and activity levels. This, coupled with other implications noted in this paper, may work against food security among the large rural population.

In Rwanda, policymakers point fingers at the old-school subsistence farming method, not small land sizes, for the low productivity and the country's struggle to produce enough food to be food secure and self-sufficient (Diao et al., 2010). Therefore, the vision for agricultural transformation is not necessarily to increase the size of plots but to encourage commercial behaviour by smallholders and promote better coordination of farmers' activities at the village level regardless of the claims made by peasants who are primarily affected by this change in their day-to-day life. These commercial and economic motivations call into question the true intention of LUC. Is it really for food security? or it was for food commodification and the country's economic growth? The drive to work on this study issue comes from this question.

This research will proceed to elaborate more on who are the farmers in Rwanda and which one are we going to consider in this study. There are so many classes of farmers in Rwanda, those who own land and means of production and others who own no or little land and must work for other farmers to live. A study done in Rwanda by Illien et al. (2022) identified other labour classes in Rwanda, including workers, petty commodity producers, capitalist farmers, professionals, and retailers/traders. Workers are households that work more labour days for others than they do in their own farming. Petty commodity producers are households that work more days on their farm than the number of workdays they hire. Capitalist farmers are those who employ workers for more labour days than they work on their farms themselves. Professionals are high-skilled and have non-agricultural jobs, while retailers and traders depend largely on non-agricultural self-employment, such as selling goods in markets (Illien et al., 2022). While these definitions broadly align with the context of this research, the nature of this study will not consider how individuals with non-agricultural jobs who are not growing food/cultivate anywhere as a farmer. However, to find better research outcomes with smallholder farmers most impacted by LUC, this research will further emphasize small-scale farmers/peasants despite their labour class.



This paper will seek to study the role of this specific agrarian policy in bringing change in agricultural production, with a target to solve hunger in the country and its role in food security. Specifically, this study will show how LUC has positively affected food production through the increased food production among the six prioritized crops as well as the increase in the country's GDP. It will further analyse how the policy was structured and implemented and the differences in affecting the food varieties grown in the country as well as farmers' nutrition, particularly among small scale farmers. This paper will also research how the focus on profitmaking from food production influenced market prices, making it too expensive for small-scale farmers to afford all the varieties of food they could need. Lastly, this paper asserts that LUC has limited farmers' autonomy in choosing what they want to cultivate by having to choose among only six crops notably maize, wheat, rice, beans, cassava, and white potato.

## **1.2 Research problem**

In Rwanda, small-scale farmers, the backbone of agriculture, struggle with food insecurity and malnutrition. Poor households in Rwanda face significant challenges in acquiring adequate nutritious food to sustain a healthy and active lifestyle and allocate resources towards enhancing their livelihoods (Danso-Abbeam et al. 2021, p.1). However, the Rwandan government uses agricultural transformation to solve its chronic food security problem by increasing agricultural productivity per worker. The Rwandan Ministry of Agriculture also implemented the LUC policy as part of the Crop Intensification Program (CIP), which focuses on mono-cropping and commercializing six priority crops: maize, wheat, rice, white potato, beans, and cassava. Despite the CIP's success, Rwanda has continued to report increased rates of malnutrition and food insecurity. With this apparent contradiction in mind, this paper seeks to understand how Rwanda's policy to expand agricultural productivity has resulted in a significant gap in universal food availability while highlighting the need to address this gap for food security.

### **1.3 Relevance and justification**

LUC policy implementation is crucial given Rwanda's agricultural issues, especially during the lean season and food shortages. The lean season worsens the challenges of most Rwandan farmers, who cultivate on narrow plots of land and encounter erosion, low soil fertility, and steep slopes (Jones, Alexander, and Smith, 2018). Consequently, the farmers must purchase additional food from local markets, where prices escalate in response to increased demand. Although the LUC policy raised production, small-scale farmers' food insecurity became even more serious. Inefficient market conditions and price sensitivity make it difficult for farmers, particularly those in areas designated by LUC policies, to diversify their diets. Considering this, this study provides a critical analysis of the present challenges encountered by Rwandan farmers, highlighting the pressing need to close the gap between high agricultural production and equitable agricultural development as well as sustainable food security.

### **1.4 Background**

The LUC policy is an important policy within the larger framework of the crop intensification program (CIP) and has a significant impact on Rwanda's agricultural sector. According to Ntihinyurwa et al. (2019), the LUC policy was initially declared in 2004 but was not put into effect until 2008 by the government of Rwanda. The program is based on reversing land fragmentation. CIP is a complex program designed to increase agricultural productivity and food security in Rwanda. The LUC policy is the fundamental cornerstone reinforcing advisory services, the organized distribution of vital inputs like seeds and fertilizer, and the integration of post-harvest technology like dryers and storage facilities. This programming framework is supported by the development of infrastructure related to land-husbandry, irrigation, and mechanization. Therefore, in order to alleviate Rwanda's agricultural problems and promote sustainable self-sufficiency farming, these coordinated actions aimed to boost agricultural productivity and decrease rainfed agriculture.

## **1.5 The implementation of the LUC policy**

Consolidated land areas were carefully selected based on soil appropriateness and agroecological compatibility with the chosen crops. Aghaloo and Sharifi (2023, p.9) argued that carefully selecting consolidated land areas based on soil suitability and agroecological compatibility is vital for enhancing agricultural output and sustainability. Farmers in Musanze district had an active role in the decision-making process by having the opportunity to choose which of the six essential crops mentioned in the program to grow during each growing season. However, the implementation faced challenges such as unaffordable prices, farmers' credit, poor quality of subsidized seeds, and farmers' resistance (Bizoza, 2021). Hence, these challenges highlight the complex realities of LUC policy implementation and its effects.

## **1.6 Research objectives and Question**

Based on empirical evidence, this research has found that implementing the LUC policy was motivated by the expectation of a commercialization approach whereby farmers would generate cash from crop sales to acquire improved farm inputs. Higher revenues and market access were expected to allow farmers to acquire various nutritious foods, ensuring their food and nutrition security even as their agriculture becomes more specialized and commercial (Nandi, Nedumaran, and Padmaja, 2021). In underdeveloped markets, peasants' production and consumption have a connection; in the case of Rwanda, considering the type of crops that were given priority, with the increase in production that was claimed by many authors as we will see in the following chapters, LUC led to a rise in the consumption of roots and tubers among farmers, particularly peasants. Meanwhile, changes in relative prices account for variations in the availability of meat and dairy nutrients.

Moreover, this research objective is set to study how SHF farmers are still struggling with food security and are facing high cases of malnutrition yet remaining the primary food producers, in a country that is reporting improvement in food production over the years according to LUC policy report. Rwandan population which is now 13.24 million of people

based on the National Institute of Statistics in Rwanda report of 2022<sup>1</sup>, which means over 70% are making their living from agriculture which is estimated to be over 9 million people lives are farmers making 31% of the national GDP and 75% of the agriculture production comes from small holder farmers (RDB, 2023)<sup>2</sup>, which is a considerable measure to show that these farmers can not to be left out. Given this context and the clear relevance for the target population within Rwanda, this research's objective is to study to what extent SHF farmers are still struggling with food security and are facing high rates of malnutrition despite remaining the primary food producers, in a country that is reporting improvement in food production over the years according to LUC policy report.

The main question of this research is:

*What are the impacts of Rwanda's Land Use Consolidation Policy on food security within the country?* moving forward to find out: first, how have food availability, access, utilization, and stability been affecting farmers in rural areas and second, *what socioeconomic effects has the policy had on different groups of farmers?*

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<sup>1</sup><https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwji9dm1z4ODAxXLzwlHHTbqCscQFnoECBYQAQ&url=https%3A%2F%2Fwww.statistics.gov.rw%2Fstatistical-publications%2Fsubject%2Fpopulation-size-and-population-characteristics&usg=AOvVaw1BIUIXgxxmBhnyJPsXIBFQ&opi=89978449>

<sup>2</sup><https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEw3fnby4ODAxWHxAIHHRtzC-IQFigAegQIDRAA&url=https%3A%2F%2Frdb.rw%2Finvestment-opportunities%2Fagriculture%2F%23%3A~%3Atext%3DContact%2520Us-%2COverview%2C70%2525%2520of%2520the%2520total%2520population.&usg=AOvVaw3vLsxugxRnAqZ18addW5Sr&opi=89978449>

## CHAPTER 2: PROBLEM STATEMENT

Rwanda has a remarkable topography. Nevertheless, underneath this captivating scenery, a persistent problem has afflicted the country for many generations: the prevalent challenge of food insecurity and malnutrition. Despite the notable advancements in Rwanda's agricultural sector, a significant segment of the country's populace continues to suffer from food insecurity and malnutrition (Weatherspoon et al., 2019, p.3). Families in rural regions face the difficult challenge of ensuring access to diverse and nutritious food to fulfil their daily dietary requirements. This persistent problem hinders national progress, emphasizing the need for a comprehensive and durable solution. It becomes considerably worse since it affects children and pregnant mothers, the most vulnerable members of society (Woodhill et al. 2022, p.1109). Therefore, this issue threatens individual well-being and national potential, limiting socio-economic growth and stability.

It is vital to thoroughly examine the complex causes that contribute to the issues of food insecurity and malnutrition to tackle this persistent issue effectively. Pereira and De Oliveira (2020) asserted that agricultural production and distribution concerns socio-economic inequality, restricted educational opportunities, inadequate healthcare access, water sanitation issues, and environmental factors lead to food insecurity and malnutrition (p.3238). Addressing this issue necessitates a comprehensive approach that prioritizes the improvement of agricultural techniques and acknowledges and deals with the fundamental factors at play. Providing knowledge, resources, and sustainable farming techniques is crucial in empowering communities. Every Rwandan should also have access to food and the chance for a happier and healthier future due to investments in social infrastructure, healthcare, and education that may reduce poverty. Thus, Rwanda can only address its food insecurity and malnutrition that have hampered its progress with a comprehensive, multi-dimensional strategy.

## **2.1 Gaps between Increased Productivity and Food Security Improvement**

Rwanda's LUC policy and other agricultural measures increased agricultural production, demonstrating the nation's potential for surplus food harvests. Nevertheless, despite the rise in output, the anticipated improvements in food security did not arise (Chigbu et al. 2019, p.1354). Despite the hopeful predictions at the beginning of the policy implementation, it is evident that the accessibility of a wide range of nutritionally sufficient food options continued to pose a significant obstacle for a considerable portion of the Rwandan population. A notable divergence was brought to light by the increase in agricultural production and the persistent difficulty in obtaining a variety of food alternatives, as well as the high prevalence of malnutrition among children and women living in rural regions. The gap between increased production levels and tangible progress in the nation's dietary conditions raised doubts regarding the effectiveness of policies such as the LUC. Despite a surplus of crops, many Rwandans still experience food insecurity as a result of the LUC's failure to meet the population's diverse needs, rather than producing an abundance of nutrient-dense food.

The apparent difference between people's inability to satisfy their nutritional needs referring to the status of malnutrition reported in Rwanda and the country's increasing agricultural production draws attention to a serious problem that needs to be addressed by academics, politicians, and the agricultural community at large. According to Nilsson (2018), programs aimed at ensuring food security, such as LUC, need to enhance the amount and quality of the food supply chain (p. 1730). Crop yields alone are not the only factor to consider; there are persistent challenges in providing access to a diverse and healthful diet, which contrasts with the abundance of food production. It examines a few topics, such as cost-effectiveness, market accessibility, distribution networks, and nutritional education. thus, it is required to carefully analyze the policy frameworks and their consequences on the eating patterns, nutritional status, and food security of the Rwandan people in order to successfully reduce this gap as the country tries to make its way through it.

## **CHAPTER 3: METHODOLOGY**

### **3.1 Research Design**

A literature assessment on LUC policy in Rwanda and desk research formed the basis of this study's case-study approach. Case study research enables researchers to investigate complicated phenomena in real-life circumstances, yielding significant insights and a holistic grasp of the subject (Paparini et al. 2020, p.6). The necessity to understand the LUC policy's multifaceted implications and real-life context drove this approach. This study used a case study methodology to analyse the LUC policy and comprehend better small-scale farmers' difficulties and the factors that influence their situation. This method helped assess the impact of the LUC policy and revealed inconsistencies between policy intentions and the realities faced by Rwandan farmers. Therefore, this cohesive approach explained the LUC policy and Rwanda's food security and agricultural policies, providing an integrated overview of farming issues and food security solutions.

The utilisation of the case study approach was vital due to its distinct capacity to provide in-depth, context-specific observations crucial for accurately understanding complex occurrences. Haven and Van Grootel (2019) supposed that case studies offer a comprehensive understanding of a specific topic by examining multiple aspects over an extended duration while incorporating diverse sources of information. The case study technique allowed for an in-depth examination of Rwanda's LUC policy's details in the context of Rwandan small-scale farmers. An in-depth analysis of the LUC policy also revealed small-scale farmers' complex implementation issues, exposing their experiences, perceptions, and challenges. This methodology option generated complex and contextually diverse findings that helped enrich Rwandan agricultural policies and food security discourse. Thus, the case study method provided insight into the LUC policy's influence on Rwanda's food security, informing future policy decisions.

### 3.2 Data Collection

This research project primarily focused on analysing secondary data derived from various data sources and literature works. Olabode, Bakare, and Olateju (2018) alleged that research relies on secondary data, typically from multiple sources, to examine trends, validate findings, and make relevant conclusions while conserving resources and time (p.184). This research project relied on reports, journals, and official publications about agricultural policies, food security, and particularly those written on LUC policy. Incorporating secondary sources in this study significantly enhanced its depth by including a comprehensive historical backdrop, policy papers, and scholarly evaluations. Using secondary data analysis also allowed this research project to situate its findings into the broader framework of agricultural policy and activities aimed at enhancing food security. Therefore, this research project collected data from secondary sources and literature works.

This research project collected data by examining relevant Rwanda food security literature. Hart (2018) supposed that a research paper needs relevant literature to understand current knowledge, identify gaps, and contextualize the study in the scholarly conversation (p.8). Examining academic literature played a crucial role in clarifying the effects of policies on agricultural practices, the allocation of resources, and the overall consequences of food security. This approach combined information from various sources to identify recurring trends, obstacles, and achievements linked to the execution of the LUC policy. Through a rigorous analysis of the existing literature, this research project's objective was to provide a comprehensive knowledge of the impact of the LUC on crop yield, resource consumption, and livelihoods in Rwanda. Consequently, this comprehensive analysis of prior research served as an essential initial phase, offering valuable perspectives for policymakers, researchers, and stakeholders interested in understanding the complex mechanisms of land use consolidation and its impact on promoting strong food security in Rwanda.

Using secondary data through triangulation was fundamental to this research, enhancing its accuracy and credibility. Triangulation describes using numerous methodologies, data sources, researchers, or hypotheses to verify and validate study findings, ensuring a more complete and accurate understanding of the phenomenon (Halkias, Neubert, and Harkiolakis, 2023, p.3). This research used secondary data triangulation to cross-check information from different sources and reinforce the study's conclusions. It also combined



firsthand accounts from small-scale farmers affected by the LUC policy with scholarly analyses and government publications to provide a comprehensive and detailed understanding of its impact on Rwandan food security. This careful approach guaranteed that the research covered the depths of the LUC policy, its implementation, and the different experiences of the farmers it directly affects. Thus, this in-depth exploration added to academic discussion and had policymaker and stakeholder implications.

### **3.3 Data Analysis**

This research paper used thematic qualitative analysis to explore the narratives and perspectives of small-scale farmers affected by the LUC policy. Castleberry and Nolen (2018, p. 807) asserted that thematic analysis finds patterns, themes, and insights in interview responses, aiming to provide a comprehensive knowledge of the farmers' struggles, desires, and coping mechanisms in the face of policy implementation by categorising the qualitative data and general themes. A thematic analysis of relevant material was also essential to understanding Rwanda's food security, particularly the LUC. Analysing several literary sources allowed for identifying recurring themes, patterns, and significant insights. Hence, a qualitative analysis of the relevant literature offered depth and context to the research endeavour and showed how the LUC policy affects Rwandan small-scale farmers.

Data interpretation relied heavily on comparative analyses, allowing for a deep examination of differences between expected outcomes and the experiences observed from analysing relevant literature. Comparative analysis enables researchers to identify and examine patterns, disparities, and interrelationships among variables (Greckhamer et al. 2018, p.484). This comparative approach provided a critical perspective, which helped in recognizing significant differences and enhanced understanding of the complex nature of the subject matter. This research project also used triangulation to cross-check data sources to strengthen the research's trustworthiness. Therefore, this research used these interpretative techniques to demonstrate the LUC policy's complex implications and contribute to agricultural policy and food security discussions. This study was done carefully considering the ethics of an academic research and very conscious of the sensibility the critics might have in studying and analysing a policy that was implemented by the Government of Rwanda for education purposes.



## **CHAPTER 4: FINDINGS AND ANALYSIS**

### **4.1. INTRODUCTION**

An initial focus of this research studied what the LUC policy intended to accomplish, why the policy existed, and how the government structured such policy. This research also enquired about the policy's targets and the expected results. This gave way to presenting the critique of the LUC policy that was obtained from different literature reviews on what the policy ended up accomplishing as well as from discussions of the different effects it had especially on food security in Rwanda regarding peasants.

The study will proceed by showing the status of food production in Rwanda before and after the implementation of LUC, which will lead us to examine what food security is and why increasing food production in a country is not enough to confirm food security in the case of Rwanda. In this chapter, this research will show how LUC policy affected the status of food security and how it has changed farmers' nutrition through unregulated food prices on the markets as well as their autonomy to choose what to grow in their farms.

### **4.2. Land Use Consolidation policy implementation**

Food insecurity is a widespread problem that affects millions of people worldwide (Wudil et al, 2022). As populations increase, countries seek solutions and implement policies to ensure people have adequate access to nutritious food. In Rwanda, hunger is increasing due to a variety of factors including the reduction in farmland and rapid population growth, however, the Ministry of Agriculture has made progress in recent years to improve food security. Through initiatives such as the Crop Intensification program (CIP), agricultural productivity has increased. Policies such as land use consolidation (LUC) have made it easier to optimize productivity and increase yield all around the country, with the intention of reducing food insecurity (Kathiresan, 2012). Although there have been some significant changes post-implementation, there are still areas for improvement in agrarian policies.

Rapid population growth in Rwanda is a leading cause of pressure on land; therefore, land management is necessary to transform the agrarian sector. Looking at how the culture influences land fragmentation in Rwanda, where you find parents owning big land but will have to divide the land into pieces/small plots to give to their children through inheritance which (Nsabimana et al., 2023) claimed that land fragmentation due to excessive parceling out of family agricultural land mostly done in a way of giving inheritance with rapid population growth hinders efficient land use which affects food security and reported that the country registers an average annual population growth of 2.5 percent, which is pretty fast. Eighty percent of Rwanda's population resides in rural areas with land holdings smaller than one hectare (Nilsson, 2018). 26 percent of household farms are less than 0.2 Hectares in size, with an average plot size of 0.75 Hectares (Ndushabandi et al., 2018). Most of the farming done is predominantly for household consumption as the typical Chayanovian characteristic of peasant's economy.

In 2008, the Rwanda Agricultural Board (RAB) implemented land use consolidation (LUC) policy as part of the Crop Intensification Program, which was to coordinate farming activities while retaining their individual property rights. Since 2008 land use consolidation was claimed to increase significantly from approximately 28,000 Hectares to 503,000 Hectares in 2011 and 600,000 hectares by 2016 as more farmers appreciated the benefits of land consolidation (Kathiresan, 2012). The introduction of the policy was mainly to encourage the transformation of the agriculture sector from subsistence through cooperative farming.

The Land Use Consolidation policy aims at improving food and nutrition security in the short term. The long-term goal is poverty and hunger mitigation in Rwanda. Some other objectives of the land use consolidation policy included crop specialization, increasing the country's Gross Domestic Product (GDP) through commercialization of farm produce, food self-sufficiency, and sustainable agriculture (Ndushabandi et al., 2018). Agriculture contributes approximately 33 percent of Rwanda's Gross Domestic Product (GDP) (Ndushabandi et al., 2018) but many small farm holdings resulted in farmers growing crops for their consumption rather than commercialization. Therefore, the agricultural sector declined as the land potential was not utilized. Additionally, Rwanda imports large quantities of food, such as rice, which can be grown locally, leading to the country's failure to be self-

sufficient (Prete et al., 2019). The land use consolidation policy encouraged better agricultural practices, increasing food and nutrition security outcomes.

Although the perception of the policy was primarily positive, it was not welcomed by all farmers, leading to limited participation in the beginning. A survey carried out after the implementation indicated that approximately 45 percent of farmers resisted the policy after its implementation (Knox, 2016). Additionally, roughly 65 percent of farmers participating in LUC stated they were "very satisfied," and 10 percent claimed to be unsatisfied (Knox, 2016). Approximately 24 percent had a neutral view of the policy (Knox, 2016). Land use consolidation impacted agricultural production outcomes in several ways, including increased crop yield, especially maize, increased fertilizer used, efficient delivery of inputs, post-harvest handling and storage, and efficient land use. Approximately 69 percent of farmers reported timely delivery of fertilizers for farming (Knox, 2016). In less than a decade, maize production tripled, and the yield of Irish potatoes, beans, and soybeans doubled (Weatherspoon et al., 2019). There was an increase in food production all around the country, and farmers had a surplus for sale. Fertilizer application increased from 4kg/hectare to 30kg/hectare (Weatherspoon et al., 2019). However, some farmers expressed they lacked access to post-harvest storage and farm fertilizers (Muyombano & Espling, 2020). The seeds provided were of poor quality, which later improved (Muyombano & Espling, 2020). Additionally, there were delays in the delivery of maize seeds, resulting in late planting during the agricultural season (Muyombano & Espling, 2020).

#### **4.2.1. Why did the LUC policy generate resistance from farmers?**

During the implementation of LUC policy, which Muyombano & Espling (2020) described very clearly, all farmers in specified Land Use Consolidation zones, were required to cultivate a single crop variety at a time, without combining them. Each farmer cultivated and took care of their own plot even if they had to consolidate, they were supposed to cultivate jointly the chosen crop. The literature claims that this was not a consolidation of the land but of the use of the land as they kept the ownership of the land by they had to jointly use their land the same way 'land use'. The farmers followed the sector agronomists' instructions to the letter on when to start planting and when to harvest and harvesting before to the specified time was prohibited. In addition to that, they claim that some farmers were reluctant, especially smallholder farmers, who had no other choice than to join a program

that required them to cultivate their land jointly with other farmers and grow one crop, even if the intentions of the program were good. For SHF growing one selected crop on their plot of land, the policy meant using 100% of their asset to grow one crop variety and they did not have anywhere else to grow unselected crops for their families, risking their family's food security. These farmers during a collective interview expressed their consent and resistance but claimed that they felt powerless and their right to grow what they wanted on their own was stripped out of their hands by this policy. "We wanted to rotate between potatoes and sorghum. But the government authorities told us that the decision was made to plant beans and maize. There is nothing more left for us to do. We don't have the rights to choose what to cultivate on our property" (Interview with the group, Kimonyi, 2013) (Muyombano & Espling (2020, p.6).

### **4.3. Impact of LUC on food production (dynamics of production before and after LUC)**

#### **4.3.1. Monocropping and the increase in food production**

According to (FAO, 2022) "Agricultural production refers to planting, growing, and harvesting crops to produce foods fit for human consumption. It also entails rearing livestock to produce different goods. When agricultural production is well managed, yields are optimized, ensuring food security. 'Yield' refers to how much agricultural product is harvested from a plot of land during the growing season Depending on the crop and local practices, yield is usually measured in units such as kilograms, tons, and liters"

Farmers in Rwanda valued the ability to grow various crops in different locations. Before LUC, many farmers opted for diversification since it was a risk management strategy (Muhinda & Dusengemungu, n.d). Planting different crops ensured that the risk was spread in case of failure of one crop due to pests and diseases or low market prices (Muhinda & Dusengemungu, n.d). Different plants have different growing rates, influencing farmers' plant combinations. Farmers ensured at least one harvest that provided a good yield and income to pay for school fees and feed their families by inter-cropping (Muyombano & Espling, 2020). As a result, farmers had intercropping combinations like maize and beans or bananas and beans (Muyombano & Espling, 2020). For example, in areas like Muko, farmers preferred sorghum to maize since it grew faster. However, due to inefficiencies in planting,

weeding, and harvesting different plots, most firms did not experience high farm output, resulting in food production for their consumption.

The land use consolidation policy in Rwanda focuses on crop specialization. The priority crops planted on consolidated land include soybean, banana, beans, maize, wheat, rice, cassava, and Irish potatoes (Muhinda & Dusengemungu, n.d). The primary crop grown in different districts was chosen based on local agroecological factors such as climate, soil quality, and natural disasters. However, yield increase did not happen to all farmers. Most farmers have reported increased yields, while approximately 19 percent indicated lower yields (Knox, 2016). Maize was the most common crop grown by 71 percent of the farmers (Muhinda & Dusengemungu, n.d). Rice was the least-grown crop across all districts due to inaccessibility to improved seeds and lack of rice milling services (Muhinda & Dusengemungu, 2013). After LUC policy ensured mono-cropping systems and better agricultural practices such as pest and disease management and specialization, enabling farmers to become more knowledgeable through training, resulting in higher yields. Farming shifted from subsistence to market-oriented due to surplus after huge harvests.

#### **4.3.2. The role of inputs and subsidies**

Poverty is prevalent in many rural areas of Rwanda. As a result, most farmers cannot afford agricultural inputs like high-quality seeds and chemical fertilizers for better quality and quantity of produce (Muyombano & Espling, 2020). Since some farmers could not purchase fertilizers, especially small-scale farmers or poor farmers reported difficulties in purchasing fertilizers their production outputs varied widely (Muyombano & Espling, 2020). Joining the LUC program ensured farmers could access the inputs which was to help increase food production. A subsidized voucher system was used, and only farmers who were part of the Land use consolidation program were given improved seeds and fertilizers (Ndushabandi et al., 2018). Through this subsidy system, half the cost of inputs was paid by the government and half by the farmers (Muyombano & Espling, 2020). Although this program aimed to cheapen the cost of inputs, some farmers still found the fertilizers too expensive and used their organic fertilizers instead. Other farmers were skeptical about using chemical fertilizers (Muyombano & Espling, 2020). Additionally, some farmers used their produce seeds rather than getting subsidized ones. Sixty-five percent of farmers obtained seeds from government-subsidized sources, while 11.2 percent used their own produced seeds (Ndushabandi et al.,

2018). Although there was some resistance from some farmers, other farmers received the program quite positively. Over the years, farmers improved their perception of fertilizers as the yield improved. A survey in different districts showed that approximately 97 % of farmers use organic fertilizers, while 87% use inorganic or chemical fertilizers. Combining the two fertilizer types resulted in high volume yields (Ndushabandi et al., 2018). After the implementation of Land Use consolidation, the input use in Rwanda increased from 4kg/hectare to 30kg/ hectare (Ndushabandi et al., 2018). As a result, production amount and quality trends have been very positive.

There was a significant increase in maize, Irish potatoes, and beans production. Research shows one percent increase in total fertilizer leads to a 0.35 percent increase in total output (Ndushabandi et al., 2018). The relationship between crop output and fertilizer use was 2.85 to 1, meaning that 2.85 tones of fertilizer were required to increase crop yield by a ton (Nsabimana et al., 2023). One percent increase in fertilizer resulted in a 0.18 percent increase in beans output, a 0.14 percent increase in rice, and a 0.8 percent increase in maize output (Nilsson, 2018). Small firm holdings experience soil fertility depletion due to continuous cultivation without nutrient replacement (Nsabimana et al., 2023). The land use consolidation program enabled fertilizer application, which improved the productivity of the soils, causing high quality and quantity of yields. According to Nilson (2019), who studied the impact of LUC on agricultural productivity, LUC has indeed had a positive influence on crop yield, but only among households with large farms, indicating that not all farmers were affected equally (Nsabimana,2023. P.2). the research finds that the bourgeois or big farmers benefited more since they could own the means of production and could afford inputs easily than the proletariat who had to struggle to afford inputs since they are subsidized but not totally free.

### **4.3. 3. Efficient land use**

Poor agricultural performance in Rwanda is a result of many factors, such as land scarcity as the population rises and poor land optimization. The average land holding in the country is below 0.7 Hectares, which holds back large farm outputs (Nilsson, 2018). Fragmented land limits agricultural productivity since modern mechanization cannot be implemented like in large, consolidated farms. Most farmers had their small land holdings in steep areas, leading to soil degradation through erosion (Nilsson, 2018). It was economical for farmers to implement some soil management techniques, such as terracing, due to the size of the land,



which left the land unproductive with minimal yield. Additionally, small landholding farmers depend on rain and are susceptible to climate change, such as prolonged drought (Ndushabandi et al., 2018). Erratic rainfall hits small-hold land farmers especially hard compared to consolidated farms with irrigation systems. As a result, land fragmentation led to very low yields and heightened food insecurity.

Implementing land consolidation led to larger farm sizes that could be used efficiently. At the beginning of the land consolidation program, only 5% (28,000 hectares) of the agricultural land in the country was involved, and the percentage grew to 40% (600,000 hectares) by 2016 as more farmers appreciated the benefits of consolidation (Ndushabandi et al., 2018). The Crop Intensification Program (CIP) was implemented to increase access to productive inputs, post-harvest handling, and improve land use intensification (Ndushabandi et al., 2018). Participating farmers coordinated the planting and harvesting and were offered extension services like storage facilities.

The coordination of farming activities under CIP ensured more productivity among farmers, resulting in better land use. As a result, food production increased with larger farm sizes, and post-harvest storage ensured food security for farmers and the country. There was a significant disparity in maize and beans yield between intensive and non-intensive mono-cropped areas in Rwanda. Farms in intensive areas produced triple the amount of beans and double the amount of maize as those in intensive-cropped areas (Nsabimana et al., 2023). However, the program's success does not substantiate food security in the country.

#### **4.3.4.LUC impact on soil conservation**

The CIP program encouraged soil conservation practices to reduce soil erosion and ensure soil fertility in consolidated farms. Soil conservation is essential to promoting food security. Before LUC implementation, most Rwandan farmers had small farms, often on steep slopes prone to erosion, leaving some farms unproductive. Farmers practiced intense intercropping, and the soil became nutrient-depleted (Nilsson, 2018). As a result, farmers had low food output that was mainly for their consumption. After the implementation of LUC, there was an increase in the use of soil fertilizers in different regions, which promoted soil fertility, and as a result, crop yields increased. It was more difficult and uneconomical to implement erosion control measures in fragmented land (Cantore, 2016). The larger size of

consolidated land made it easier to practice different types of planting to reduce run-off soil erosion, so it is claimed that these soil conservation practices lead to increased yield.

#### 4.4. FOOD SECURITY.

The concept of food security refers to people having consistent physical and financial access to enough nutritious and safe food to satisfy their dietary needs for a healthy and active existence without facing hunger or the fear of starvation according to World food summit FAO declared definition in 1996 (Pinstrup-Andersen,2009). Nearly 20 percent of the population in Rwanda is food insecure (Weatherspoon et al, 2019). Additionally, Rwanda spends approximately 820 million dollars dealing with the effects of hunger and malnutrition (Weatherspoon et al., 2019). Food security entails more than food production. It involves ensuring food availability, access, stability, nutritional adequacy, and safety.

##### 4.4.1. Food security before and after LUC policy.

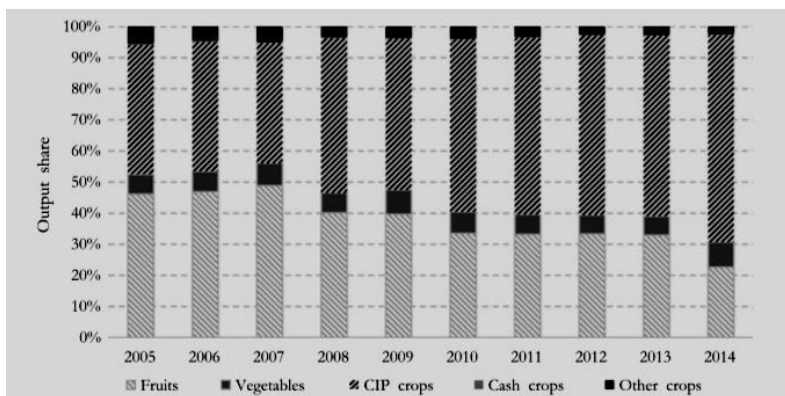


Fig. 1. Rwanda status of crop production 2005–2014 based on FAOstat data reported by Del Prete et al (2029). Output share is the metric tons (mt) produced as a share of total production”(Del Prete et al, 2019.p.141).

Figure 1 illustrates the growth of crops under CIP throughout the years. Before CIP, these crops were around 50% of what Rwanda was growing. After the policy rolled out, by 2014, they shot up to 70% of the total crops, indicating a big impact on boosting food availability. The study found a noticeable increase in eating roots and tubers. On the flip side, the authors noted a downside, saying they saw a drop in the consumption of meat, fish, and fruits (Del Prete et al., 2019).

	2006	2009	2012	2015
Food Secure (%)	65.4	78.5	79.0	74.0
Moderately food insecure (%)	27.9	17.3	17.0	19.0
Severely food insecure (%)	6.7	4.2	4.0	7.0

Table 1: Food Security Status in Rwandan Households, 2006-15 (Del Prete et al., 2019, p. 5).

This research could only use data from 2015 as food security measures after the implementation of the policy as demonstrated in Table (1) where we find an inverse in increase of food security among households that were food secure before the policy and a decrease in households that were moderately food secure and an increasing percentage of those who were severely food insecure.

Food security implies that there is physical and financial access to food. Although food production can be high, such food can be inaccessible to most of the population due to high price. Food price controls usually favor middle to high-income households, neglecting rural low-income farmers (Weatherspoon et al., 2019). Before LUC, most farmers struggled to get their produce to markets, affecting their income. As a result, most farmers could barely afford to purchase food at the market prices. Farmers opted to plant their food, which was not sustainable, and risks such as drought or any other climate change like a lot of rain or delays in rain patterns, floods left many starving. Plus, a small scare farmer can rarely produce everything they need as food. There is always a need for a small trade. For that, more infrastructure was built within the implementation of the crop intensification program, more farmers could get their produce to the market, increasing their profits (Prete et al., 2019), on this point intercropping on a small plot of land which was practically done by poor farmers was not the most sustainable agricultural practice to do either.

Before the implementation of LUC, farmers were mainly planting for their consumption. The smallholder farms did not require much training to maintain their farms since the food production was not too large. However during the implementation of this policy, farmers had to be trained in different areas, influencing farm output. There was a

drastic increase in farm outputs for different crops like maize and beans which was due to the use of inputs such as chemical fertilizers which was also subsidized as part of the program and good agricultural practice as well. Farmers receive training based on the type of crop they are growing, ensuring the success of mono-cropping hence increasing the productivity (Nilsson, 2018). This asserts that now farmers are growing food not just for consumption, but they can also take it to the market, to trade and get money to buy other commodities which will include other food varieties as well. After executing this policy into action, in different areas and times, the literature shows that farmers generally had more crops after harvest. According to a report from USAID in 2014, those in CIP regions had a higher yield per hectare compared to farmers outside of CIP. This was a win because boosting agricultural production was a key aim of the policy.

#### **4.5. Impact of LUC on food security and farmers' nutrition**

We are going to look at how the LUC policy, provided food availability in different regions, but limited farmers' access to a variety of nutritious food through monocropping. Land Use Consolidation has increased agricultural productivity in Rwanda, especially for farmers with access to fertilizers. Since its implementation, maize production has tripled, and the yield of Irish potatoes, beans, and soybeans doubled (Weatherspoon et al., 2019). As a result, there was a surplus for sale after own consumption, which caused increased income in households (Kathiresan, 2012). However, Poverty is a significant challenge affecting Rwanda's food security, especially in rural areas where approximately 48.8 percent of the population lives below the poverty line (Ministry of Agriculture and Animal Resources, 2009) and roughly 28 percent of the rural population was food insecure (Ministry of Agriculture and Animal Resources, 2009). Some regions are more food insecure than others: Bugesera at 40 percent, the lake shore at 37 percent, and southern Plateau at 34 percent (Ministry of Agriculture and Animal Resources, 2009). Households with low income cannot access enough nutritious food, especially during drought seasons when food is limited, and prices are higher (Ministry of Agriculture and Animal Resources, 2009). Approximately 24 percent of the food-insecure population is vulnerable to shocks such as drought (Ministry of Agriculture and Animal Resources, 2009). An increase in sales due to more production has affected consumption practices, and households are not diversifying their food choices due to financial access. However, considering that the policy tried to deal with such issues by

providing training on nutrition education and Farmers were made aware of the importance of a balanced diet as (Ndushabandi et al., 2018) claim that Approximately 74 percent of the farmers received nutritious food training about healthy food choices to help reduce diet-related diseases like stunting. This research evaluates the possibility of farmers to really afford other food variety in all seasons since they be selling at cheaper prices, how are these farmers going to afford food from other regions even in the learn season? like any other capitalized market, the market of food will be having the presence of the middleman whose price will add to the price of the market, for example, the vegetable or potatoes that are grown in the northern province, will be sold in the eastern province, but the price would have gone higher since there was need for transport, middle man, tax, profits or the market price to the local farmer who sold his beans and maize in the eastern part is not going to be able to afford potatoes on his diet as he want to.

The downside to the land use consolidation policy is that it encouraged poor dietary habits while encouraging increased food production (Weatherspoon et al., 2019). Monocropping due to the crop intensification program resulted in a lack of diversity that was provided by intercropping. Before LUC, farmers could plant different crops in different land sections, offering them diverse and more nutritious options (Weatherspoon et al., 2019). The nutritious risks due to mono-cropping are also being researched for the impact that they might have on the prevalence of stunting in Rwanda (Weatherspoon et al., 2019). In 2014 and 2015, approximately 37 percent of children below five years experienced stunting (Weatherspoon et al., 2019). Land consolidation mainly focused on planting starchy tubers and roots, such as Irish potatoes and cassava, which resulted in their increased consumption. Based on data reported in 2019 claimed that food insecure houses consume starches five days per week, reducing the consumption of foods rich in vitamins (two days per week) and proteins such as vegetables, meat, and fish (Weatherspoon et al., 2019). In 2013, above 50 percent of the calorie supply per person consisted of micronutrient food groups like cereals and starchy roots (Prete et al., 2019).

Many developing countries struggle with food security, and for the case of Rwanda in 2008, when the government came up with a land use consolidation policy, 28% of households were food insecure, and agriculture production depended on very small, fragmented land and farmers growing food traditionally. To implement a policy like Land use consolidation that requires different farmers to consolidate their land and cultivate

together at the same standards despite their economic class, consolidate their use of farmlands, and cultivate one crop, required a strong intervention from the government not only on the designing the policy but also in the monitoring for the policy to be successfully implemented. Such intervention explains why and how the government authorities acted on different levels and took charge of overseeing the operations. The policy makers included severe punishment to farmers who did not comply with the program like charging fines and removing the unselected crops in case one plants crops that are not selected for that CIP zone. As Muyombano & Espling (2020) demonstrated in one of his interviews a farmer from Muko described instances where farmers who attempted to grow sorghum in selected sites had their crop removed by the sector agronomist in an individual interview in 2013. A similar punishment was reported in a collective interview conducted and reported by Muyombano & Espling where female farmers stated that they preferred to grow crops like sorghum, vegetables, and potatoes which could grow faster and they would harvest more and make more money so they could pay school fees for their children, rather than growing maize which was a selected crop of that time, they faced a fine of 5000 RWF each from the agronomist drawn from a 'collective interview, Shingiro, 2014'.(2020, p6).

#### **4.5.1. Why food production alone is not enough for food security?**

The Land Use Consolidation (LUC) policy resulted in higher yields for crops such as maize and beans in different districts in Rwanda. Although food production increased due to the crop intensification program, food insecurity is still a significant problem affecting households in intensive and non-intensive farmland areas. A survey done on LUC households in Rwanda in 2016 indicated that more than two-thirds (67%) of the homes did not have enough to eat in the period of a week that passed (Knox, 2016). 16 % of farmers relied on help from others for a small meal, and 44% reduced their daily consumption by eating fewer meals (Knox, 2016). Although there was a surplus of food production after the LUC implementation, and drawing from data from the literature, food security was not ensured as food was not available to everyone since small-scale farmers who represent the majority of the population of Rwanda still vulnerable and cannot access any type of food they need at any time.

For a country that used to have severe cases of starvation and extreme poverty, a solution to the food availability in the country was needed, as noticed, LUC succeeded in

increasing food production in the country, with yields increasing markedly after 7 years of the LUC and crop intensification programs. However, this policy did not lead to improved food security as it was claimed by many authors, since food security is much more than food production. This paper argues the fact that Rwanda managed to produce more food as a country does not mean that the country became food secure, it means that there is food available at the markets but people need to have physical and financial access to those markets to be able to afford food at given prices, or any other form of exchange needed for them to buy whatever type of food they need at any time they may need it to diversify their diet, in order for them to be effectively food secure. However, since the implementation of the policy was done by regions according to CIP zones, and each region was supposed to grow a certain crop depending on the season, this means that for a certain season, farmers in that part of the region will be eating what they managed to grow. For instance, in eastern Rwanda, where they mostly grow maize, rice, and beans, for a season where they have grown maize, farmers will only be eating maize until they go to the market to buy other types of food to diversify their diet. This includes vegetables, beans, potatoes, etc. which may be grown in other regions of the country outside this eastern CIP site.

Before considering the effects of having farmers depend on the market to eat, (Nsabimana et al,2021, p.72) speculated that the priority and that was given to maize and beans under CIP program raise these crop production but has simultaneously spiked up the prices of other staple food food that makes up the dominant part of the population's diet. It's important to mention that most farmers in Rwanda are not from the same class. Indeed, small-scale farmers were more negatively affected by this policy since in their peasant way of living they do not make enough money to allow them to rely on the market. This is the case because they own small plots or few assets, and live by the fruit of their labor. In the case of Rwanda, many small-scale farmers who were tricked to be part of the program either voluntarily or not, with many of those who resisted being pressured and sanctioned to join anyway as we have see in the previous literature, in addition to that CIP zones specializes in the production of only crop despite the need for local households to consume a varied balanced diet”(Nsabimana et al,2021, p.72). However, for a poor farmer who used to cultivate his small plot of land to grow many types of crops to feed their family, and with the new policy he ends up in the CIP region where they are growing maize, which means, these farmers will only be allowed to grow maize, and having maize as harvest at the end of the

season. since it was not grown on a big land, he won't make that much money to afford to buy potatoes grown in the northern province, or cassava brought to the market from the southern province since they arrive in the Eastern province when the prices are higher, neither this farmers will be able to afford his groceries for his family until the next season, which will end up putting them in a position to eat maize only which some days will not even be enough of a meal or sell the maize and buy another type of food a few times a week or in a month but not every day nor regularly to have a balanced diet. which this paper finds to explain the high levels of malnutrition reported in Rwanda, especially in rural areas which are the areas occupied by SHFs.

This study argues that these high levels of malnutrition among SHF farmers who are the primary producers of food in the country stay high due to this policy which made them produce limited types of crops for the markets not for themselves and now small-scale farmers can barely afford nor access a balanced diet. Overall, LUC has Increased malnutrition due to a lack of diet diversity in daily farmer consumption. On the other side, for big farmers who own larger plots of land, this policy has boosted their economic standing since they are producing more crops surplus to sell, and they make more money and they manage to save and afford any other type of food they want at the markets. these are the bourgeois, unfortunately, they are few if we compare the statistics of small-scale farmers in Rwanda who make up 73% of all farmers and according to a study (Nilson,2019), the link between high agricultural production and LUC is far higher among farmers whose land is bigger than one hectare, based on the literature, the poor farmers are the majority of Rwandan farmers have very little plots of land, less than a hectare and are the one described as small scale farmers. “This is particularly evident in Rwanda where 80 per cent of the population live in rural areas, have agriculture as their primary source of income, and cultivate landholdings smaller than one hectare” (Nilson,2019, p.1726), which takes us to the point that those who got rich or who were positively impacted by this policy owning larger plots of land are very few people who belong in the rest of the 20% remaining.

#### **4.6. LUC policy and the environment**

Climate change directly impacts food security. Food production becomes more unstable as temperatures change and rainfall patterns are affected. Most of Rwanda's small holding farms depend on rain for growing food (Muyombano & Espling, 2020). Drought outbreaks



and inconsistent rainfall are shocks that affect farmers participating in LUC and other small-hold farmers. Shocks include floods, crop pests and diseases, drought, and severe illness. Fifty-four percent of LUC households reported to have been affected by at least one shock, and 20 percent have not fully recovered (Knox, 2016). Even though there was increased food production from sole cropping, if there were a crop disease, the whole area would be affected, causing food insecurity (Muyombano & Espling, 2020). The instability caused by such shocks threatens food security as the food produced might not be enough to sustain a farmer's family till the next harvest.

From the nutrition data published by Del Prete et al (2019,p.141) presented below, while there is a remarkable success of the CIP in terms of harvest and CIP crop productivity, the research conducted by Piatti-Fünfkirchen et al. find divergent data on nutrition, in between 2010 and 2015, 82% of children between the ages of 6 months and 2 years did not have a minimum acceptable diet, and over 50% of this age group did not have meals on a minimum frequency. Additionally, 71% of this age group did not receive a minimum dietary diversity, indicating a micronutrient deficiency (2020.P1). there is the role the environment plays in food production which is very important to consider for the success of the policies to reach its goal but there is also the impact that this policy had on the environment in the long run.

this research assesses the consequences of commercializing peasant agriculture on the environment, which seemed to be more sustainable as farmers produce enough of what they eat, this study demonstrates that this policy changed it into commodified agriculture where farmers in the village grow food to supply markets in cities. leaving a lot of production pressure on that small plot of land owned by farmers, increasing land overexploitation, and constant and excess use of chemical fertilizers since the farmer also needs to produce more, compete, and make more money which he/she is going to depend on, Creating a metabolism rift in agriculture where this constant use of fertilizers ends up increasing the acidity of the soil, reducing the natural fertility of the soil which is its capacity to grow crops organically, but also those pesticides and chemicals changes the environment around or ends up contaminating water sources.

## 5. CONCLUSION AND RECOMMENDATIONS

After LUC was implemented, there has been an increase in food production and farmers are implementing better agricultural practices. Farmers are generally more aware of good agricultural practices that can protect their land from soil erosion and practice monocropping in a better way. The program has successfully shifted some farmers' perspectives to sustainable food production.

LUC was a success in raising agricultural production and making food products more available in markets, however even if it is a step towards broader food security, it did not ensure the food security of everyone in the country. Further, although it raised the country's national GDP, the nutrition of "smallholder farmers makeup 80% of households" (Nilson,2019) was not improved as demonstrated in Table 1, the data do show that severe food insecure households increased after the implementation of the policy that they were before. relative to how they resisted because the policy did not match their lifestyle as peasants, but they were ignored, and the policy kept them involved even involuntarily.

### 5.1. Give power back to farmers

As a proposition, policymakers should come up with engaging and life-changing policies, that take into account the needs and ideas of farmers as primary concerned citizens. It's like looking at the case from the bottom up, involving the beneficiaries in decision-making, or at least listening to their voices when they express resistance. This way, we can boost the autonomy of farmers in policymaking. Drawing from Agarwal's perspective in 2014, "Food sovereignty is not just about having access to food; it's also about letting communities decide how their food is produced, distributed, and consumed, all while ensuring fair pricing and food price regulations are in place." This paper asserts that if small farmers' voices who make up the majority of farmers in Rwanda, had been considered in the making of this policy, it would have improved the results of this policy toward food security and improved the day-to-day lives of these populations. Instead of making policies in offices in a top-bottom approach and focusing on macroeconomic indicators like GDP while leaving a good number of the population in a vulnerable condition exposed to severe cases of malnutrition which will affect the future of the country in the long run if a big number of kids grows malnourished or stunted.

## **5.2. crop variety**

Considering that this policy only allowed farmers to grow limited prioritized 6 crops, and whoever concerned tried to grow something else would end up sanctioned by the government, I suggest the government should take action and make efforts to grow a diverse range of foods and does not stick solely to the six main crops of CIP. The government could adjust the policy and CIP program to include more crop varieties and more nutrient-rich crops/food like more vegetables or meat production than those usual cash crops in the prioritized crops, as they have shown only in "2018 when they removed wheat among the key crops and added Bananas and sweat potatoes" (Muyombano. E, 2020.p3).

## **5.3. Peasantization**

This research contributes to a broader study diving into how a grassroots approaches like 'peasantization' can be applied in a country where policy is focused more on economic development to truly achieve food security, zero hunger, and zero malnutrition goals or simply removing peasants from the equation of capitalist agriculture protecting them from being exploited by the big market.

There is a need for more studies to be done on what could improve the agricultural system in Rwanda to reach food security, a small and overpopulated country where farmers own very small plots of lands and make their living from farming. Yet the country needs to develop economically and with an agriculture-based economy there is a lot of pressure to capitalize on agriculture but with a big number of small-scale farmers, there is a need to study better strategies and new policies to be made to protect the rights of the peasants and serious price regulation.

## **5.4. Food processing**

In terms of food production, I suggest empowering farmers to engage in food processing which is adding value to the harvests and a source of employment for other farmers in the lower class to get some money, similar to what NYIRANGARAMA did. While this might be an example from a larger-scale farmer, the idea applies to farmers of various

sizes if they are given the opportunity or introduced to such concepts. By transforming their produce—such as turning maize into maize flour or offering various options for rice—farmers can add value to their products. This shift can enable them to earn more income rather than selling their harvest at low prices to big industries.

Drawing inspiration from a field trip experience with farmers in the Netherlands, where farmers preserve and conserve their surplus even cabbage by canning and storing them for later consumption, comes an advanced proposition to implement similar practices in Rwanda. Encouraging farmers to process and preserve their produce could not only add more value to their produce but also make a variety of foods available throughout the year, eliminating worries about the off-season.

This approach benefits all classes of farmers, significantly contributing to food security. It addresses the issue of food scarcity during off-seasons, provides assurance to farmers that their harvest won't go to waste, and allows them to sell their produce at reasonable prices. With additional efforts from the government in price regulations, farmers can earn a decent income, and locally preserved food may become more affordable compared to imported produce with limited shelf life.

## **5.5. EXTRACTIVISM**

This paper contributes to an important strand of literature on the linkages between policy and the reality of Rwanda, a country where the majority of economic activity depends on agriculture, and where farmers are SHF not because they choose to, but because they have only received or inherited small portions of land. The best way to ensure economic development for farmers and the country should be to invest in food processing locally, as a way to conserve food and create employment instead of relying on internal agrarian extractivism. McKay defines extractivism as "high volume of food extracted and imported as raw material with little or no processing at all" (2017, p.203), even though he was referring to Bolivia exporting its surplus to China. Small-scale farmers in Rwanda suffer similarly since the market extracts their surplus from them at a very low price to supply their harvest in other parts of the country and may end up in international markets leaving them with little money that does not allow them to make ends meet.

To finish, it is important to take into consideration that one policy, however strong and transformative it is, cannot solve all the problems people are facing at once. LUC contributed to alleviating hunger at a high rate. This paper provides additional evidence to suggest alternative measures of success and recommendations for further policy adaptation. There is a need for more programming and policies to protect and improve nutrition status in Rwanda in a way that includes SHF in the formulation and implementation as the active food producers that they are.

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