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## RESEARCH ARTICLE

### INVESTIGATING THE FEASIBILITY OF LAND CONSOLIDATION IN RWANDA: EVIDENCE OF CHINA

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#### ABSTRACT

Feeding the growing population is the main concern of the worldwide and it is more urgency to increase agricultural productivity, particularly crops as those are the main sources of food of the population. Developing countries are more challenged with agricultural activities due to the environmental changes; some major should be taken substantially. Rwanda as one of developing countries is coping with these challenges and land use consolidation is one the majors taken to confront them. It was significantly increased crops production in its first implementation years which then is slowing down by environmental and economic factors and mismanagement of cropping systems in some extends. The aim of this research is to find out the feasible methods to reassure land consolidation to boost crops productivity and ensure food security by referring to Chinese successes. It was shown that the people in rural areas are not happy with the application of land consolidation claiming that they cannot afford food by the application of it. The research concludes that the government should construct facilities to enhance land resources quality, quantity and management and primarily ensure the food self sufficient for farmers. Also the application of land use consolidation needs a strong collaboration with the local government and the farmers for the wellbeing of the rural Rwandans.

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#### INTRODUCTION

Food availability and food security is the main concern of the global population and more urgency in developing countries; where even food self sufficiency is still a challenge, especially for farmers in rural areas. Bolstering the livelihoods of the population is feasible through maintenance of food sovereignty and safety by increasing agricultural productivity. Most of developing countries' source of income is agriculture production and it is encountering many challenges nowadays; there is food security when all the people at the same time has access to sufficient, safe nutrients and food preferences (Farsund et al., 2015). Rwanda among developing countries is facing the same challenge even worse due to the decline of agricultural yields; the farmers in rural areas are suffering for hunger while the productivity continues to decrease. Land fragmentation is one of the major hinders of crop productivity, 80% of the population is operating in one or less than one hectare of land. Some researchers argue that fragmentation of land is good for the farmers who have enough resources where it is known as productive because they are courageous of getting a significant production from their farms. It reduces the risk of total crops failure during calamities or diseases due to the deceleration of spreading in different plots; it also facilitate

crop rotation (Bentley, Jeffery, 1987); but it is seen as a threat in the other hand, because it is costly in term of management, supervision and security, time consuming from one plot to another, waste of land especially; it may cause also the disputes between neighbors (Mwebaza Rose et al., 2002). Fragmentation of land may prevent farmers from changing high profit crops, more likely when the crops need an extended area and the farmers don't have (Word Bank, 2005). For this instance, farming system in Rwanda is characterized by land fragmentation and farmers often lose their grown crops as well as soil nutrients during floods or other environmental disasters. Their farms are very exposed, 70% of agricultural land is on hills and hills sides. With farmers' illiteracy and low incomes, it is still hard to deal with those calamities where the improvement of crops production needs more investment and intensity. Almost half of the farms are small with less than 0.3 hectares (45.8 percent) and more than 83% of farms are smaller than 0.9 hectares barely larger than what is deemed the minimum of 0.7 hectares to sustain a family (Government of Rwanda, 2004). While land fragmentation requires high cost with low economies countries, land consolidation can improve agricultural productivity and rural development by lowering costs and facilitate agricultural infrastructures as well as land and production management. Land consolidation and allocation are needed for farmers' proficiency and enable proficient farmers to access larger land holdings that will reduce costs and increase productivity (Bizimana et al., 2004). It requires tenure information on land what is well done in

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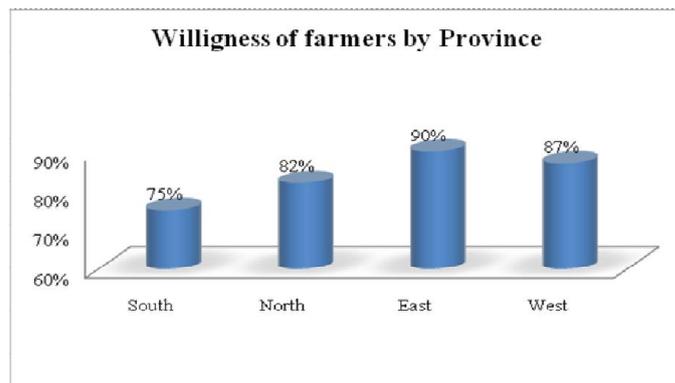
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Rwanda with the collection of information regarding land to facilitate the feasibility of the program which was implemented in 2008 as a part of CIP (Crop Intensification Program) launched early in 2007. The policy promotes the cultivation of one single crop in a selected region, that the government believes it will facilitate the extension services and provision of improved seeds and fertilizers. Land use consolidation has had a significant yield in Rwanda in its first years of implementation, but gradually starts to slowdown and farmers become unsatisfied with the management and evaluation believing that the evaluation and post harvest application led to low productivity and inability to afford food, finally hunger that is becoming worse than even before the implementation of that policy. Improvements are needed to feed the population which is growing faster. Its processes vary from different countries; there are some similarities and lesson to learn from one another. It is in that context, there are some lessons, Rwanda may learn from china. This research suggests improvement policies for land use consolidation in Rwanda by referring to Chinese successes and reviewing the livelihoods of the population. Data were collected through interviews and observations.

**Overview of land consolidation in Rwanda**

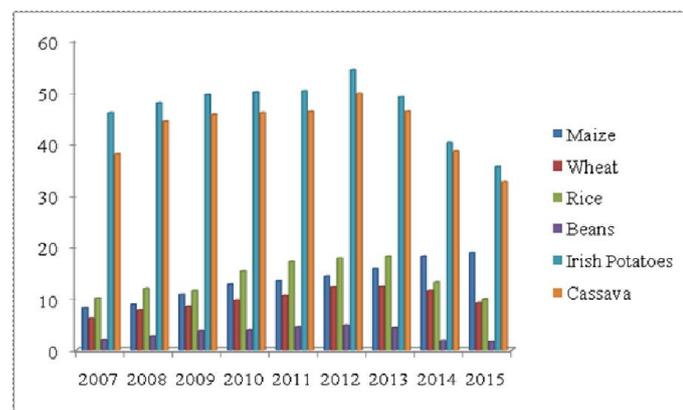
Land use consolidation policy is not new; it has been implemented in different countries with different objectives but for the case of Rwanda, the main objectives are enlarge the farm size and land use planning in village centers, and then improve agricultural productivity (Musahara *et al.*, 2014). Our research is focusing on the second objective, improves agricultural productivity, especially crops by referring to Chinese success. Due to the population density and the limited arable land, the average farmers is working with a very small plot that push the government to launch land use consolidation policy in 2008, by joining these small plots together in order to facilitate cropping systems and management. It is expected that these outcomes would enhance productivity and crop yields as well as enhance the well being of the population in Rwanda. Even though, the policy was implemented, every farmer own his/her plot and the government decide what grown plant to cultivate in such area, where it found that still some still use their own traditional ways and grow the selected plant but the yield become low, where there still many separated plots which remain unexploited land. Sometimes the delivery of inputs came late and that affect the productivity.

Land use consolidation helped to increase the productivity of selected crops and the first 3 years and the production start to decline then as shown in the table below. The decline of productivity is due to various factors, including irregular rains, droughts and flood in some areas and also the late delivery of inputs that delay the sowing period and thereafter the low production, farmers claim that sometimes the crops they have to cultivate are not the ones which yield a great productivity. On this point the local agronomists should be aware of which kinds of crops are productive in their regions and deliver the improved inputs to farmers early. Farmers shown their thoughts and suggestions about their farms use and willingness of land use consolidation.



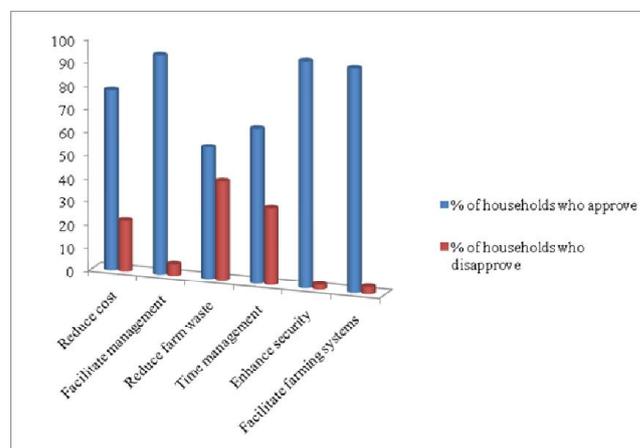
**Figure 2. Willingness of farmers to put farms together**

Rwanda actually has 4 provinces and Kigali city. In this investigation we didn't include Kigali as our main focus is in rural areas. In the above graphic, the population in rural areas are willing to put their land together for consolidation but there are still some unpleased factors they mentioned that need improvement like deliverance of inputs on time and increasing the price of their yields as they have no right on the price of their crops and are required to sell their yields to some organizations that pay low price in that they cannot even afford to buy their food to consume. For them, they need help to get the final products to consume and sell the remaining after being satisfied. For this case the government can organize cooperative for farmers and facilitate them to access the materials needed to afford the basic food to consume. An example on maize as one of selected crops to consolidate, the government can facilitate them to get the instruments for getting maize floor.



Source of data: MINAGRI, 2015

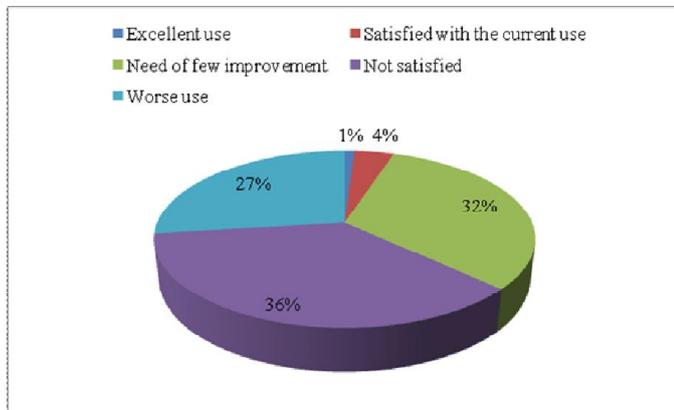
**Figure 1. Change in production of major crops under land use consolidation**



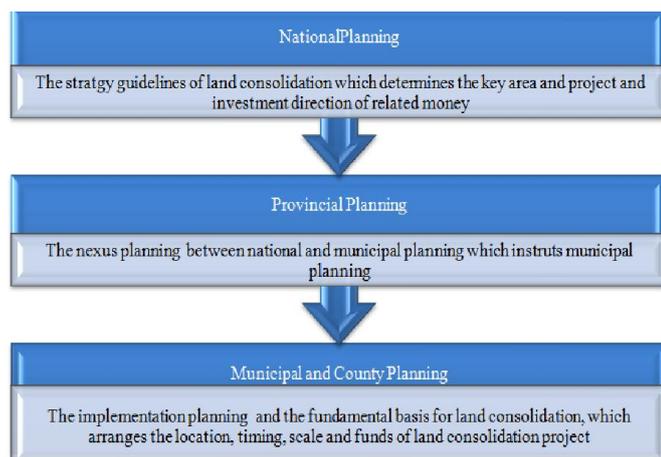
**Figure 3. Farmers' thoughts on the benefits of land use consolidation**

Considering other factors to enhance land use consolidation, farmers shared their reactions and satisfaction on those factors in the following graphics:

Farmers who are under consolidated land are seeing the benefit of the policy but they claim that they are making their efforts for those organizations mentioned above on figure 1.



**Figure 3. Farmers satisfaction of the current land use consolidation**



**Figure 4. Chinese land consolidation planning system**

As shown in the above graphics, farmers are not satisfied with the current use of land consolidation that must lead the researchers and decision makers to find out the feasible improvement methods to ensure food security and sovereignty of the Rwandan rural population.

### Land consolidation in China

Land consolidation practices in China have an immense history from 1066 B.C. but the modern land consolidation was started in the 1950s (Wang, 1997). During that time it was involved in land rearrangement, enhancement of land use and renovation of agricultural activities in order to increase agricultural production. Farmland fragmentations in China had had negative impacts on agriculture (Lu Xiao *et al.*, 2013). Land consolidation becomes an effective means to change land fragmentation and advance social and economic development in the rural areas (Yang *et al.*, 2004). Land consolidation has made a significant achievement in different ways; increasing the effectiveness of cultivated land since 1990s, optimization

of rural land use structure which led to the development of agricultural activities, comprehension of agricultural production capacity which facilitate the land management, promotion of farmland ecological protection and construction, increasing the production and the well being of the rural population. This was the prime concern of the government buy focusing on enhance the cultivation of grains that enable China to feed a huge amount of its population.

### Conclusions and lessons from China

Land consolidation is one of the major tools to promote staples food; improve cropping activities as well as the livelihoods of farmers. Therefore pertinent measures should be taken into consideration and improve the livelihoods of the rural population in Rwanda. The findings in this research and the successful achievement of China show that land use consolidation in Rwanda has some rooms to improve.

The hierarchical structure of Chinese land use consolidation system is one of the policy Rwanda can apply. Therefore major policies in Rwanda should start from the national leaders, decision makers and researchers; and give the implementation to the local governance as they are the ones who know clearly what is really needed for the area and understand farmers' situation. Secondly, the local government should make sure that all the needed inputs are delivered to farmers on time and organize some training for them on how to use those inputs in order to get high yield. Thirdly, the yield from those consolidated land must be essentially for farmers' satisfaction and then come markets. Beside those four recommendations, we suggest also the increase land consolidated area to increase crops yield; keep boosting land production capacity, i.e. boost both quality and quantity of farms; protect landscape and ecological environment. Land consolidation should fully absorb the idea of quantity, quality and ecological management to boost the capability of land resources. Land consolidation can improve land productivity and enhances agricultural technical progress. It facilitates the land management and cropping activities. The research went through the situation of land use consolidation in Rwanda and considered some feasible policies Rwanda can learn from China. It conclude that the major responsibility is for the government as most farmers in rural areas are poor and illiterate to improve themselves their cropping systems. It suggests the construction of the basic farmland vigorously by enhancing the land resources quality and quantity.

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