



Republic of Rwanda
Ministry of Agriculture and Animal Resources

Farm Land Use Consolidation in Rwanda

Assessment from the perspectives of agriculture
sector

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Arumugam KATHIRESAN

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1. Executive Summary

Food crop production in Rwanda is predominantly dependent on the productivity in small- and fragmented farms. Raising productivity levels in smallholder farms therefore represents a vital means to economic growth and poverty reduction in Rwanda. The government of Rwanda is constantly seeking ways and policies to intensify production and raise farmers' income on existing land. Heavy investments are being made to revamp marshlands, improve irrigation systems, facilitate inputs and mechanization to diversify and enhance the level of productivity in small farms.

Since the scopes of physical expansion of cultivable land area are limited, proper utilization of land is paramount to food security for the rapidly growing population. To help manage the farm lands with an objective of supporting economic development and social welfare, Rwanda's Organic Land law endorses the consolidation of the use of small plots of farm lands in order to improve land management and agriculture productivity.

Ministry of Agriculture and Animal Resources (MINAGRI) has embarked on a simplified land use consolidation model whereby farmers in a given area grow the priority food crops (maize, rice, wheat, Irish potato, cassava, soybean and beans) in a synchronized fashion while keeping their land rights intact. Although consolidation is voluntary, it is a pre requisite for availing the benefits such as subsidized inputs under Crop Intensification Program (CIP), a revolutionary flagship program promoting food production.

This report evaluates the progress, implementation and impacts of land use consolidation on food crop production, and draws insights on matching the strengths with opportunities and converting weaknesses to strengths.

Although initially faced with hesitation, farmers across the country have started recognizing the benefits of land use consolidation. Under the land use consolidation farming model, growing resource intensive priority crops as rice, maize and wheat are more readily accepted by the farmers than the other crops. The acceptance of land use consolidation is generally more widespread in Eastern and Northern provinces than in the Southern and Western provinces.

Since its introduction in 2008, the total area under land use consolidation has increased by 18-fold from 28,016 Ha in 2008 to 502,916.55 Ha in 2011. The consolidated production of priority crops under CIP has also brought significant increases in food production – maize by 5-fold; wheat and cassava by about 3 fold; Irish potato, soybean and beans by about 2-fold; rice by 30%. Interestingly, the productivity in consolidated land areas has consistently been higher for maize and wheat. This has caused a paradigm shift from producing enough to producing surplus thus placing the country's vision for market oriented agriculture on track.

Land use consolidation is a multi sector process. Although the technical plan for land use is drawn by MINAGRI, it is implemented in conjunction with local administration authorities. Based on the agro ecological potential and the land area available in each district, the CIP estimates the consolidated area that can be grown with priority crops in each district. Through

negotiations with district authorities, target figures are agreed and captured in the performance contracts of the respective districts. The district- and sector agronomists and other field officers in the cells then mobilize the farmers for growing the priority crops in a consolidated fashion.

Given the capacity constraints, coordinating the planned activities amongst the various layers of implementation poses serious challenges in delivering the objectives of land use consolidation. The local authorities are often driven by their performance indicators (targeted land areas) with less regards for accomplishing sustainable improvements in the productivity of priority crops. This is one of the major disenchantments amongst small farm holders, and hence requires to be addressed by strengthening the horizontal- and vertical linkages and by improving communications amongst the key actors of implementation.

Despite a significant physical expansion (13%) of total cultivated area in the country, the pressure on consolidation of lands for cultivation of priority crops has caused a steady decline in area under cultivation of other (non priority) traditional crops – from 52.6% in 2004 to 42.4% in 2011. Since cultivation of some of the other non priority crops could provide additional revenues, protect risks from mono cropping and balanced nutrition, the replacement of other crops by priority crops in consolidated areas needs to be justified on such factors as profitability and household food security.

While the usage of inputs in consolidated land areas has increased significantly, efficiency gains through further deployment of improved varieties, mechanization and natural resource management remain untapped. Owing to the huge variations in microclimatic conditions within a given agro ecological zone, the crop- and varietal appropriation in consolidated land areas need to be refined by engaging farmers through a participatory approach.

The colossal production of priority food crops has reiterated the need for sustenance of land use consolidation. The ecological sustainability of land use consolidation needs to be improved by promoting crop rotation, usage of organic manures, soil and water conservation measures and farmers' innovation. The economic sustainability of land use consolidation requires strengthening of value chain. As the demand for inputs has increased, the government shall gradually withdraw and hand over to the supply chain management to the private sector, but remain as a catalyst in enhancing marketability of farm outputs and raising public- and private investments in consolidated land areas.

Available data and interviews with stakeholders suggest that non-land factors such as improved technologies, extension services, post harvest handling, storage, and settlement patterns also need to be improved to increase productivity and profitability of priority crops through land use consolidation. The increased volumes of production prompt the associated need for investments in rural infrastructure, feeder roads, and access to finance in consolidated land areas through public-private partnerships.

Fine-tuning of the concepts and further improvements in implementation of land use consolidation in Rwanda shall orient small farms towards markets through land use consolidation and thereby accomplish the envisioned transformation from subsistence to modern agriculture.

2. Preamble

Rwanda's economy is largely agrarian. More than 80% of the Rwanda's projected population of 10,718,379¹ depends on farming. The total land area of the country measures 24,700 square kilometers. Although about 79% of the country's land is classified as agricultural, about 11% of the land represents permanent crop land². The remaining agricultural lands are covered with forests, marshlands and marginal lands in the hillsides where permanent and routine cultivation of crops are not tenable. Of the total arable land, 1,735,025 Ha is cultivated with food and cash crops³ and the remaining represents pastures and bushes. In 2011, food crops were grown over 935,176 Ha during the most active season⁴ (Season B; March-August).

With an average of 407 persons per square Km, Rwanda represents the most densely populated nation in the continent¹. Hence the land distribution is highly fragmented and skewed in Rwanda. About 36 % of the households own 6% of the farm lands, with an average of 0.11 Ha. The national average holding of 0.76 Ha is generally divided over 4 to 5 small plots, often in multiple locations. Such multiple holdings are valued by Rwandan since they can diversify their crop production in the different locations and thus provide protection against natural risks⁵. Such a risk evasive approach however suffers from low productivity and thus keeps the smallholder farmers within a vicious cycle of subsistence agriculture and poverty.

The overarching strategies of economic development and poverty reduction in Rwanda that envisions social transformation through agriculture require shifting from such subsistence farming to commercial oriented agriculture. Vision 2020 aspires to fundamentally transform Rwanda to a middle income country and eradicate poverty and hunger as embarked in the Millennium Development Goals (MDGs) by effectively transforming the country's agriculture into a productive, high value, market oriented sector, with forward linkages to other sectors of national economy. Describing agriculture as engine of economic growth, the Comprehensive African Agricultural Development Program (CAADP) of New Partnership in African Development (NEPAD) recognizes agricultural intensification through sustainable land management as one of the key strategic pillars.

Given the demographic pressure on land in Rwanda however, securing production of food crops for the growing population from the limited land poses a persistent challenge. Volume of food crop production is a function of physical land area and the productivity of land under cultivation. Crop productivity, often measured as the ratio of farm outputs to inputs, reflects the efficiency of usage of inputs. However the efficiency of the inputs depends on the size of the farm land. Although production efficiency gains are possible in all farm size categories, they are generally much higher in large- and medium farms than in small farms^{6,7}. Smallholders require using more

¹ Fast Facts (Jan 2011), National Institute of Statistics of Rwanda, <http://statistics.gov.rw>

² USAID (2010) Country Profile: Rwanda

³ Rwanda Statistical Year Book (2011), National Institute of Statistics of Rwanda

⁴ Crop Assessment 2011 Season B: Crop area, Yield and Production, Ministry of Agriculture and Animal Resources

⁵ USAID (2011) Rwanda - Property rights and resource governance profile; <http://usaidlandtenure.net>

⁶ Yuan Zhou (2010) Smallholder Agriculture, Sustainability and the Syngenta Foundation, Syngenta Foundation for Sustainable Agriculture

⁷ Oduol JBA, Hotta K, Shinkai S, Tsuji M (2006) Farm Size and Productive Efficiency: Lessons from Smallholder Farms in Embu District, Kenya J. Fac. Agr., Kyushu Univ. 51 (2): 449-458

inputs to reach the efficiency attained in larger holdings^{6,8}. Land fragmentation thus affects productivity and competitiveness of smallholder farms. Furthermore, the inherent difficulties in mechanizing farm chores in small farms also impede public and private investments⁹. Fragmentation of cultivable lands minimizes equitable and sustainable management of natural resources such as soil and water^{10,11}.

In Rwanda, since the land area is limited, the scopes for further expansion of farming into hitherto uncultivated lands are minimal. Agricultural land utilization systems in Rwanda should therefore focus on optimizing the use of inputs and natural resources for sustainable food production. Land consolidation has always been regarded as an instrument or entry point for efficient utilization of farm lands. Given the dependence of large population on farm lands for living, consolidation of land use patterns is more rational and tangible than physical consolidation of farm lands.

In 2005, the government of Rwanda introduced Organic Land Law¹² which stipulates that the State is responsible for managing the state land in the public interest and with the objective of supporting economic development and social welfare. The Organic Land Law gives the Minister of Agriculture in conjunction with local authorities and the respective residents the authority to approve the consolidation of the use of small plots of land in order to improve land management and productivity. The law further requires that while each landholder retains his or her individual rights to the land, he/she should ensure that procedures for land use consolidation shall respect the order of the Ministry of Agriculture and Animal Resources (MINAGRI) which determines the modalities for land use consolidation.

Under the current land utilization model, farmers in a given area need to grow specific food crops in a synchronized fashion that will improve the productivity¹³. Thus the agricultural production efforts of individual landholdings are integrated and facilitated to achieve a cohesive production environment. The land use consolidation optimizes the use of resources in the agricultural sector and provides the framework for re-allocation of lands wherever necessary. For instance, in some cases, the land consolidation also requires resettlement of family housing units from the agriculturally productive lands to administrative village areas (Imidugudu). The farmers and local government authorities collaborate in rearranging land parcels, growing priority crops, selling and processing of agricultural produces and distribution and marketing of agricultural products.

The priority food crops in Rwanda include maize, wheat, rice, Irish potato, cassava, soybean and beans. To a great extent, the volumes of production of these food crops determine the levels of

⁸ Niroula GS, Thapa GB (2007) Land Degradation & Development 18 (3): 237–248

⁹ Mrema, G. C., Baker D. and Kahan, D (2008) Agricultural Mechanization in Sub-Saharan Africa: Time for a new look, FAO, Rome

¹⁰ Deininger K, Byerlee D (2011) Rising Global Interest in Farmland - Can it yield sustainable and equitable benefits? World Bank

¹¹ Kirk M, Löffler U, Petermann T (1998) Land Tenure and Policy Issues in Land Use Planning with special reference to Southern and Eastern Africa German Foundation for International Development

¹² Organic Law N° 08/2005 of 14/07/2005 Determining the use and management of Land in Rwanda; www.migration.gov.rw

¹³ Sustainable Crop Intensification Program – Shifting focus from ‘producing enough’ to ‘producing surplus’ (2010) Ministry of Agriculture and Animal Resources, Kigali; http://minagri.gov.rw/index.php?option=com_docman&task=doc_download&gid=86&Itemid=37&lang=en

food security in Rwanda. Hence the government has adopted a land use consolidation model under the provisions of the Organic Land Law whereby the priority crops are grown in a consolidated manner in identified locations across the country. Based on the adaptability of the priority crops to the various agro climatic zones in the country, farmers are advised to grow crops in a consolidated fashion. In a synergistic approach, inputs such as seeds and fertilizers are distributed to farmers who engage in land use consolidation through a flagship program known as Crop Intensification Program (CIP). Consolidated use of lands allows farmers to benefit from the various services under CIP such as inputs (improved seeds, fertilizers), proximity extension services, post harvest handling and storage facilities, irrigation and mechanization by public- and private stakeholders. However, the implications of land use consolidation policy on the increase in food crop production triggered by crop intensification program are still not clearly understood and therefore require an appraisal. This forms the goal of this report.

3. Evaluation Objectives and Methodology

3.1. Purpose

Crop Intensification Program is one of the important strategic interventions in improving the food crop production in Rwanda. By virtues of increased production of food crops, it is evident that the CIP program has made a significant impact on improving food security^{13, 14}. However it is not clearly known how synergistic the land use consolidation policy is in the context of crop intensification program. There is also a growing concern on how the land use consolidation policy is implemented and perceived by the farmers. This has prompted MINAGRI to assess the land consolidation on both the demand and supply sides and evaluate the contribution of the land consolidation program to agricultural productivity and national food security. This serves the general objective of this report.

The *specific objectives* of the evaluation process are described below;

1. *Examination of the context, current planning and implementation process of the land consolidation program:*

The study explored how the land area to be consolidated is planned and the bases of selection of priority crops to be grown in a given area to be consolidated each season from federal to district level. Once the target is identified how authorities at the district-, sector- and cell levels execute their powers and what their limitations are in implementing consolidation of land use. The evaluation shall become useful in redefining of programs, strategies and policies by MINAGRI and other key stakeholders in agriculture sector. The findings from the assessment shall serve as a valuable tool in maximizing the impact of further support to agricultural productivity and national food security.

2. *Appraisal of the achievements and shortcomings of the land consolidation program and identification of the possible contributing factors and causes:*

The assessment gathered the perceptions of stakeholders on the implementation of land use consolidation policy. Weaknesses and threats if any in implementing the land use

¹⁴ IFDC (2010) Evaluation Report: Crop Intensification Program (2008-2009)

consolidation policy at the grass root level were identified and used in describing shortcomings of the program. The exercise attempted to understand what other agriculture services shall be combined in order to improve land use consolidation policy in the context of crop intensification program.

3. *Description of lessons learned for better planning and implementation of future activities:*
The assessment paid attention to capture the complaints and successful stories of implementation of land use consolidation policy in the country. To serve as a guide for future planning, emphasis was laid on how the learned lessons shall lead to a better understanding of where the land consolidation program is coming from, where it is now and what has worked and what has not worked. The possible consequences from the new wave of settlement and relocation of housing of farmers from the productive areas to Imidugudu on land use consolidation were examined.
4. *Formulation of recommendations for short, medium and long term actions:*
From the findings and lessons learned through this assessment, the study made recommendations for the short-, medium- and long actions in order to strengthen the crop intensification program. These recommendations are revolved around ensuring the relevance and the sustainability of land use consolidation, overcoming difficulties in implementation, requirements on both the demand- and supply chains, addressing the management needs, institutional arrangements and the inherent risks and gaps in communication and extension services.
5. *Proposition of an action plan outline and a monitoring and evaluation framework:*
Based on the recommendations formulated, plan of actions that shall lead to effective implementation of land use consolidation was outlined. The action plan underscores an overall objective of sustainable and tangible expansion of land area under consolidation to achieve food security, poverty reduction and economic growth as envisioned by the government. To further assess the plans of action a framework for monitoring and evaluation was also included.

3.2. Methodology

The impacts of land use consolidation in crop intensification program were evaluated using a range of quantitative and qualitative analytical tools. The work involved literature review, field data analyses, informal and/or structured interviews and observations.

3.2.1. SWOT analysis

SWOT analysis (alternately SLOOT analysis) is a strategic planning method used to evaluate the Strengths, Weaknesses/Limitations, Opportunities, and Threats involved in a venture. The primary purpose of the SWOT analysis was to identify and assign each significant factor, positive and negative, to one of the four categories. The SWOT analysis can offer powerful insights into the potential and critical issues affecting land use consolidation. The true value of the SWOT analysis is in bringing this information together, to assess the most promising opportunities, and the most crucial issues.

In the present study, it involved identifying the internal and external factors that are favorable and unfavorable to achieve the objectives and implementation of land use consolidation. The internal factors may be viewed as strengths or weaknesses depending upon their impact on the organization's objectives. The external factors included macroeconomic matters, technological change, legislation, and socio-economic changes.

The internal strengths and weaknesses were compared to the external opportunities and threats to gain additional insights into the condition and potential of the land use consolidation policy. The SWOT was used to find such competitive advantages by matching the strengths to opportunities. By applying conversion strategies, weaknesses and threats were converted into strengths or opportunities.

3.2.2. Quantitative analyses

Data on area under cultivation of each of the priority crops under crop intensification program, their total production and yield levels of the past 8 years were collected from the agricultural statistics division of MINAGRI. In addition, the area under consolidated cultivation of the priority crops, the production and yield levels were collected from crop intensification program. Correlation between area under cultivation and production and yields were quantified. The relationship between area, production and yield were analyzed further using Microsoft Excel spreadsheets and graphic tools.

3.2.3. Qualitative analyses

With a view to identify weaknesses, strengths and suggestions, informal interviews were held with national government staffs at all levels in the MINAGRI, MINALOC and MINIRENA. Structured interviews were held with service providers, farmers groups, and non-governmental organizations (NGOs) who are involved along the value chain of the priority crops under crop intensification program. The outputs from the interviews were pooled, condensed and synthesized to draw the perceptions and shortcomings in managerial- and institutional arrangements of implementation of land use consolidation.

4. Findings

4.1. Planning and Implementation of land use consolidation

Under MINAGRI, the crop intensification program (CIP) is responsible for the overall planning of land area that needs to be consolidated for growing priority food crops. One of the key components of CIP includes consolidated use of farm lands in the production areas. Under CIP, agricultural inputs such as improved seeds and fertilizers are distributed to farmers through public-private partnerships. Extension services on the use of inputs and improved cultivation practices are also rendered to farmers. Although farmers' participation in land use consolidation is voluntary, consolidation is a condition for availing the other benefits under CIP.

Based on the projected growth in population, the current trends in consumption of food crops and the maximum expandable area under cultivation, the strategy for sustainable crop intensification for the year 2011-2017 has identified the targets for expansion of area under cultivation (Table 1). The target figures for 2013 show the maximum possible expansion. It is assumed that no further significant expansion of lands possible beyond the targeted area set under 2013.

Table.1. Projected expansion of land areas (Ha) under cultivation of priority crops

| Crop | 2011 | 2012 | 2013* |
|---------------------|----------|----------|----------|
| Maize | 208800 | 261000 | 286412.5 |
| Wheat | 45718 | 57147.5 | 62862.25 |
| Rice | 16000 | 18000 | 20000 |
| Irish Potato | 201561 | 251148 | 277145.1 |
| Cassava | 203741.4 | 240979 | 305613 |
| Beans | 332285.6 | 418610.9 | 481402.6 |

* indicates the maximum possible arable land area.

According to the classification of the various agro ecological zones described by Rwanda Agriculture Board (RAB), CIP identifies the potential areas for the priority crops (maize, rice, Irish potato, wheat, cassava, beans, soya beans and peas) in each district. The current area under cultivation of these crops in each season is available from the crop assessment data for all the districts. By comparing the gaps between the potential target areas for each district and the current cultivated area, CIP plans the area to be consolidated in each district. In conjunction with the local government authorities, CIP then identifies suitable lands for consolidated cultivation of priority crops in each district.

Until recently the local authorities were asked to specify the area (in figures) that will be consolidated. However such voluntary proposals in the past were always found to be lower than the potential targets identified by CIP. Hence the CIP has recently begun specifying the possible target figure of land areas that needs to be consolidated in each district. Through negotiations with the district authorities (Mayor, vice-mayor and agronomists), the target figures are eventually agreed as 'indicators' in the annual performance contract of each district.

Depending on the land availability and the suitability of crops, the targeted areas are then divided amongst the sectors under each district. The executive secretary (crops) and the agronomists of each sector under the district agree to capture the target areas as ‘indicators’ in their annual performance contract. A further division of targeted land area under consolidated use is made at the cell level under each sector.

At the Umudugudu level, teams comprised of 20-25 farmers coordinate the consolidation of land use and amicable resettlement of housings located in agriculturally productive areas in an alternate land of equivalent value in Umudugudu. Most often it is the chief of Umudugudu who also heads the team. In some cases, a lead farmer is assigned as the head of the farmers’ group. The head along with two other chosen farmers are responsible for monitoring the use of inputs and benefits of CIP in the consolidated lands. Since the inputs are delivered by MINAGRI through service providers to farmers, service providers also play a key role in promoting land use consolidation. Thus the MINAGRI staffs under CIP, RAB extension agents, local government authorities, service providers, agronomists, field workers under integrated development program (IDP) and team/Umudugudu leaders are responsible for mobilizing the farmers and implementing the land use consolidation policy.

4.2. Trends in land use patterns and productivity of food crops – the role of land use consolidation

4.2.1. Consolidated use and productivity

Started in 2007, the implementation of CIP began in season A of 2008. Farmers need to join land use consolidation in order to tap the other benefits under CIP. Although the policy faced some hesitation from the farmers during the initial phase of implementation, many farmers across the country have eventually begun to recognize the benefits of land use consolidation. Across the country, a large number of farmers, who were until now not familiar with improved seeds and fertilizers, have started accessing inputs through the program. Buoyed by the evident increase in yield performance, several farmers are willing to increase production of food crops through land use consolidation and other supportive policies under CIP. Recent surveys made by IFDC show that 83.7% of the farmers use fertilizers, of which 60% of the farmers use fertilizer under the crop intensification program¹⁵.

Between 2008A and 2011A, the total consolidated land area under CIP increased by 18-fold from 28,016 Ha to 502,916.55 Ha (Table 1). In 2011B, 524,185.95 Ha (29.86% of arable land) had been consolidated and were planted with priority crops. The share of land area under consolidation of priority food crops in the total national production is rising rapidly. For instance, 61.14% of total area cultivated with maize was under consolidation in 2010. Since rice in Rwanda is grown almost exclusively in marshlands, almost the entire area under rice cultivation is consolidated. Rice yield during in the country is above the average yields obtained under irrigated conditions (5 t/ha) elsewhere in other traditional rice growing countries^{16, 17}.

¹⁵ IFDC (2011) Analysis of fertilizer consumption by farmers in Rwanda: 2005-2010 period; Draft report.

¹⁶ Rice Almanac (2010), Second Edition. IRRI, Philippines; WARDA, Ivory Coast; CIAT, Columbia

¹⁷ Duwayri M, van Tran D, Nguyen VN (2000) Reflections on yield gaps in rice production: How to narrow the gaps. FAO

Table.2. Land area under consolidated cultivation of priority food crops in Rwanda

| Crops | 2008 A | 2009 A | 2010 A | 2010B | 2011A | 2011B |
|--------------|--------|--------|---------|-----------|------------|------------|
| Maize | 17,808 | 35,000 | 83,427 | 29,474.29 | 138,490.35 | 83,470.70 |
| Irish potato | 160 | 5,000 | 36,420 | 2,728.71 | 37,183.00 | 60,263.00 |
| Cassava | 9,448 | 10,000 | 5,748 | n/a | 57,981.00 | 102,528.00 |
| Wheat | 600 | 10,000 | 7,340 | 3,721.00 | 5,800.20 | 29,679.00 |
| Rice | 0 | 6,000 | 6,703 | 6,900.00 | 8,700.00 | 8,500.00 |
| Soya bean | 0 | 0 | 5,570 | n/a | 751.00 | 2,000.00 |
| Beans | 0 | 0 | 105,580 | n/a | 254,011.00 | 237,745.25 |
| Peas | 0 | 0 | 3,660 | n/a | n/a | n/a |
| Total | 28,016 | 66,000 | 254,448 | 42,824.00 | 502,916.55 | 524,185.95 |

n/a: data not available

In 2011, the consolidated land under maize and rice cultivation exceeded by 6.3% and 7.5% of the target set under CIP (table 1), and 28.64%, 48.4%, 77.6% and 78.7% of the targeted figures for beans, Irish potato, wheat and cassava have been consolidated. The data on the influence of land use consolidation on the total production is presently not available for all the priority crops. From the limited data made available by the CIP unit on production of maize and wheat for 2010, it is clear that the productivity in land area under consolidation is significantly higher than that in fragmented areas (Fig. 1). While the area under land use consolidation represented only 22.4% of the total wheat area under cultivation, the production from consolidated lands contributed 37.9% of the total production. From the 61.1% of total area under maize cultivation, the consolidated land area under maize produced 83.3% of total production in the country. Although the results show only a casual relationship, the superiority in yields of the consolidated areas over the national average is consistently higher over the past several seasons (Fig.1).

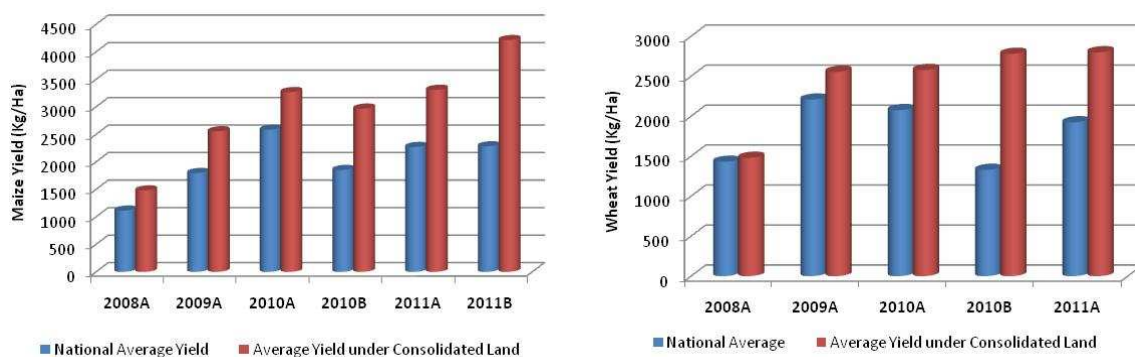


Fig.1. Comparison of productivity (yield) of maize and wheat in farm lands under consolidation with that of the national average.

4.2.2. Increase in cultivated area and productivity of priority crops

The drive for consolidation of land use has a spiraling effect on the productivity of priority crops as it indirectly promotes the use of inputs and extension services to farmers. The expansion of land area under cultivation of priority crops and the increase in production and yields are discussed below:

4.2.2.1. Maize

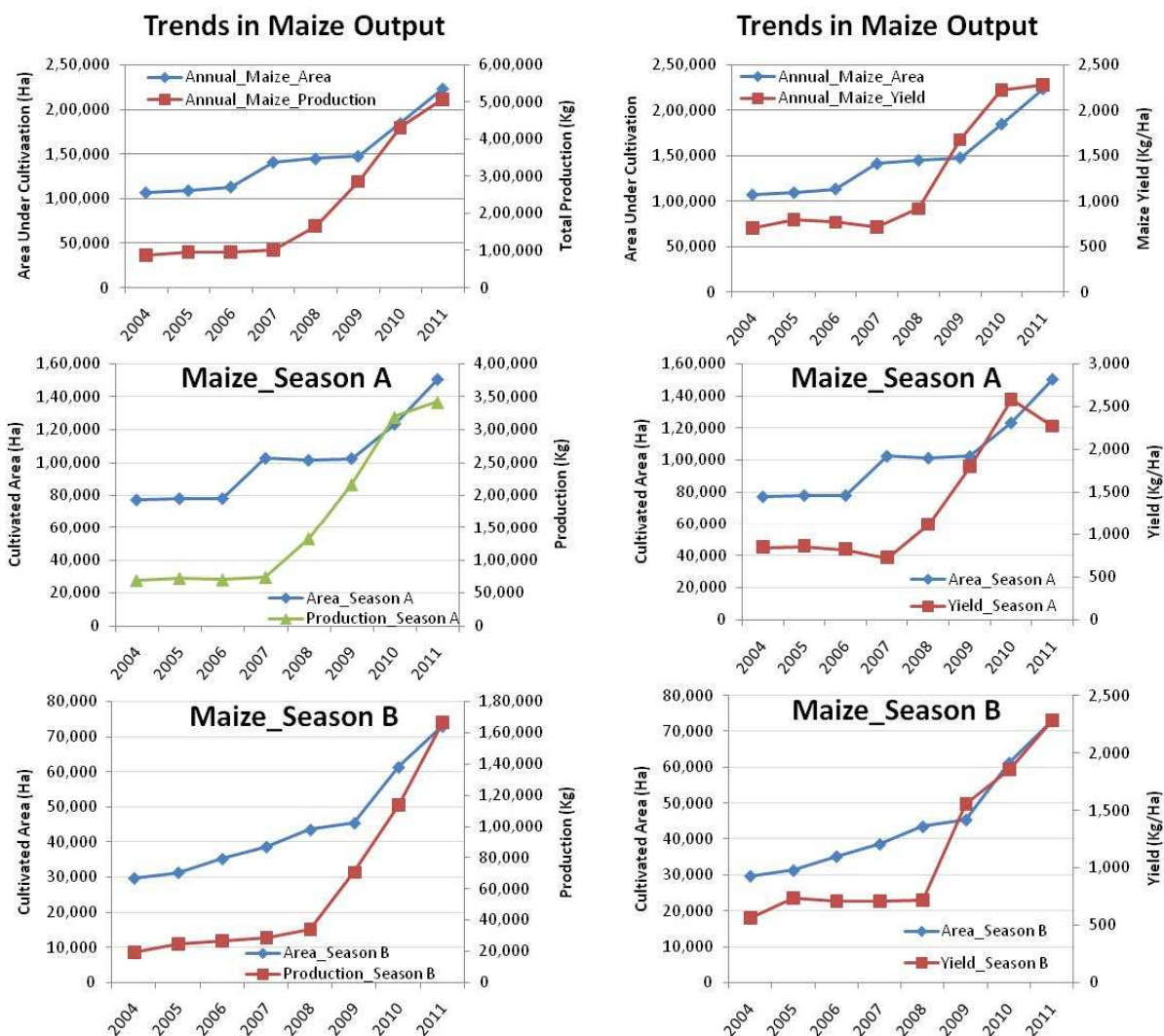


Fig.2. Changes in area under maize cultivation, production and yields since 2004.

Table.3. Correlation coefficients between area and production, and area and yield for maize cultivated during the two seasons in the past eight years in Rwanda

| Season | Area and production | Area and yield |
|----------|---------------------|----------------|
| Season A | 1.0 | 0.819 |
| Season B | 0.975 | 0.942 |

Despite the fact that there had been many first time maize growers in the newly expanded land areas, the production of maize has increased as the land area under cultivation increased. There is a strong correlation between land area and production in both the seasons. Although the yield levels show a general increase, the correlation between land area and yield is higher during season B than in season A. Currently however more land area is used for maize cultivation in season A than in season B. This indicates stronger potential for land consolidation of maize in season B.

4.2.2.2. Irish Potato

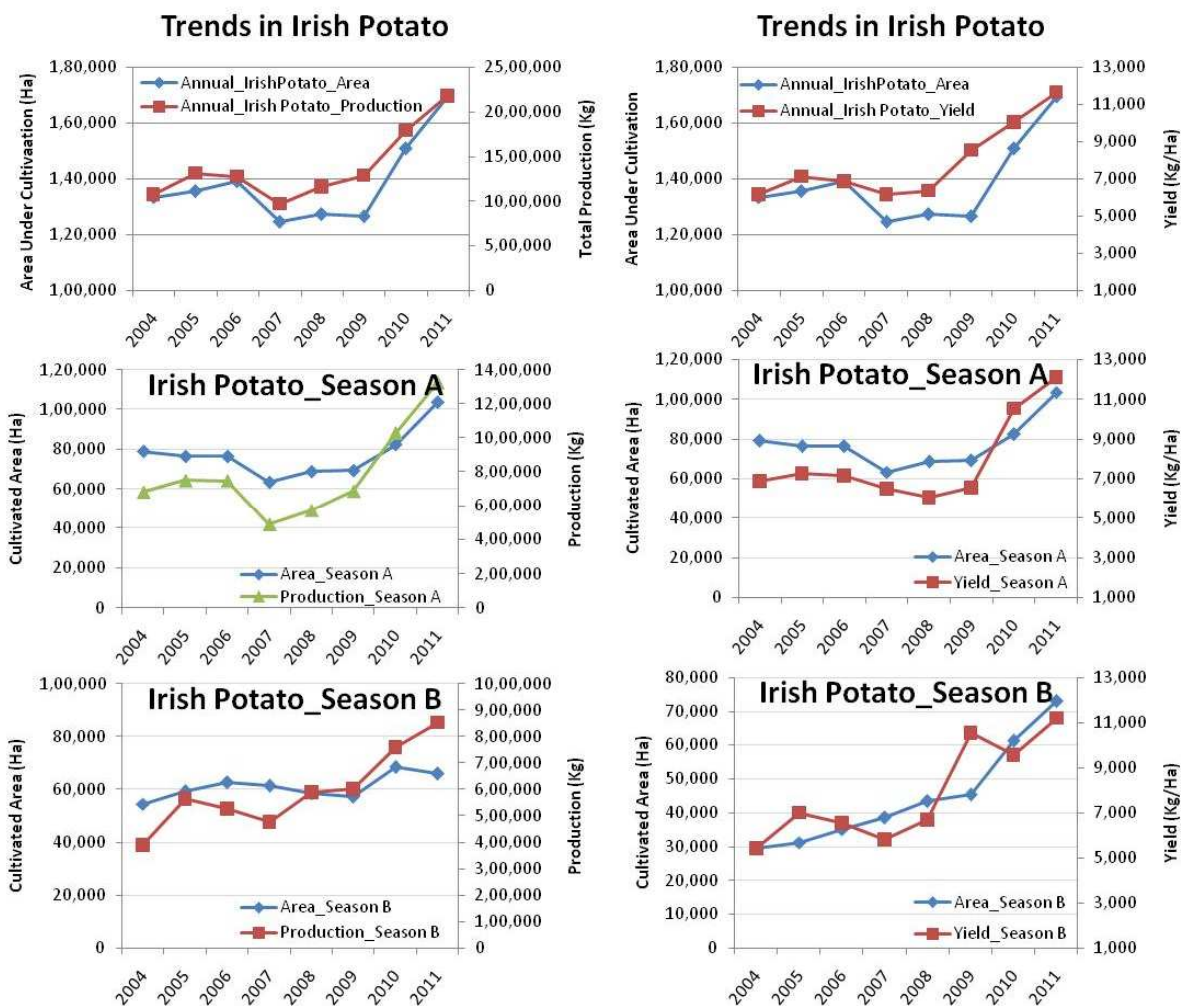


Fig.3. Recent trends in area under cultivation, production and yields of Irish potato

Table.4. Correlation coefficients between area and production, and area and yield for Irish potato cultivated during the two seasons in the past eight years in Rwanda

| Season | Area and production | Area and yield |
|----------|---------------------|----------------|
| Season A | 1.0 | 0.898 |
| Season B | 0.774 | 0.503 |

Both land area under cultivation of Irish potato and production has increased significantly in the past seven years. While the total production has increased by about 4-fold, the average yield of Irish potato has doubled. The relationships between cultivated area, production and yields are generally higher during season A than during season B. The weaker correlation between area and yield during season B (Table 3) suggests that consolidation of lands for cultivation of Irish potato during season B need to be closely monitored.

4.2.2.3. Cassava

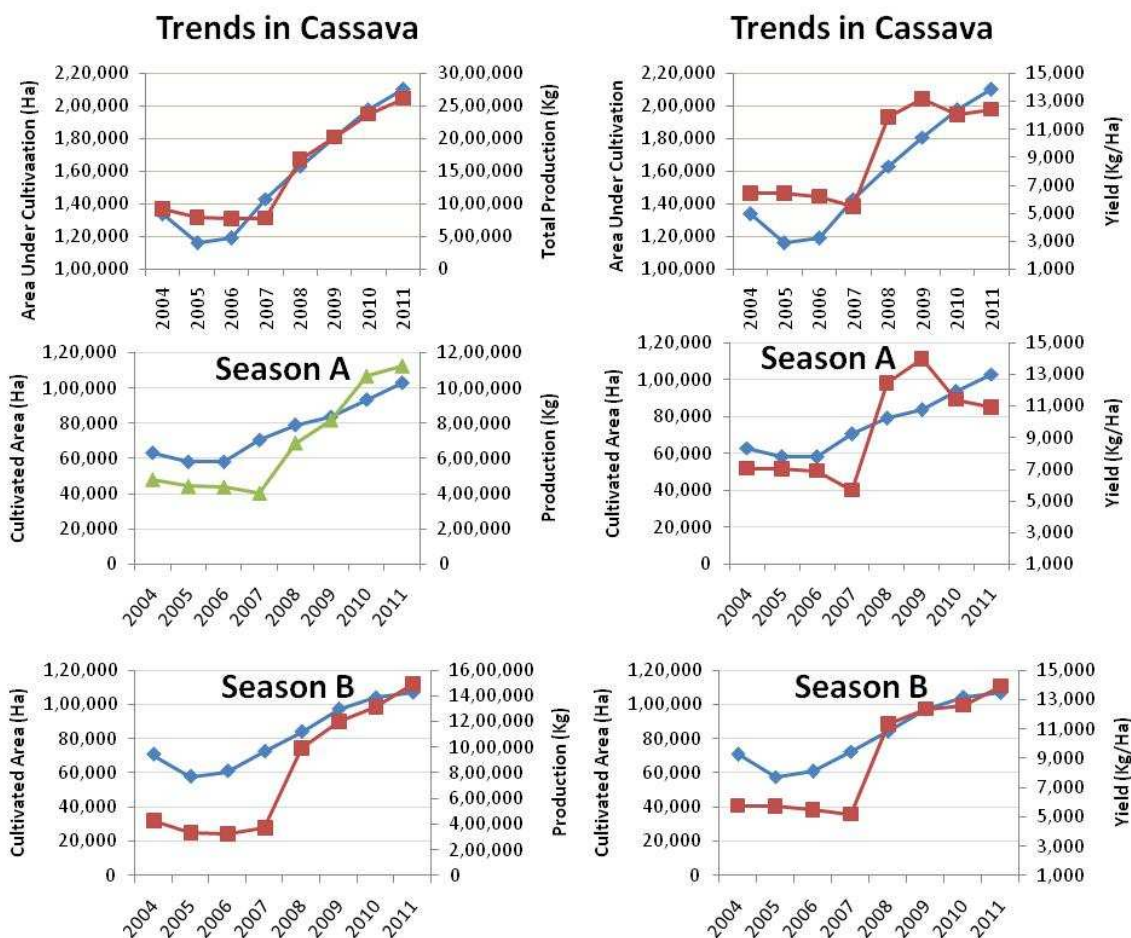


Fig.4. Cultivated area, production and yield levels of Cassava in Rwanda since 2004

Table.5. Correlation coefficients between area and production, and area and yield for Cassava cultivated during the two seasons in the past eight years in Rwanda

| Season | Area and production | Area and yield |
|----------|---------------------|----------------|
| Season A | 1.0 | 0.712 |
| Season B | 0.973 | 0.943 |

While both area under cultivation of cassava and production generally has increased, it is mainly due to a strong correlation between area and yield during season B. During season A, the yields of cassava during the past 2 years have shown on a downward trend, although the area under cultivation has increased faster during the season A than during season B implying that promotion of land use consolidation shall be more beneficial during season B than during season A.

4.2.2.4. Wheat

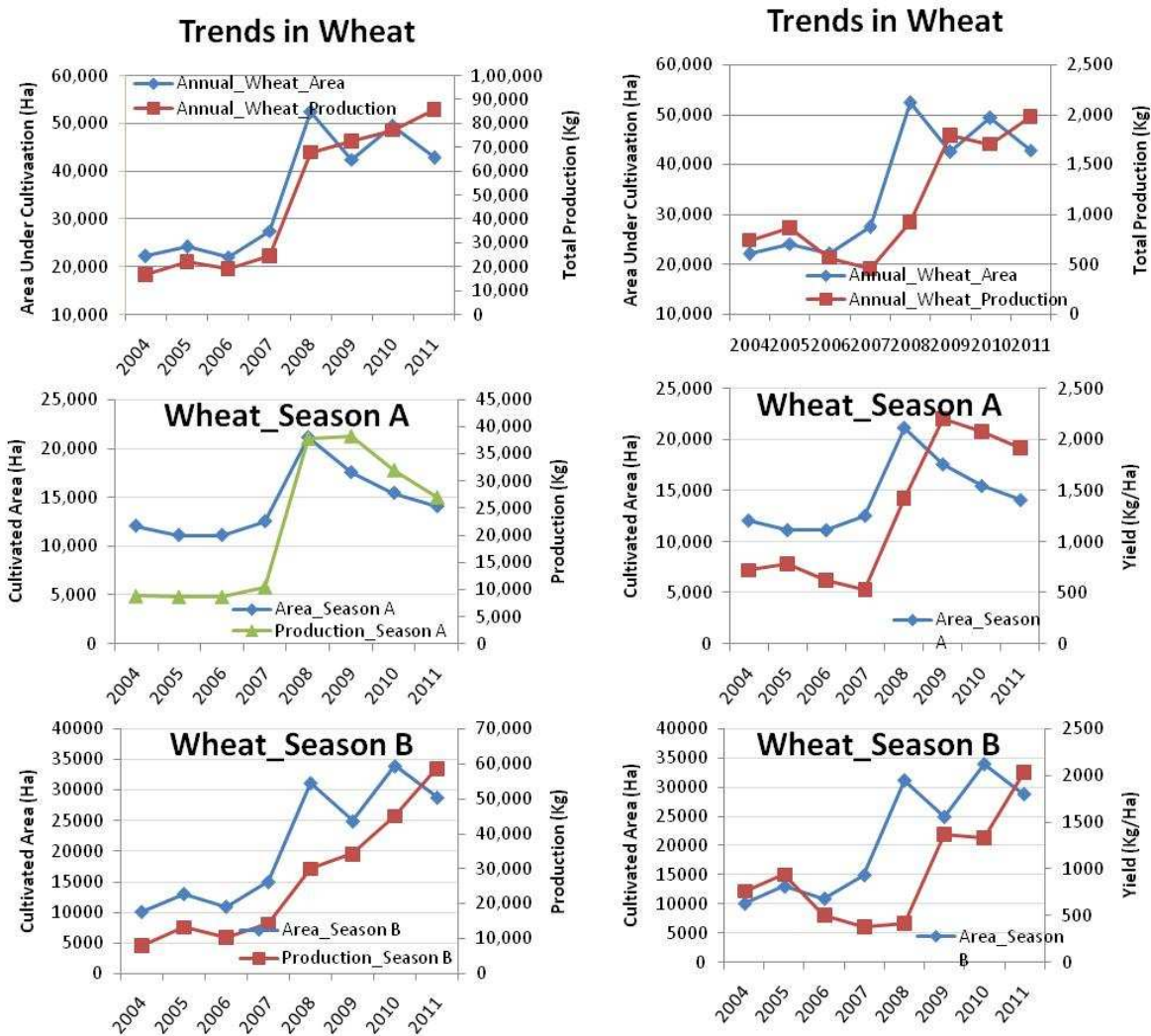


Fig.6. Changes in wheat cultivation, production and yields during the last 8 years

Table.7. Correlation coefficients between area and production, and area and yield for wheat cultivated during the two seasons in the past eight years in Rwanda

| Season | Area and production | Area and yield |
|----------|---------------------|----------------|
| Season A | 1.0 | 0.634 |
| Season B | 0.874 | 0.499 |

The area under wheat cultivation increased significantly between 2006 and 2008. However since then, both the area under wheat cultivation and yield has been declining during season A. Despite a lack of significant changes in area under wheat cultivation during season B, both the yields and total production has been increasing. This suggests that land use consolidation could be more efficient during season B than season A.

4.2.2.5. Rice

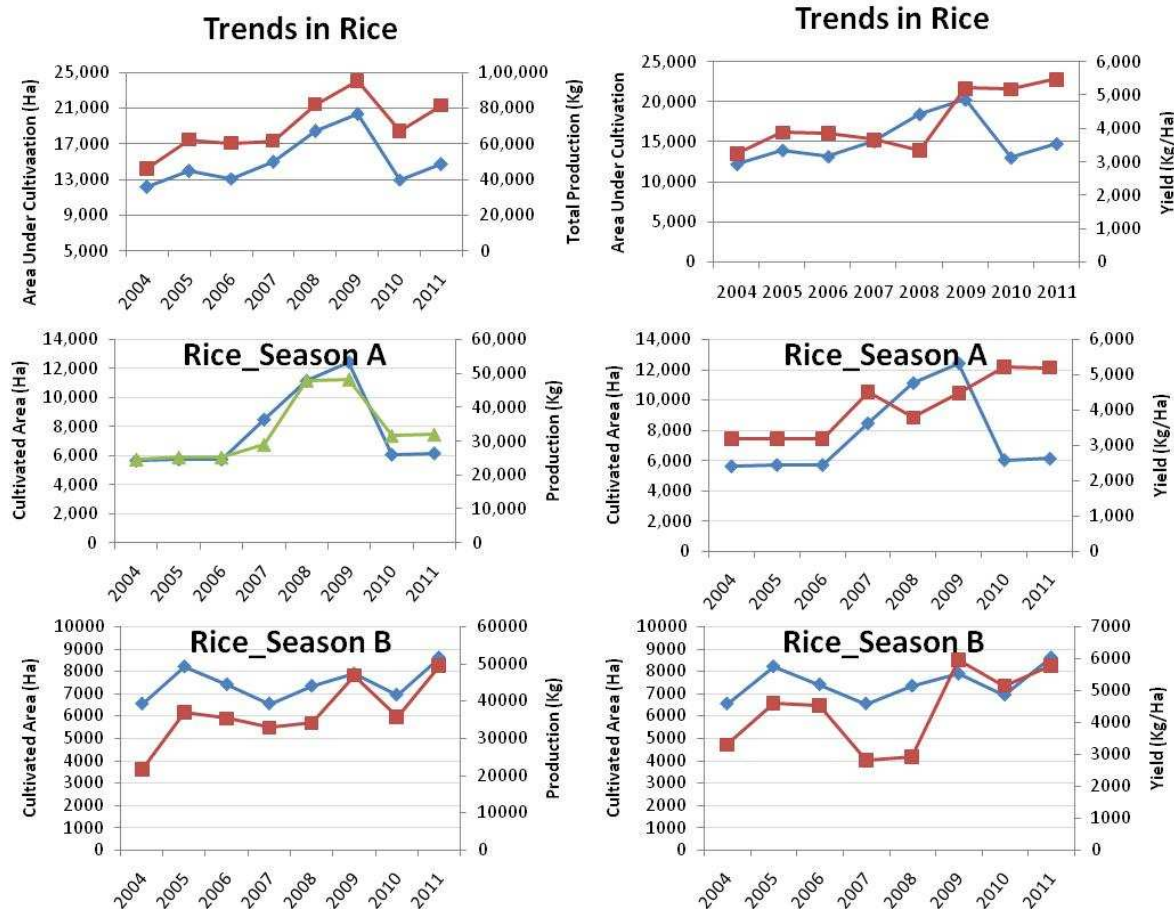


Fig.6. Trends in rice cultivation, production and yields since 2004

Table.7. Correlation coefficients between area and production, and area and yield for rice cultivated during the two seasons in the past eight years in Rwanda

| Season | Area and production | Area and yield |
|----------|---------------------|----------------|
| Season A | 1.0 | 0.174 |
| Season B | 0.822 | 0.698 |

Rice presents a typical case where the production and yields are parallel to the land area under cultivation. The increases in land area and production are almost identical during season A. Increase in land area under cultivation however has not significantly influenced the yield during season A. Hence non-land factors might have played a key role during season A. Thus while increase in production shall be envisaged with further consolidation and/or expansion of land area, further increase in productivity of rice shall be more dependent on non-land factors.

4.2.2.6. Soybean

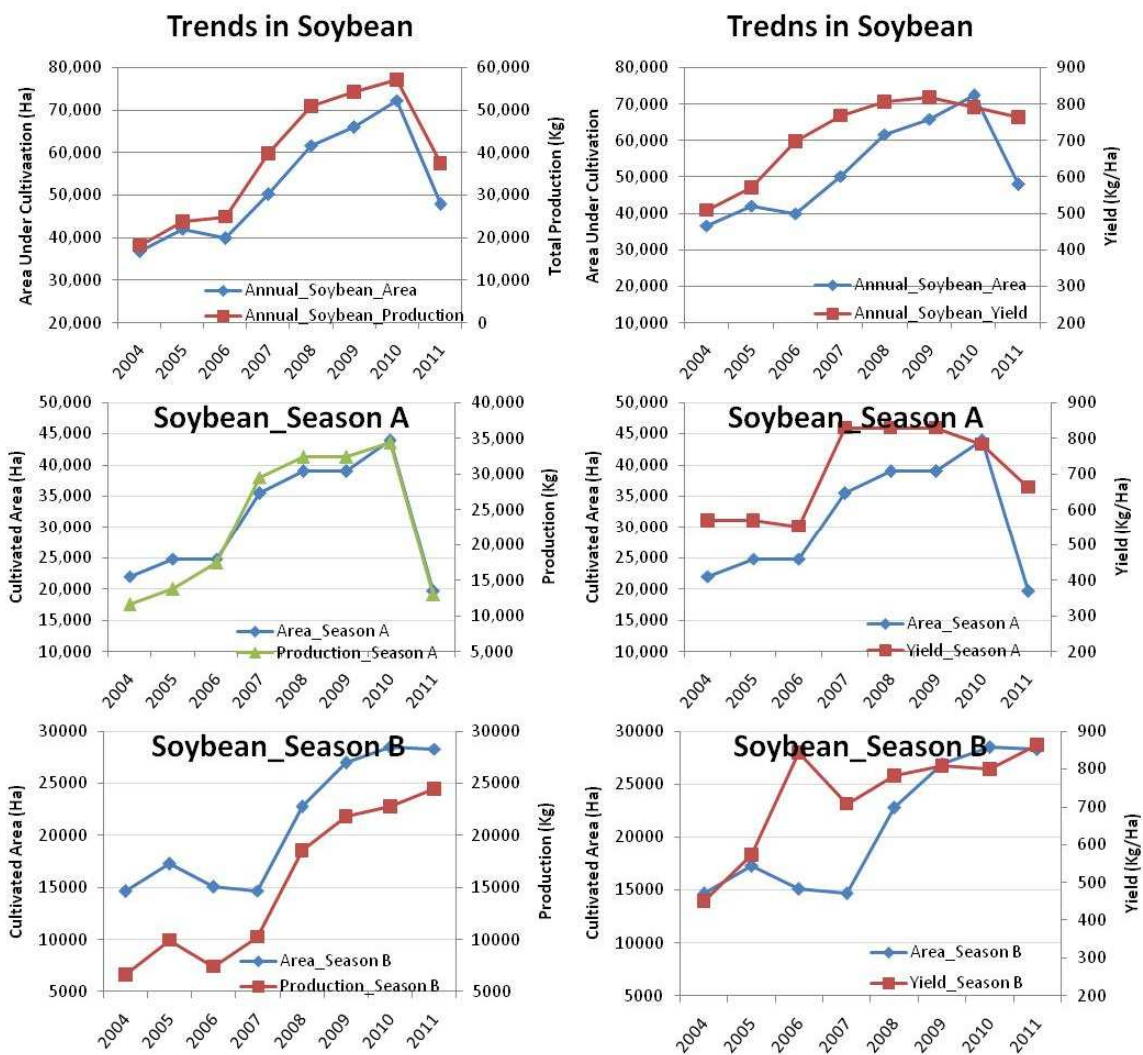


Fig.7. Area under cultivation of soybean, production and productivity (yield) since 2004

Table.8. Correlation coefficients between area and production, and area and yield for soybean cultivated during the two seasons in the past eight years in Rwanda

| Season | Area and production | Area and yield |
|----------|---------------------|----------------|
| Season A | 1.0 | 0.847 |
| Season B | 0.984 | 0.608 |

There is a strong correlation between land area under cultivation and the total production of soybean. The yield levels do not show much difference with increase in land area in the past five years. Thus the non-land factors influencing yield levels of soybean have not been improved in the past 5 years. Hence the total soybean production is proportional to the land area. Hence increment in soybean production presently is a function of land area. Therefore while more attention is needed to raise productivity, consolidation of land under soybean cultivation shall be continued.

4.2.2.7. Beans

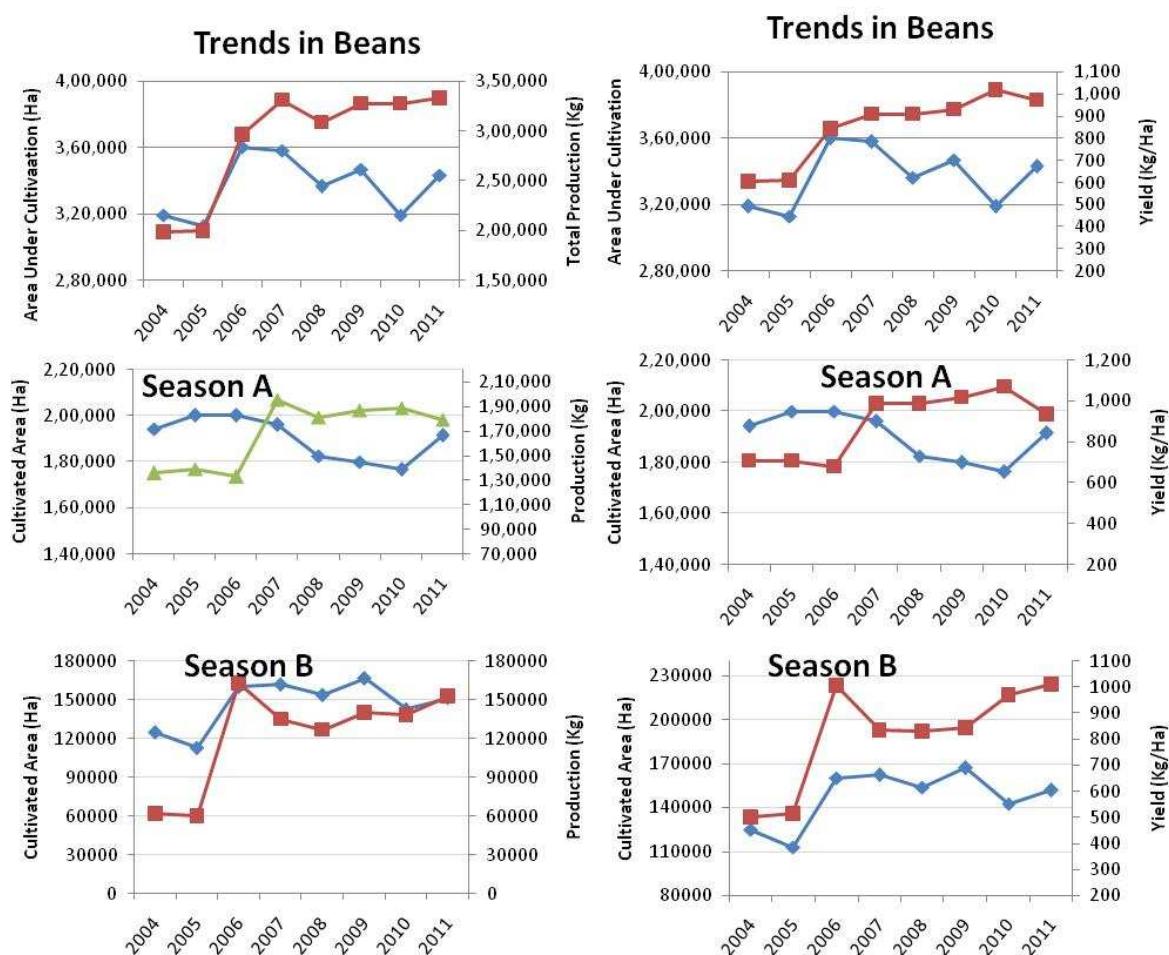


Fig.8. Changes in area under cultivation of beans, production and yield levels in the past eight years

Table.9. Correlation coefficients between area and production, and area and yield for beans cultivated during the two seasons in the past eight years in Rwanda

| Season | Area and production | Area and yield |
|----------|---------------------|----------------|
| Season A | non-linear | non-linear |
| Season B | 0.886 | 0.772 |

The area under beans cultivation has not increased significantly since 2007. The correlation between area and production and between area and yield are non-linear. This is due to fluctuations in the area under beans production. However, changes in production of beans show casual positive relationship with changes in area under bean cultivation. This suggests that the scopes for increase in beans production currently revolve around increase in area under cultivation. Hence both land consolidation and non-land factors need to be improved to increase production of beans.

4.3. Consolidation of lands under priority crops gradually replace 'other' crops

In addition to the priority food crops promoted by CIP, other food crops such as banana (cooking, beer and fruit), sweet potato, sorghum and vegetables such as dodo, gourds, egg plants, onion and cabbages are also traditionally grown to meet household and market needs. The land area under cultivation of these 'other' crops is continuously under pressure from priority crops. The share of land cultivated with other crops has been steadily declining between 2004 and 2011 from 52.6% to 42.4% of total land area under cultivation (Fig. 9).

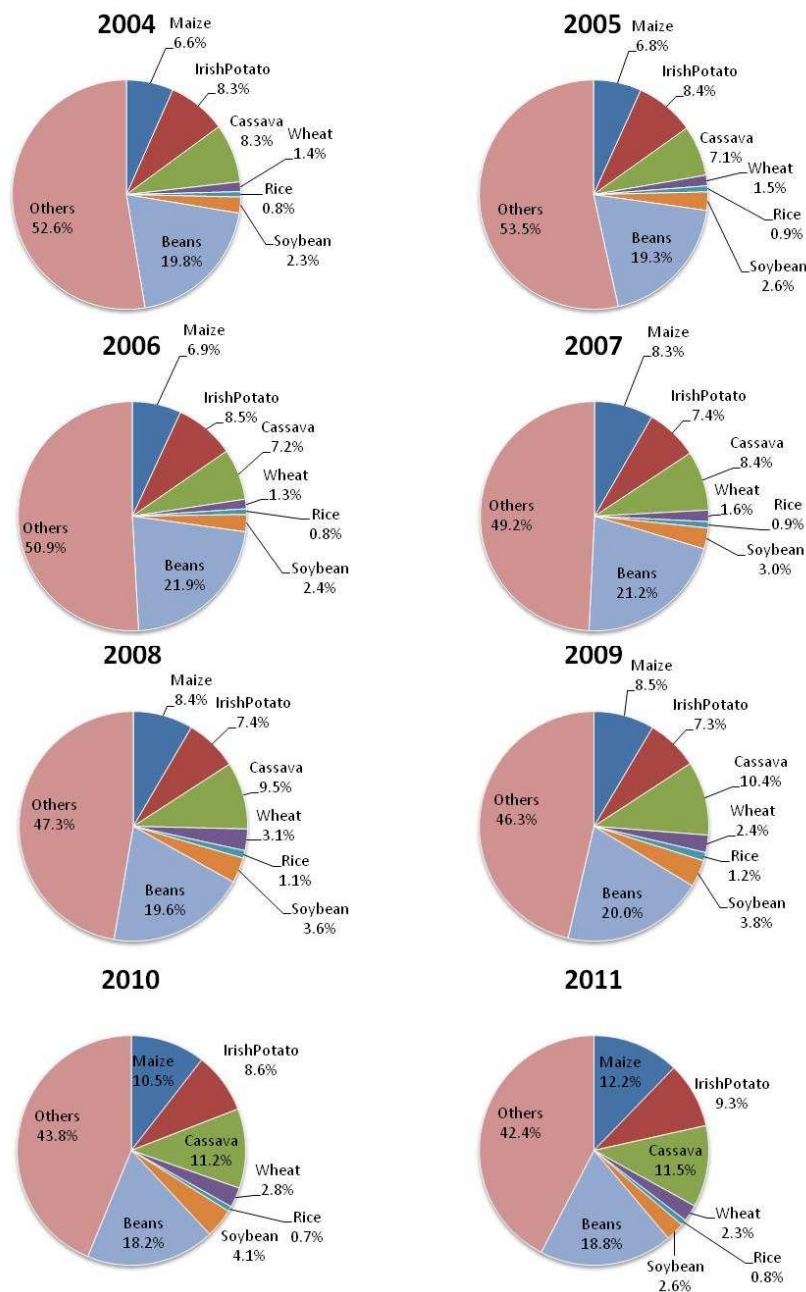


Fig.9. Share of land areas cultivated with priority crops and other crops since 2004.

In real terms, between 2004 and 2011, the area under cultivation of other crops has decreased from 332,931 Ha to 301,538 Ha during season A. In the same period, it has declined from 515,154 Ha to 471,660 Ha during season B. Despite a significant increase (about 13%) in cumulative total cultivated area under 'all' crops from 786423 Ha to 889886 Ha during season A and from 826345 Ha to 935176 Ha during season B, such a decrease in cultivation of other crops suggests that there is a significant pressure for (a) replacement of other crops with priority crops and (b) exclusion of other crops in new cultivated areas. These figures also show that consolidation of land use has worked strongly in both new- and old farm land areas in favor of priority crops.

4.4. Farmers' concerns

In general, farmers in the Eastern and Northern provinces have more readily accepted the land use consolidation policy under CIP than farmers in Southern and Western provinces, although farmers across the country expressed some concerns over the modalities. The participants generally show more hesitation during the first time than the second time around. Although a detailed survey of farmers was beyond the scope of this assignment, it appears that most of the first time participants continue to prefer the consolidated use of their lands in the ensuing seasons.

The concerns generally revolve around the fear of losing the land rights and mistrust amongst the farmers in a given area. In most instances, this is also due to weak communication along the channels of implementation. The field visits also revealed that in few cases, a sense of confrontation between farmers and implementing agencies prevail. It is clear that in these cases, the objectives of land use consolidation have not been explained to farmers by the agents. In particular, the benefits of consolidated cultivation to smallholders in using the natural resources such as water and soil more efficiently are not explained. Several smallholder farmers are also unclear about the market potential of the crops and are critical of the possible price movements at the end of harvest. Farmers in some areas still seek clarifications on the long-term legal rights over the land and the sustainability of the input use in the absence of CIP.

Both the agents and farmers in several places still have not yet clearly understood the voluntary nature of the program and the benefits associated with land use consolidation. In some places, farmers also face compulsions by the local authorities for growing priority crops in their fields. There are cases where other crops such as sweet potato were uprooted in farmers' fields by local authorities in order to enforce the consolidated cultivation of priority crops. In these instances, it appears that the implementing officials are driven by the target land area figures (shown as indicators) in their performance contracts. Some farmers expressed their misplaced feelings of having lost the ownership of their farm holdings due to their inability of growing other crops in their lands. In addition, some farmers are afraid that they will not get a good compensation for their housing which is presently located in agriculturally productive areas within the land area under consolidation. There is also a sense of feeling amongst some farmers that they were not consulted in choosing the priority crop that needs to be grown in their lands.

4.5. Food security and profitability: Some differences in rationale and priorities prevail

Through implementation of land use consolidation, CIP has increased the total production of maize by about 5 fold; wheat and cassava by about 3 fold; Irish potato, soybean and beans by about 2-fold; and rice by 30% when compared to the base levels in 2007 (Figs. 2-8). Such outputs have transformed Rwanda from a list of food insecure countries to a country with improved food security. The program has provided the much needed foundation for a positive change in Rwanda's agriculture development. Thus CIP appears to be on its trajectory towards the national objective of producing the predicted needs of growing population of Rwanda.

The large increases in production of food crops in consolidated areas have created large supply of food in local and regional markets. The seasonal production in some high production areas is more than the local demands in the respective areas. In such areas, the government and the World Food Program (WFP) are embarked on purchase of food. Under Purchase for Progress (P4P) initiative, WFP has purchased food worth 350 million Rwandan francs (about US\$600,000) in Rwanda¹⁸. The large scale production of food crops has also prompted the construction of storage facilities in several places. The government also has been actively engaged in creating a strategic food grain reserve so as to redistribute the food crops in other needy areas and seasons. Furthermore, the high production has also evoked strong interests amongst private entrepreneurs in service provision, trading, marketing and agro-processing in rural areas.

While most of the farmers agree that they are contributing towards national food security, some differences in views on what food security means exist at household levels. Food security for smallholder and resource poor farmers involves their physical (rather than economic) access to food crops which in turn directly depends on their ability to grow the needed crops in their own lands. For instance, some farmers feel that it is the ability to produce enough quantities of food grains, tubers, beans and some vegetables from their lands that enables household food security. With the implementation of one cow per family, the calorific values of these crops shall meet the nutritional demands of women and children in rural households and other vulnerable groups. Recent food and nutrition monitoring conducted in Rwanda show that the food insecure households eat starches 5 days per week and only rarely eat vegetables (2 days/week) or pulses (only once per week)¹⁹. Food and nutrition security monitoring conducted in Rwanda in the past 2 years show that food insecure households ranged between 25 and 34 percent¹⁹. Ironically however, the land use consolidation is getting accepted more slowly in western and southern provinces where the highest percentages of households are food insecure¹⁹.

Under the land use consolidation policy, the farmers are not able to diversify their choices of growing crops by using such options as intercropping, mixed cropping and diversifying the crops in the various plots of their holdings. In the present context of land use consolidation, intercropping and kitchen gardening are considered as inappropriate in most of the locations where the resources are suboptimal. Some also fret that the probability of occurrence of natural risks such as pests, diseases, and drought are higher due to synchronized cropping of the same crop and mono cropping in a given area of land consolidation. Such perceptions prompt some

¹⁸ World Food Program (2011) Purchase for Progress (P4P) initiative in Rwanda
<http://www.wfp.org/countries/rwanda>

¹⁹ World Food Program (2011) Rwanda Food and Nutrition Security Monitoring System, Round 3, September

farmers to feel food insecure since their physical access to the food crops required for their households have been reduced in their own land holdings.

In many places across the country, farmers grow onion which can be harvested in 3 months. In some farms, the onion yields up to 8 t/ Ha. In comparison, the maize crop which takes 4 months to mature, yields about 4 t/ Ha in the same fields. Given the current market prices for onion of about 250 FRW/Kg and for maize of 150 FRW/Kg, such farmers find growing onion as more profitable than maize. Thus the rationale of market oriented commercial farming in some cases implies comparative advantages in profitability over growing food security crops.

There are also cases in the Western province where local farmers sell maize produced in their fields in the local markets, and yet buy maize imported from Uganda for household consumption. In these cases, the flavor of the imported maize is found to be superior over the locally produced maize by farmers. A similar trend is also obvious in rice markets. Consumers largely prefer rice produced in Tanzania over the locally produced rice. Initially this was due to a relatively poorer quality of processing of locally produced rice leading to high percentage of broken grains. Despite the improvements made in the quality of processing of locally produced rice in the recent years, the preference of Tanzanian rice is still strong in local markets due to the inherent qualities (flavor) of Tanzanian rice (Supa). Some farmers criticize the middlemen (traders) who exploit the oversupply in low to medium production areas by subjecting their produces to lower prices. Nonetheless, most of the Rwandan farmers in high production areas claim that marketability of their farm produces has improved significantly in the past 2 years.

4.6. Linkages along the value chains in consolidated areas

The enormous increase in volumes of production of food crop produces since the introduction of CIP (Figs. 2-8) has necessitated an urgent need to ascertain the value chain of priority crops. Currently the input supply chains and output chains are largely managed by public sector. For instance, the logistics (procurement, transportation and primary distribution) of inputs such as seeds, fertilizers, machineries and soil and water management technologies are facilitated by MINAGRI through various projects and programs. The seeds and fertilizers are distributed in consolidated land areas to private distributors (service providers) through bidding procedures, while the machineries are largely supplied to farmers on a hiring basis through the public programs. Thus the costs of inputs and in some cases the produces (outputs) remain under the influence of public sector.

The accessibility of input such as seeds and fertilizers in consolidated land use areas has shown remarkable improvements in most places, although the distribution of inputs through voucher system is found to be cumbersome and time consuming by farmers. The network of private agricultural input importers and agro dealers are presently fragmented and far too weak to provide timely and cost effective supply of farm inputs in consolidated areas. However, some initiatives^{20,21} on providing a focused market for farm inputs and improving the capacity of agro

²⁰ Rwanda Agro-Dealer Development (RADD), IFDC Report 35 (3)

²¹ PReFER: Privatization of Rwanda's Fertilizer Import and Distribution System;
<http://www.ifdc.org/Projects/Current/PReFER>

dealers are currently underway. There is an urgent need for raising the supply of inputs, farmers' accessibility to inputs and decreasing transaction costs.

The coverage of proximity extension services in consolidated areas, although improving, is not sufficient. Organized extension services are absent in several places. The existing extension services fall short of farmers' expectations. Generally farmers in most of the consolidated land areas learn from each other. Farmers in most consolidated places are in dire need of improved technologies and knowledge on practices that will improve the crop productivity, use of natural resources such as soil and water and technical know-how on increasing land- and crop management. However a formal participatory extension service whereby knowledge based farmer-to-farmer dissemination of proven technologies is limited. Thus there is a widely felt need for improvements in efficient coordination and structure of extension services in consolidated areas.

The farmers' knowledge on the importance of post harvest handling, storage and processing, and their impact on the quality of farm produces is limited. Programs on educating and creating awareness on the influence of quality on the market prices of farm produces are limited in consolidated areas, and hence farmers in consolidated areas remain largely ignorant. Centers for primary processing, secondary processing and/or value addition for priority crops is low or negligible in most of the consolidated areas. Often the rural traders present a fragmented market for farm produces. There is an urgent need for establishing an organized and/or concentrated market for farm produces in several consolidated areas in the country.

4.7. SWOT analyses

The strengths, weaknesses, opportunities and threats of land use consolidation policy in the context of CIP are shown in fig. 9. The positive attributes that are internal to the organizational capabilities were described as the strengths. Factors that are within the control of organizational implementation of land use consolidation but yet detract from the ability to attain the objectives are listed as weaknesses. External factors from which the land use consolidation policy stands to benefit are described as opportunities. Threats include those factors that are beyond the control of implementing agencies that could reduce and/or hamper the benefits of the land use consolidation from reaching to the farmers and society at large.

| | |
|---|--|
| <p>Strengths:</p> <ul style="list-style-type: none"> - Comprehensive laws determining the use of farm lands - Sector Strategies and Policies - Active engagement of donors - Synergy with other public investments (irrigation, mechanization, post harvest handling, storage, hillsides) - Experience in procurement and distribution of inputs - Horizontal linkages with other Ministries (MINITERE, MINICOM, MINALOC) - Facilitation of Inputs (seeds, fertilizers) - Established delivery service system (service providers) - Strong Vertical and horizontal linkages with grass root level beneficiaries <ul style="list-style-type: none"> District-Sector-Cell- Umudugudu Integrated services Network of farmers' cooperatives and Imbaragas | <p>Weaknesses:</p> <ul style="list-style-type: none"> - Misinterpretation of Land Use policies - Generalized classification of zones for priority crops - Human capacity in implementation - Weak participation/engagement of farmers in decision making - Weak Extension Network - Low reach-ability in marginal lands (remote/hilly areas) - Weak research support - Less preparedness in handling natural risks <ul style="list-style-type: none"> e.g. pest/disease outbreak, climate change - Low adoption of mechanization - Inadequate private investments in value chain - Inadequate storage and marketing services - Lack of value addition industries - Lack of branding of local farm produces |
| <p>Opportunities:</p> <ul style="list-style-type: none"> - Favorable production conditions (climate, natural resources) - Strong market demand for commodities (local and regional) - Regional integration: Economic/Trade Agreements <ul style="list-style-type: none"> EAC, COMESA GATT, WTO - Regional, International Initiatives/Collaboration/Projects - Favorable macroeconomic and policy environments - External investment interests - Integrated community (rural) development Strategies | <p>Threats:</p> <ul style="list-style-type: none"> - Sustainability <ul style="list-style-type: none"> Ecological (agronomic performance, drought, biotic stresses, weeds) Economic (subsidy costs, fuel prices) - Population pressure on land and food production - High microclimatic variability in production zones - Water scarcity and distribution/irrigation - Fluctuations in global food prices - Dynamics in trading regulations - High operational costs (transport, logistics) - Regional competition (Ugandan maize, Tanzanian rice) - Limited rural infrastructure (water, energy, transport, settlement, health) - Climate Change |

Fig.9. SWOT analyses showing strengths, weaknesses, opportunities and threats of increasing agricultural productivity and food security through land use consolidation

5. Lessons learned

The Lessons Learned from the implementation of land use consolidation policy under CIP summarizes the information gathered on the success stories, the felt concerns and the perceived impressions on what worked well and what did not work well. Overall, the concept of land use consolidation is increasingly getting accepted by farmers as beneficial. Most of the issues stem from how it is implemented, and thus the problems are mostly institutional in nature although some technical issues also exist.

1. Consolidated cultivation of priority crops served as a key factor in raising production

Growing crops in a consolidated fashion in a given area has been a major driving force for the many successes accomplished by CIP in the country. It is clear from the data obtained on production and productivity (crop yield) that the consolidation of lands has led to significant increase in productivity of all the priority crops. These results, when made visible to farmers in hitherto unconsolidated land areas, will motivate them to join the consolidation efforts. It is important to note however that the correlation between land area and production and productivity are variable between seasons (Figs. 2-8) suggesting that the consolidation of land use require seasonal appropriation of crops.

2. Land use consolidation has improved the efficiency of delivery systems

The distribution of farm inputs in consolidated areas has been well received by the smallholder farmers. Recent surveys made by IFDC¹⁵ confirm that fertilizer user rate has increased significantly as a result of land use consolidation. The distribution of improved seeds and the rates of adoption of mechanization are also typically higher in consolidated lands. The service provider network system in various districts has improved their efficiency in distributing the inputs in consolidated land areas. This shall be attributed to the greater degree of synergy between other core activities of MINAGRI such as irrigation, mechanization, post harvest handling and storage in consolidated land areas.

3. CIP relies on local government authorities who do not have the same understanding on the principles of land use consolidation

The purpose of land use consolidation is to increase productivity by enabling efficient delivery of services such as farm inputs, proximity extension services, integrated post harvest handling and storage (PHHS) and market facilities. Thus the intended meaning of land use consolidation is to mobilize farmers cultivating in a given area together and help decide to grow the same crop by themselves in a manner that there is no other crop grown in between, with a minimum of 5 Ha in a given site. But the purpose and meaning often get lost amongst or misunderstood by the local government authorities who tend to interpret that the policy is to ensure that farmers grow a particular priority crop regardless of the non-land components/factors that play a significant role in improving the productivity in smallholder farms. This is mainly because the recently decentralized administrative structures are not yet fully integrated with national agricultural development programs. Hence they do not currently share the same perceptions towards productivity as the MINAGRI staff. However given the human capacity constraints, the implementation of land use consolidation under CIP is increasingly dependent on the local government authorities.

4. Clarifications on the understanding of terms of arrangements under land use consolidation

Most of the first time participants engage in land use consolidation without knowing the terms of their participation. The problem is acute with those having their housings in the agriculturally productive areas. One of the common fears amongst farmers is that they will lose house- and land rights without a good compensation. This is mainly due to mistrust and lack of clarifications from officiating intermediaries on the terms of agreements. The current activities under CIP on mobilization of farmers in land consolidation thus do not sufficiently motivate the farmers neither by explaining the benefits of consolidation or by providing the terms of agreements in written or vocal formats, despite the fact that laws are in favor of the farmers.

5. Need for improved communication amongst the key players

Land use consolidation is a pre requisite for receiving the input packages under CIP. While the land use consolidation is implemented by local authorities in conjunction with MINAGRI, the inputs are supplied through service providers who do not have adequate capacity to monitor/integrate with local administration. The grass root level MINAGRI-RAB officers and MINALOC officers often have differing views of their roles in agricultural development (even though they work with the same farmer groups). Most local district authorities feel that the district agronomist reports to, and is more interested in following directives from MINAGRI-RAB. On the contrary, the district agronomists hope the mayors take more interest in productivity issues. Furthermore, they feel that if the mayors use their leadership concerning non-land factors such as PHHS and marketing, the farmers would quickly accept and follow the land use consolidation.

The district- and sector level agronomists working for the local government do not carry the same message from MINAGRI-RAB as they fall under different administrations. More importantly the contexts such as food security and land productivity in their messages often are absent or not consistent. There is also a need to integrate other stakeholders and donor funded agriculture projects/programs more efficiently in motivating farmers and thereby promoting land use consolidation and other activities under CIP.

6. Local authorities are driven by indicators under their performance contracts

MINAGRI has specified the target figures for area under cultivation of priority crops through consolidation in the performance contracts of the districts. Instead of leading the farmers from the front to participate in consolidation of their farm lands by highlighting the benefits, the district- and sector level agronomists in some areas of the country strive hard to achieve this target by forcing the farmers (pulling other crops out of the soil in farmers' fields regardless of the stage of crop growth) to engage into consolidation. This often leads to resistance and worsen the already misplaced fears of losing the land rights amongst farming community.

7. Selection of priority crops need to be refined under agro ecological zones

Given the large degree of variations in microclimatic conditions (soil type, nutrient profile, water availability) within the agro ecological zones often within a cell, the crops often do not have the consistency in their performance. Currently the recommendation of priority crops by CIP is founded on crop appropriations that are based on the broader classification of agro ecological zones in the country. Due to such a top-to-bottom approach on selection of priority crops, the need for farmers' participatory approach is over looked in most of the places. This often leads to difficulties in implementing the land use consolidation policy in some areas.

8. Risks associated with decreased production of local food or subsistence crops

The successful implementation of land use consolidation under CIP has led to increased mono cropping in some areas. Such intensification of production of priority crops over a larger area often exposes crops to newer pests and diseases. For instance, parasitic weeds such as *Striga spp.* and disease epidemics such as blast in rice and smut in maize are common occurrences in various pockets of consolidated areas. The preparedness of farmers and the agronomists against such threats are however low, thus constantly placing the food security of rural livelihoods at risk. The common perception amongst farmers that inter cropping (sowing of crops in different rows) is not allowed under land use consolidation needs clarification. It is also possible that the continuum of farmers' innovation with traditional crops and agriculture has abruptly ended due to a radical shift in land use patterns in favor of priority crops.

9. Comparative advantages of priority crops over 'other' crops

Cultivation of priority crops in several parts of the country has improved the profitability and revenues of farmers, although in some cases there are scenarios where the profitability of other (non priority) crops appears to be significantly higher over the priority crops proposed under land use consolidation. As the consolidated land area under priority crops increase rapidly, the ability of farmers to grow other profitable crops are being limited under the context of land use consolidation. Furthermore, the ability of farmers to grow subsistence crops that will ensure household food security is also under pressure. Thus despite the comparative advantages, there is limited compromise between priority crops and other profitable/subsistence crops.

10. The impact of land use consolidation on rural household food security/vulnerability needs to be asserted

Since the target figures for land area under consolidated production of priority crops were developed by CIP on the basis of the projected demands for the growing population, food security appears to have been assumed as the production of the required food locally while indeed it might imply national food sovereignty. In a globalized market however, whether conciliation shall be made between targets for national food sovereignty by allowing a small window for food trade needs to be addressed. This would reduce the pressure on land for cultivation of other traditional crops. In addition, the smallholders' notion of attaining household food security through physical access to food crops from their own land holdings also requires additional focus. How the land use consolidation has changed the food security/vulnerability of the rural households that hitherto have been producing their required food crops is not clearly understood.

11. Non-land factors influencing productivity and profitability require more synergy

The non linear relationship between land area under cultivation of priority crops and productivity (Figs. 2-8) show that the non-land factors need renewed focus for further increase in productivity and economic profitability of priority crops. Many farmers are new to growing priority crops and therefore need to acquire knowledge on crop production and management practices. Although more than 80% of farmers under CIP use fertilizers, they lack guidance on how to efficiently and sustainably manage the soil fertility and other inputs. Extension services on technical know-how on technologies on production and mechanization are inadequate in consolidated land use areas.

The surplus production has attracted the interests of WFP and the government to consider purchase of farm produces. Yet the rapid increase in volumes of production in

consolidated land areas also has posed a huge challenge of storing and marketing of the farm outputs. The government has established several storage facilities and created awareness on post harvest handling of farm produces. Such efforts need to be scaled up in other consolidated areas across the country. Given the limited storage facilities, the farmers in several production areas still rely largely on the rural traders who are far too fragmented and less efficient in stabilizing the prices and quality of produces. The lengthy and time consuming procedures followed by cooperatives on collecting the produces, bidding and realizing the cash force a large number of smallholders to sell their products to rural traders.

The network of private traders and processors nevertheless has shown significant improvements in high producing areas in the recent times. The horizontal- and vertical linkages of actors along the value chain that can influence the overall effectiveness of the production, distribution and marketing systems however lack the necessary attention in areas where consolidation of land use are being implemented.

12. Sustainability of land use consolidation and crop intensification

The sustainability of crop intensification driven by land use consolidation will depend on the ecological, economical and social benefits that are felt by the farmers and the public at large. The higher crop yields observed in the consolidated areas supports the view that the land use consolidation will be economically advantageous if marketing and other segments of the value chains are adequately addressed. As the production increases, further considerations on attaining economic and social sustainability of land use consolidation by generating off-farm employment opportunities through rural industries that are based on agro-processing, trading and other supply chain activities are currently lacking. The cost effectiveness of investments in mechanization and irrigation are found to be higher in areas where the land is used in a consolidated fashion. For instance, the tractor hiring program is more successful in consolidated land areas than in other places in the country.

The importance of environmental sustainability through crop rotation and a range of other agricultural approaches, practices and technologies that would promote efficient use of natural resources such as soil, water, fauna and other flora has not yet been given due consideration under land use consolidation. Currently CIP lays more emphasis on inorganic fertilizers. As a result, organic manures are not being promoted in consolidated land areas. Achieving sustainable crop production intensification through an ecosystem approach promoting the trend from non-renewable external agricultural inputs towards biological inputs has also not seen attention under land use consolidation. However, the strong and frequent interactions between MINAGRI with grass root levels such as cooperatives suggests that consolidation of farm land use shall sustainably intensify the crop production and ensure food security in the country.

13. Impacts of land consolidation on women farmers is unclear

It is not clear if women, and in particular women-headed households, enjoyed the benefits associated with new consolidation policy to the same extent as men. More particularly whether the impact of cultivation of priority crops has affected the nutritional status of women and children have not yet been understood. The local authorities feel that it is possible that the land use consolidation under crop intensification program may have some unintended effects of marginalizing women. This is mainly because of the traditional views on the role of women as well as constraints of informal land inheritance and decision making processes in rural households. Monitoring and evaluation of the extent of women's participation have not yet been included under land use consolidation.

14. Limitations in the current data collection systems, monitoring and evaluation

Crop assessment is the major source of data on area under cultivation, production and yield levels in various districts. Other information such as the land area under consolidation for all the crops, use of inputs (improved seeds and fertilizers), gender impact, market accessibility, profitability and food security/vulnerability of rural households are not available under the crop assessment. The extent of land use consolidation under CIP is currently available only for maize and wheat. However data on the extent of land under consolidated use is not available for other priority crops with CIP. This is mainly due to lack of efforts in capturing such information. It is also common that some data sets are rough estimates felt by agronomists and/or program officers. This affects the ability to critically monitor and evaluate the impacts of land use consolidation.

6. Recommendations

The lessons learned from the implementation of land use consolidation policy provide the basis for recommendations for further improvement of processes and procedures of implementation and for avoidance of recurrence of any significant adverse effects/trends. Attention needs to be paid on how to use the strengths of current consolidation efforts to take advantage of opportunities and minimize the threats that are external to the system.

The current land use consolidation policy in Rwanda encourages crop specialization to realize economies of scale and to orient the agricultural sector more towards the commercial market. Despite the consolidation of farming, a large number of farmers continue to maintain smallholdings. And therefore some of the old problems still persist and some new challenges have emerged. Policy instruments should therefore enhance smallholders' productivity and competitiveness in order to ensure the socioeconomic benefits of land use consolidation. It is therefore crucial to consider the views from bottom in order to determine the effectiveness of land use consolidation. The following recommendations hence revolve around the removal of barriers that constrain smallholders from attaining the objectives of land use consolidation. The recommendations below are classified on the basis of (a) issues/observations (section 5) made in the study and (b) major themes of interventions:

6.1. Recommended actions/options for the observed issues

| Observations/Issues | Recommended Actions/Options |
|---|---|
| <p>1. Consolidated cultivation of priority crops served as a key factor in raising production</p> | <ul style="list-style-type: none"> • Conduct periodical technical reviews with due diligence on seasonal appropriations, sustainability, profitability and further improvement of crop 'productivity' • Encourage more investments in research to develop high yielding varieties and improve production efficiency in smallholder farms • Enhance monitoring capacities of land use consolidation, usage of the delivered vouchers and inputs (especially fertilizers) at grass root level by organizing smaller groups of farmers in consolidated land areas |
| <p>2. Land use consolidation has improved the efficiency of delivery systems</p> | <ul style="list-style-type: none"> • Improve reach-ability and timeliness of supply of inputs in remote and hilly areas • Gradually reduce government interventions in procurement, distribution and delivery of inputs in already consolidated areas • Promote public- and private investments by increasing the cost effectiveness and adoption rates of other new technologies, mechanization, public- and private services along the value chain |
| <p>3. CIP relies on local government authorities who do not have the same understanding on the principles of land use consolidation</p> | <ul style="list-style-type: none"> • Organize provincial- and national workshops for local administration authorities to explain the objectives, context, and governance of land use consolidation and farming models • Increase human capacity under crop intensification program to refine seasonal/annual planning and coordination of land use consolidation activities, and improve communication between local administration authorities and farmers • Integrate activities under land use consolidation with other donor projects/programs at different layers (land management, natural resource management, cooperatives, extension services, marketing, finance) • Provide clarifications on whether 'inter cropping' is allowed in consolidated lands • Dissuade mixed cropping in consolidated lands • Emphasize on the voluntary nature of the program • Set up smaller groups of farmers at grass root levels will improve monitoring and evaluation of consolidated land use |

| Observations/Issues | Recommended Actions/Options |
|---|---|
| <p>4. Clarifications on the understanding of terms of arrangements under land use consolidation</p> | <ul style="list-style-type: none"> • Organize aggressive campaigns to sensitize farmers at cell levels • Include farmers and representatives of local communities in all agriculture related land use policies • Provide legal assistance to farmers wherever necessary • Address any grievances, unintended consequences and stakeholders who were affected by the land use consolidation |
| <p>5. Need for improved communication amongst the key players</p> | <ul style="list-style-type: none"> • Streamline and review institutional responsibilities to strengthen coordination between agencies • Organize regular meetings with district- and sector agronomists, service providers and local administration authorities • Establish effective consultations that will enable representative participation of stakeholders • Increase participation of farmers in decision-making on land use patterns • Form coordination bodies to integrate the activities of different organizations to implement land use consolidation |
| <p>6. Local authorities are driven by indicators under their performance contracts</p> | <ul style="list-style-type: none"> • Moderate the target figures on land use consolidation – emphasize on gradual increments over the next few years • Set new indicators such as volumes of production, usage rate of improved seeds and fertilizers in consolidated land areas • Revitalize focus on productivity by removing non-agriculture mandates from district- and sector agronomists • Lead the farmers from the front in growing priority crops in consolidated areas than forcing land use consolidation or insisting the choice of crops that are to be grown • Refrain from forceful clearing/pulling of other crops from farmers' fields located in areas that are marked for consolidation • Define responsibilities and curbs for local administration authorities on land use consolidation • Establish future consolidation plans by including realistic targets and the required actions |

| Observations/Issues | Recommended Actions/Options |
|--|---|
| <p>7. <i>Selection of priority crops need to be refined under agro ecological zones</i></p> | <ul style="list-style-type: none"> • Establish detailed maps on soil, microclimate, water availability and crop history of sites/cells • Refine the currently available blanket crop recommendations giving due considerations to differences in microclimate, soil type and adaptability in sites/cells/sectors/districts under each agro ecological zone • Include farmers in the decision making process through a participatory approach • Routinely improve the varietal appropriation by selecting and/or diversifying new and improved varieties that are superior in performance and resistance to biotic- and abiotic stresses |
| <p>8. <i>Risks associated with decreased production of local food crops or subsistence crops</i></p> | <ul style="list-style-type: none"> • Determine the appropriation of inter cropping systems • Promote rotation of priority crops with other food/cash crops in consolidated land areas • Develop shorter duration varieties of priority- and other crops to accommodate the other crops in one of the three seasons in consolidated land areas • Amplify and extend the spillover effects of the means of raising productivity (usage of fertilizers, irrigation, mechanization) to other crops • Encourage on-farm innovation of farmers in applying their knowledge gained from traditional crops in the cultivation of priority crops |
| <p>9. <i>Comparative advantages of priority crops over 'other' crops</i></p> | <ul style="list-style-type: none"> • Demonstrate the profitability and other advantages of growing priority crops over other crops in earmarked areas for consolidation, if necessary • Redefine the packages (HYV, hybrids, subsidies or free services) so as to outstrip the profitability of other crops in lands marked for consolidated use • Acknowledge and encourage other crops that are more profitable to the farmers in proven locations • Improve the cost effectiveness of new technologies, mechanization, irrigation command areas and marketability in consolidated land use areas • Improve the synergies of donor projects and programs to widen the profitability of priority crops over other crops |

| Observations/Issues | Recommended Actions/Options |
|--|---|
| <p>10. <i>The impact of land use consolidation on rural household food security/vulnerability needs to be asserted</i></p> | <ul style="list-style-type: none"> • Monitor and evaluate the impacts on food supply and security/vulnerability as farmers shift production to priority crops • Assess the changes in food consumption patterns (dietary habits), nutritional/calorific balances in women and children in consolidated land areas • Investigate the changes in purchasing power/adequacy of farm families in meeting their essential household needs in consolidated land areas • Improve data collection and include socio-economic components in the surveys that could reflect the impacts of land use consolidation on food security, profitability and gender |
| <p>11. <i>Non-land factors influencing productivity and profitability require more synergy</i></p> | <ul style="list-style-type: none"> • Continue introduction of new and superior, high yielding varieties of priority crops • Increase the input use efficiency – fertilizers, water, and other natural resources • Increase investments in- and encourage irrigation, mechanization, and rural infrastructure through public-private partnerships • Establish organizational structure and functioning of a nation-wide comprehensive extension system for farmers in consolidated land use areas • Increase human capacity under extension services that will promote production, post harvest handling, storage and marketing of outputs in smallholder farms in consolidated areas • Improve the skills of supply chain management amongst private entrepreneurs, agro-dealers and rural traders • Provide periodic training programs on crop production, crop protection and natural resource management • Improve cohesion and help establish a network of agro dealers, traders and processors in consolidated land areas • Minimize post harvest losses of priority crops through creation of awareness and training on handling and storage • Improve bargaining power of producers by setting up cooperatives in new consolidated areas, and inculcating organizational, business and managerial skills • Improve transparency in rural trading by setting up a registry of approved traders in consolidated areas |

| Observations/Issues | Recommended Actions/Options |
|--|---|
| | <ul style="list-style-type: none"> • Facilitate market information and price forecasts in all consolidated areas • Encourage rural entrepreneurs in service provision, agro processing, trading and marketing of farm produces |
| <p>12. Sustainability of land use consolidation and crop intensification</p> | <ul style="list-style-type: none"> • Promote crop rotation and other technically proven sustainable management of natural resources • Provide farmer awareness programs on land degradation and soil erosion in consolidated land areas • Conduct regular annual technical reviews of agronomic performance of crops and land and environmental degradation in consolidated areas • Periodically assess the ‘ecological risks’ of land consolidation and crop intensification • Improve the preparedness of any natural challenges – drought, pest and diseases, etc. • Promote crop insurance against losses due to biotic and abiotic stresses (crop yield insurance/crop revenue insurance) • Set up institutional framework and financing systems to improve soil and water conservation measures • Assess the efficacy of voucher systems • Establish clear strategy on subsidy programs • Promote quality of primary products and management of by-products • Encourage and/or sponsor branding of Rwandan agricultural produces • Increase financial access/assistance to smallholders in consolidated land areas • Ensure that identified future land use consolidation locations are market oriented • Support creation of off-farm employment opportunities by encouraging micro-, small- and medium rural enterprises around supply chain, agro-processing, marketing and trading • Identify potential private investors and/or large scale buyers (super markets/franchises in the country and in the region) and facilitate linkages with producers in consolidated areas |
| <p>13. Impacts of land consolidation on women farmers is unclear</p> | <ul style="list-style-type: none"> • Promote and evaluate the extent of women farmers’ participation in land consolidation • Endorse proven technologies that will reduce the drudgery and improve the productivity of women |

| Observations/Issues | Recommended Actions/Options |
|---|--|
| | labor under intensified farming in consolidated areas <ul style="list-style-type: none"> • Assess the perceptions of women farmers' on priority crops over other crops • Ensure promotion of balanced dietary habits and nutritional intake amongst pregnant women and children in rural households |
| 14. Limitations in the current data collection systems, monitoring and evaluation | <ul style="list-style-type: none"> • Expand the scopes of crop assessment by including specific questionnaire on land use consolidation, seed and fertilizer usage • Increase technical capacity in surveys, data collection, storage and access • Assess on-farm comparative economic advantages of priority crops over other crops • Conduct a comprehensive market research on existing market conditions and market opportunities in consolidated land areas |

6.2. Recommendations based on major intervention themes

6.2.1. Improved communication

The purpose, objectives and implementation strategies of land use consolidation are not clearly understood at local administration and grass root levels. Hence it becomes critical to improve communication amongst the various stakeholders through routine briefings, meetings and workshops at sector, district, provincial and national levels. The objectives of such initiatives shall include the following:

- (i) demonstration of scopes and merits of land use consolidation
- (ii) consultations on governance
- (iii) establishment of future consolidation plans, realistic targets/areas
- (iv) sensitization of land use policies
- (v) addressing any grievances and unintended consequences, and
- (vi) legal assistance to all stakeholders who were affected by the land use consolidation

6.2.2. Participatory approach

The increased production of priority crops observed under implementation of land use consolidation shall be seen by many as a normal and expected first-round result of a top-down program supported by other parallel programs such as CIP. The challenge however lies ahead in sustaining the progress and unlocking further efficiency gains. This would require more participatory bottom-up approaches. Leveraging empirical knowledge about what works in their habitat/ecosystem could provide sustainability to the success of land use consolidation. Some of the recommendations shall include:

- i. encouraging on-farm innovation of farmers in applying their knowledge gained from traditional crops in the cultivation of priority crops
- ii. engaging farmer groups in decision-making and annual planning
- iii. participatory assessment of profitability and land use patterns

- iv. scrutinizing the appropriateness and efficiency of key elements such as crops, varieties (participatory research), subsidies, markets and other segments of value chain by small farmer groups in each sector and
- v. participatory appraisal of perceptions of women and children on food security and livelihoods

6.2.3. On-farm risk management

While there are significant benefits of growing priority crops in a consolidated fashion, there are some inherent risks to smallholders who depend on the land for food and income. As the land consolidation annuls the hitherto available option of farmers growing multiple food crops over several blocks, it is imperative to put risk protection or mitigation measures in place. These include;

- i. provision of basic training to farmers on planning on inputs, outputs, natural resource management and finance
- ii. stimulation of on-farm research on higher-yielding, disease resistant, drought tolerant varieties, crop rotation and soil and water management practices
- iii. introduction and promotion of innovative financial products on loans, subsidies, crop insurance, warehouses and machineries in consolidated land areas
- iv. establishment of grain or food reserves by setting aside foreign exchange and food importation and distribution channels to procure and/or distribute food to the people during periods of food crisis, and
- v. market-led price stabilization through appropriate regional policy framework on tariffs

6.2.4. Access to input- and output markets

The government driven initiative of supplying inputs (seeds and fertilizers) is one of the major factors in raising productivity in consolidated land areas. It is not clear if the farmers will continue to use fertilizers in the absence of such an initiative. It is therefore imperative to create a genuine demand for inputs amongst farming community prior to the exit of public interventions. The marketing of farm produces suffer from lack of a strong network of traders and/or processors and lack of transparency. The recommendations include the following:

- i. conduct a comprehensive market research on existing market conditions and market opportunities in consolidated land areas
- ii. improve reach-ability and timeliness of supply of inputs in remote and hilly areas
- iii. establish a network of agro dealers, traders and processors
- iv. develop bargaining skills of producers by setting up cooperatives in new consolidated areas, and inculcating organizational, business and managerial skills
- v. encourage micro-, small- and medium rural enterprises around supply chain, agro-processing, marketing and trading of farm inputs and farm outputs
- vi. improve transparency in rural trading by setting up a registry of approved traders in consolidated areas
- vii. facilitate market information and price forecasts in all consolidated areas
- viii. encourage rural entrepreneurs in service provision, agro processing, trading and marketing of farm produces
- ix. promote quality of primary products and management of by-products
- x. encourage and/or sponsor branding of Rwandan agricultural produces
- xi. increase financial access/assistance to smallholders in consolidated land areas
- xii. strengthen linkages between supply-side interventions and demand-side considerations

- xiii. promote public- and private investments by increasing the cost effectiveness and adoption rates of other new technologies, mechanization, public- and private services along the value chain
- xiv. improve the skills of supply chain management amongst private entrepreneurs, agro-dealers and rural traders and
- xv. gradually reduce government interventions in procurement, distribution and delivery of inputs in already consolidated areas

6.2.5. Improved monitoring and evaluation

While the principles of land use consolidation and the first round of interventions have delivered an impact on Rwanda's national food security, the monitoring and evaluation process needs significant improvement. The findings reported here suggest a shift in scale of measures of impact evaluation from physical land area and total production to productivity, ecological risks, gender impact, nutrition component of food security, methodology of data collection, socio-economic benefits and capacity gaps in implementation of land use consolidation. The recommendations include the following:

- i. Enhance monitoring capacities of land use consolidation, usage of the delivered vouchers and inputs (especially fertilizers) at grass root level by organizing smaller groups of farmers in consolidated land areas
- ii. Set up smaller groups of farmers at grass root levels will improve monitoring and evaluation of consolidated land use
- iii. Moderate the target figures on land use consolidation – emphasize on gradual increments over the next few years
- iv. Set new indicators such as volumes of production, usage rate of improved seeds and fertilizers in consolidated land areas
- v. Revitalize focus on productivity by removing non-agriculture mandates from district- and sector agronomists
- vi. Refrain from forceful clearing/pulling of other crops from farmers' fields located in areas that are marked for consolidation
- vii. Define responsibilities and curbs for local administration authorities on land use consolidation
- viii. Monitor and evaluate the impacts on food supply and security/vulnerability as farmers shift production to priority crops
- ix. Assess the changes in food consumption patterns (dietary habits), nutritional/calorific balances in women and children in consolidated land areas
- x. Investigate the changes in purchasing power/adequacy of farm families in meeting their essential household needs in consolidated land areas
- xi. Improve data collection and include socio-economic components in the surveys that could reflect the impacts of land use consolidation on food security, profitability and gender
- xii. Conduct regular annual technical reviews of agronomic performance of crops and land and environmental degradation in consolidated areas
- xiii. Periodically assess the 'ecological risks' of land consolidation and crop intensification
- xiv. evaluate the extent of women farmers' participation in land consolidation
- xv. Assess the perceptions of women farmers' on priority crops over other crops, and
- xvi. Assess on-farm comparative economic advantages of priority crops over other crops

7. Logical framework of action plan

| Objective(s) | Activities | Expected Outputs | Indicators |
|---|--|---|---|
| 1. To improve the understanding of land use consolidation policy amongst local government authorities | 1.1. Conduct provincial and/or national workshops for local administration authorities | 1.1.1. Noise in the messages to farmer on land use consolidation reduced | 1.1.1.1. Number of complaints received from farmers decreased to zero |
| | | 1.1.2. Governance and implementation of land use consolidation improved | 1.1.2.1. Number of non-voluntary participants in land use consolidation decreased to zero |
| | 1.2. Increase human capacity under crop intensification program | 1.2.1. Seasonal/annual planning and coordination of land use consolidation activities are improved | 1.2.1.1. Coverage of area under land use consolidation of priority crops increased to 80% of total cultivated area 1.2.1.2. Farmer-to-agronomist ratio improved to 200:1 in consolidated areas |
| | 1.3. Integrate activities under land use consolidation with other donor projects/programs | 1.3.1. Improved management of land, natural resources, cooperatives, extension services, marketing, finance in consolidated areas | 1.3.1. Number of training courses conducted in consolidated land areas |
| | 1.4. Set up smaller groups of farmers at grass root levels | 1.4.1. Facilitate effective monitoring and evaluation of land use consolidation | 1.4.1.1. Fertilizer user rate increased from 80% to 100% |
| 2. To elucidate terms of arrangements under land use consolidation | 2.1. Conduct campaigns on integrity of land rights and benefits under land use consolidation | 2.1.1. Farmers are sensitized at cell level | 2.1.1. At least one campaign per cell conducted in new land areas to be consolidated |
| | 2.2. Address grievances and provide legal assistance to farmers wherever necessary | 2.2.1. To create trust and clear misunderstanding amongst farmers in consolidated areas | 2.2.1.1. Number of new complaints reduced to nil |

| Objective(s) | Activities | Expected Outputs | Indicators |
|---|---|--|--|
| 3. To improve communication amongst the key players in land use consolidation | 3.1. Conduct regular meetings with district- and sector agronomists, service providers, local administration authorities and farmer representatives | 3.1.1. Institutional responsibilities are regularly reviewed and streamlined | 3.1.1.1. At least one meeting is conducted in each sector per year |
| | 3.2. Seek feed backs and consultations with representative participation of stakeholders | 3.2.1. Farmers' participation in decision-making on land use patterns increased | 3.2.1.1. Number of organizations participating in consultations |
| 4. To elucidate the rationale of land use consolidation on raising crop productivity amongst local administration authorities | 4.1. Redefine the target figures (with gradual increments) on land use consolidation | 4.1.1. The target figures in performance contracts of local administration are moderated and productivity of priority crops are emphasized | 4.1.1.1. New indicators such as yield rates, total production of priority crops are reflected in performance contracts |
| | | | 4.1.1.2. Number of forceful clearing/pulling of other crops from farmers' fields reduced to nil |
| | 4.2. Ascertain future consolidation plans by emphasizing productivity | 4.2.1. Farmers receive multi-dimensional support from local administration authorities | 4.2.1.1. On-farm yield gaps reduced to 10% |
| 5. To improve crop appropriation based on the adaptability | 5.1. Develop site-specific recommendations of priority crops to be grown in consolidated land areas | 5.1.1. Priority crops appropriated in sites/cells/sectors/districts under each agro ecological zone | 5.1.1.1. Detailed maps on soil, microclimate, water availability and crop history of sites/cells |
| | 5.2. Accelerate varietal development and diversify the options for the various agro ecological zones | 5.2.1. More cultivars of priority crops become available for farmers to choose from | 5.2.1.1. Number of varieties with superior performance, shorter duration and resistance/tolerance to stresses |
| 6. To minimize or ward-off risks associated with decreased production of local food crops or subsistence crops | 6.1. Appropriation of inter cropping systems in consolidated land use patterns established | 6.1.1. Production of other crops stimulated without any negative impact on the productivity and land areas for priority crops | 6.1.1.1. Number of other food crops grown in areas consolidated with priority crops |

| Objective(s) | Activities | Expected Outputs | Indicators |
|---|---|--|--|
| | 6.2. Endorsement of rotation of priority crops with other food crops in consolidated land areas | 6.2.1. Production of both the priority crops and other food crops improved | 6.2.1.1. Area under other crops increased from 42.4% to 50% 6.2.1.2. Number of shorter duration varieties of priority- and other crops |
| | 6.3. Extend the spillover effects of consolidation and intensification of priority crops to other crops | 6.3.1. Use of improved seeds, fertilizers and extension services for other crops improved | 6.3.1.1. Productivity of other crops increased by 50% |
| 7. To increase comparative advantages of priority crops over 'other' crops | 7.1. Evaluate and conduct demonstrations on the profitability of priority crops over other crops | 7.1.1. Farmers are able to choose priority crops based on profitability | 7.1.1.1. At least one on-farm demonstrations conducted in each sector every year |
| | 7.2. Redefine the packages (additional inputs, extension/mechanization/irrigation services) and improve the advantages and/or profitability of priority crops | 7.2.1. Productivity potential of priority crops is fully expressed in the consolidated areas | 7.2.1.1. Number of additional packages (additional inputs, extensions/mechanization/irrigation services) available to farmers in areas where profitability of priority crops is marginal |
| | 7.3. Acknowledge and encourage 'other' crops that are more profitable to the farmers in proven locations | 7.3.1. Smallholder farmers' revenue from farming is not affected by the emphasis on priority crops in consolidated areas | 7.3.1.1. Number of complaints on growing farmers' choices of crops reduced to nil |
| 8. To enhance the impact of land use consolidation on rural household food security/vulnerability | 10.1. Assess the impact of priority crops on food supply and purchasing power of supplementary foods in consolidated land areas | 10.1.1. Food security of rural households in consolidated land areas improved | 10.1.1.1. An average food consumption score of rural households in consolidated areas improved to 35 or above |
| | 10.2. Appraise the changes in food consumption patterns, nutritional/caloric balances in women and children in consolidated land areas | 10.2.1. Nutritional balance in food consumed by rural households in consolidated land areas improved | 10.2.1.1. Nutritional indicators such as stunting and underweight are reduced to a minimum of 25% and 5% respectively in consolidated areas |
| 9. To attain mutual synergies between the non-land factors and land on productivity and profitability of priority crops | 11.1. Deploy new and superior, high yielding varieties of priority crops | 11.1.1. Genetic potential of productivity of priority crops tapped | 11.1.1. Yield levels of priority crops increased by 25% |
| | 11.2. Promote improved crop production and management practices | 11.2.1. Use efficiency of inputs (seeds, fertilizers, water) improved | 11.2.1.1. Harvest index of priority crops increased by 20% |

| Objective(s) | Activities | Expected Outputs | Indicators |
|--------------|---|---|--|
| | 11.3. Establish organizational structure of a comprehensive extension system for farmers | 11.3.1. Proximity services in consolidated land areas improved | 11.3.1.1. At least one extension agent serving farmers in each cell in consolidated land use areas |
| | 11.4. Offer periodic training programs on crop production, crop protection and natural resource management | 11.4.1. Priority crop production- and management practices are improved in consolidated land areas | 11.4.1.1. At least one training course on crop production and management in each sector every year |
| | 11.5. Conduct national training workshops on supply chain management for private entrepreneurs, agro-dealers, rural traders and agro processors | 11.5.1. Cohesion and networking of agro dealers, traders and processors improved in consolidated land areas | 11.5.1.1. Volume of inputs and provision of services supplied in consolidated land areas doubled |
| | | 11.5.2. Increased transparency and supply of inputs, private services, investments along the value chain | 11.5.2.1. Market information on prices of inputs and outputs made available to farmers 11.5.2.2. Differences in market prices of inputs, outputs of priority crops between the districts narrowed to 5% |
| | 10. Sustainability of land use consolidation and crop intensification | 12.1. Perform regular technical reviews of agronomic performance of crops and land and environmental degradation in consolidated land areas | 12.1.1. Ecological risks of crop intensification assessed in consolidated areas |
| | 12.2. Promote crop rotation and other technically proven sustainable management of natural resources | 12.2.1. Pest and disease outbreaks minimized in consolidated land areas | 12.2.1.1. Number of pest/disease outbreaks reported in consolidated areas |
| | | 12.2.2. Sustainable soil fertility management practices developed, promoted and adopted | 12.2.2.1. Strategy on soil fertility management through use of organic and inorganic fertilizers 12.2.2.2. Adoption rate of organic manures |
| | 12.3. Create awareness on land degradation and soil erosion | 12.3.1. Soil and water conservation measures adapted and natural resources are used sustainably in consolidated areas | 12.3.1.1. Number of multi-media, workshop or training programs on ecological sustainability in consolidated areas |

| Objective(s) | Activities | Expected Outputs | Indicators |
|---|--|--|--|
| | 12.4. Assess efficacy of subsidy programs/vouchers to provide economic sustainability of production of priority crops | 12.4.1. Access to subsidies by smallholder farmers improved in consolidated areas | 12.4.1.1. Reports and strategy documents on subsidy programs |
| | 12.5. Facilitate linkage between potential private investors and/or large scale buyers (super markets/franchises in the country and in the region) and producers | 12.5.1. The marketability of priority crop produces in consolidated areas improved | 12.5.1.1. Number of private entrepreneurs, volumes of produces traded in consolidated areas doubled |
| 13. To improve the impacts of land consolidation on women farmers | 13.1. Encourage participation of women farmers in land use consolidation by conducting seminars and workshops | 13.1.1. Extent of women farmers' participation in land use consolidation increased 13.1.2. Unintended effects of land use consolidation on women eradicated | 13.1.1.1. Number of women training workshops/seminars |
| | 13.2. Endorse proven technologies that will reduce the drudgery | 13.1. Productivity of women labor increased in consolidated land areas | 13.1.1.1. Number of women operated machineries and participating women farmers increased by 3-fold |
| 14. To improve the current data collection systems and monitoring- and evaluation systems | 14.1. Increase human and technical capacities involved in crop assessment | 14.1.1. Data on use of improved seeds and fertilizers, area under consolidation (>5 Ha), profitability measured for all priority crops | 14.1.1.1. Reports and Newsletters on crop assessment data from consolidated land areas |
| | 14.2. Perform a comprehensive market research on existing market conditions, market opportunities, trading volumes and market prices | 14.2.1. Market information in consolidated areas become widely available to smallholder farmers | 14.2.1.1. Reports, News paper articles on price movements, forecasts, and information on traders and agro processors in consolidated areas |

8. Appendices

8.1. Terms of Reference for the Land Consolidation Program Assessment

Objectives and Tasks

The overall objective is to assess the land consolidation progress on both the demand and supply sides and assess the contribution of the land consolidation program to agricultural productivity and national food security.

The evaluation will be used mainly for programming purposes by MINAGRI and other key stakeholders and as a valuable tool which will advise on how to revise the program in order to maximize the impact of its support to agricultural productivity and national food security. It must also reflect the management needs and the institutional arrangements within the program.

This assessment will be a lesson-learning and forward-looking exercise rather than purely an assessment of past results. The emphasis, therefore, must be placed on learned lessons for a better understanding of where the land consolidation program is coming from, where it is now and what has and what has not worked as a guide for future planning.

Specifically, the assessment will:

1. Analyse the context and current planning and implementation process of the land consolidation program;
2. Evaluate the achievements and shortcomings of the land consolidation program and analyze contributing factors and causes;
3. Draw lessons learned for better planning and implementation of future activities;
4. Formulate recommendations for short, medium and long term actions;
5. Propose an action plan outline and a monitoring and evaluation framework.

Expected Results

1. Well-documented success and shortcomings;
2. Lessons learned to improve future programming;
3. An action plan based on the evaluation recommendations;
4. A framework for monitoring and evaluation

Methodology

This assessment will be articulated in the following steps:

1. Literature review: document collection, determining quantitative and qualitative data and collecting methods, information gathering;
2. Meeting with key stakeholders (public and private sectors, donors, farmers,...), conducting interviews and organizing focus groups with involved stakeholders;
3. Field visit and data gathering;
4. Data compilation, analysis, interpretation and assessment;
5. Report writing;

Duration of the Assessment

The estimated duration of this task is four weeks. The Consultant to undertake this task is expected to prepare an agenda showing specifically days for:

1. Preparatory work (collecting and analyzing the documentation, revising the terms of reference);
2. Meeting with MINAGRI officials and collecting relevant documentation;
3. Stakeholders' consultation;
4. Field visits
5. Reporting and draft report submission;
6. Review and joint discussion with MINAGRI;
7. Final report

Consultant Profile

This task will be executed by a high level expert in agriculture. It is understood that the Consultant possesses:

1. Significant knowledge of Rwandan agriculture sector development;
2. Understand the mechanism and functionality of the land consolidation program;

Reporting

The consultant will report to MINAGRI and a brief progress report will be made to the MINAGRI Permanent Secretary weekly. A draft final report will be submitted for discussion and debriefing with MINAGRI prior to the final report (in English) to be validated during a workshop in the presence of key stakeholders in the agricultural sector (AgSWG).

The outline for the assessment report is proposed as follows:

1. Executive summary (three pages max);
2. Introduction (two pages max);
3. Evaluation objectives and methodology (two pages max);
4. Findings (twenty pages max);
5. Lessons learned (four pages max)
6. Recommendations (four pages max);
7. Appendices (not limited).

Support

MINAGRI will supervise the evaluation to provide all necessary information related to the land consolidation program and program participants.