



Institute of Policy Analysis
and Research - Rwanda

Improving policy, impacting change

RWANDAN AGRICULTURE SECTOR SITUATIONAL ANALYSIS

An IPAR sector review

IPAR Rwanda Report August, 2009

Executive Summary

Introduction

This report provides an analysis of the agricultural sector, identifying the main challenges facing it and making recommendations for interventions to address the challenges. The Rwandan economy is, and will remain for the foreseeable future, heavily dependent on the agricultural sector employing as it does around 90 percent of the population, providing 91 percent of the food consumed in the country, contributing 36 percent of GDP and accounting for 70 percents of revenue from exports. However, the poor performance of the agricultural sector has been a major impediment to economic development and it now faces further challenges due to climate change as a consequence of global warming. It is unlikely to meet some of the targets for 2012 set by the EDPRS. If the country is to achieve the Millennium Development Goal of eradicating extreme poverty significantly improving the productivity of the agriculture sector is essential.

This review was carried out by an analysis of existing policies and other documents relevant to the operation and future development of the sector and consulting with key stakeholders including those directly involved with the operation of the sector.

Key Findings

- There is high potential for the development of the sector with the introduction of modern methods of farming to increase both productivity and quality of products, the development of value added production, and initiatives to increase exports;
- For the agricultural sector to make its full potential contribution to the economy a number of areas of Government policy and strategy are critical. There is a need for the road network and meteorological services to be developed, for more land to be irrigated, for the education sector to undertake research and to provide training in agriculture and entrepreneurship, for greater support for business start-up and support for export drives;
- There has been increased production and improvements in productivity since 1994, mainly due to improvements in inputs but also due to bring more land into production. However the rate of improvement in productivity has slowed in recent years and has been volatile, mainly due to the weather;
- Further improvements in agricultural production will have to come from inputs as all land suitable for cultivation has already been brought into production;
- Currently there is little use of modern technology, and a low use of fertiliser, improved seeds and pesticides due to a combination of a shortage of supply, poor distribution networks, a lack of knowledge and skills, affordability and a lack of incentives;

- There is little irrigated land and a weak meteorological capacity making the sector vulnerable to the weather related shocks;
- The quality of products are poor, nearly a third of milk produced is wasted and the proportion of high quality of tea and coffee needs to be increased;
- 90 percent of agricultural production is food crops and 66 percent is consumed by producers and the increase in food production is not keeping pace with population growth;
- There is little commercialisation or value-added production with only two percent of small enterprises in the agro-processing sector. This is due to a combination of a lack of business skills and entrepreneurship, difficulty in getting finance and a lack of a transport infrastructure to get goods to the market;
- The main export crops are tea and coffee. Coffee production has not improved since 2002 and is volatile although the high quality proportion is increasing. The production of tea has steadily increased although the proportion that is high quality has not. It is unlikely that tea or coffee exports both in terms of volume or proportion that is high quality will meet the 2012 targets. Improving exports is hampered by the high cost of transport from farm gate to port and a lack of marketing.

Main Recommendations

- The higher education sector and research institutes should be encouraged and supported in working together to carry out research, development and knowledge transfer activities relevant to the sector and delivering education and training to support the development of the sector;
- There should be an increased use of inputs, investment in land irrigation and improvements in the metrological service;
- The sector needs to be further commercialised with more production for the market and more emphasis on value-added products. The government needs to find ways to motivate producers and encourage the availability of finance for business start-up in the sector;
- The transport infrastructure needs to be improved to support both the commercialisation of the sector and increase in exports;
- The Government needs to explore ways to remove barriers to exports including the high cost of transporting products to market.

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Acronyms and abbreviations

BNR: Banque Nationale du Rwanda (National bank of Rwanda)
CAGR: Compound Annual Growth Rate
EAC: East African Community
EDPRS: Economic Development and Poverty Reduction Strategy
FAO: Food and Agriculture Organisation
GDP: Growth Domestic Products
IPAR: Institute of Policy Analysis and Research
IPPF: International Planned Parenthood Federation
ISAR: Institut des Sciences Agronomiques du Rwanda (National agriculture research institute)
MDG: Millennium Development Goals
MINAGRI: Ministry of Agriculture and Animal Resources
MINECOFIN: Ministry of finance and economic planning
MT: Metric Tons
NISR: National Institute of Statistics of Rwanda
OCIR: Office des Cultures Industrielles du Rwanda
OTF: On the Frontier
PRSP: Poverty Reduction Strategy Paper
PSF: Private Sector Federation
RAB: Rwanda Agriculture Board
RAEB: Rwanda Agriculture Export Board
RARDA: Rwanda Animal Resource Development Authority
RADA: Rwanda Agricultural Development Authority
RHODA: Rwanda Horticulture development Authority
SPAT: Strategic Policy for Agriculture Transformation
UNDP: United Nation Development Program

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Abstract

The main objective of this review is to provide reliable situation analysis of Rwandan Agricultural sector and to recommend interventional strategies that would enable the government and her development partners to come up with sustainable interventions aimed at addressing the identified challenges. Eradicating Extreme Poverty and Hunger is the number one Millennium Development Goals which is becoming more elusive for various African countries because there is need to cut national poverty rate of each African country by 30% instead of current 60%. Such reductions can only be possible if agricultural sector contributions are accelerated in each African country especially sub Saharan Africa (UNDP, 2007).

The methodology of conducting this situational analysis took cognizance of the general consultations exercise popularly referred to as *Stakeholders Engagement Exercise*, which observed with concern that poor performance in the agricultural sector poses major constrain in Rwandan development. Policy documents of MINAGRI and other associated agencies were reviewed including their strategies and Business Plans. The aim of this first stage was to identify how all these, would fit into the general development vision of the entire country as enshrined in the vision 2020. The second stage was to interact with all key stakeholders in the agriculture sector, mainly those directly involved in the day today implementation activities. The main purpose of these interactions is to undertake overall assessment in the performance trend of their respective activities.

In Rwanda, agriculture has been performing well compared to other sectors of the economy. It should be understood that agricultural sector constitutes 90% employment opportunities in the economy and 70% export revenue in the country. On the side of provision of food, 91% of domestic food is generated by the agricultural sector. The review discovered that Agriculture in Rwanda is mainly subsistence with over 90% of output being food crops. Interestingly, 66% of the total food crops are meant for domestic consumption while only 34% find their way to the market. On the side of livestock, the growth has been reasonably steady at 7% per year especially on the side of goats.

In order to enhance sector productivity and to pursue the EDPRS benchmarks, the review made recommendations including Capacity Building to farmers on business skills and marketing strategies so that their participation may shift from mere subsistence to commercial farming. Observed also was low use of modern farming methods and inputs.

1. Introduction

Rwanda has endeavoured to make grater strides in her socio economic development since 1994 the year in which the country was plunged in genocide which claimed approximately one million lives. Currently Rwanda is at the forefront among the countries that are ambitiously improving the living standards of their people. As enshrined in MDGs and her Vision 2020, it has set ambitious targets which helps in driving her sectoral development agenda come the year 2015 and 2020 respectively. With all these at the background, Rwanda is a small country with a total area of 26,338 sq. kms and a population of 9,907,509 people in all her five provinces (IPPF, 2007).

The Rwandan economy is based mainly on agriculture. In fact the sector occupies approximately 91.1% of the active population especially women and contributes to 36% of the GDP besides contributing to about 70% of the country's export revenue. This is generated majorly through exports of Coffee and Tea which are the country's major export earning crops (MINECOFIN 2007). Land resource has been considered the most important factor of production, backbone of the economy and the basis of survival for the entire population generating about 90% of food required in the country. According to USAID the population growth of Rwanda is already threatening the position of Agriculture as backbone of economy and basis of survival. Currently, according to USAID the growth rate of Rwanda is estimated at 2.7% in an environment which is already over populated at approximately 435 inhabitants per square kilometre and Gross National Income per capita of \$ 320. It is due to this scarcity of land and higher population growth, that Family planning has been at the top of national and regional agenda in all government forums. Arable land in Rwanda is estimated at 1,380,000 ha, which is about 52% of the country's surface area (DHS, 2007). On the side of livestock, the growth has been steady at around 7% annually this has enhanced increase in milk production from 58,000 tons to 257,000 tons between 2000 and 2008 (MINAGRI, 2009).

Various challenges are still being experienced in the agricultural sector including lower utilization of farm inputs, which is partly necessitated by the terrain of the country because over 39% of arable land is situated on the slopes making it impossible for the operation of tractors. Other related problems are lack of irrigation schemes and weak meteorological capacity. Currently, only 0.6% of land is under irrigation this is as a result of high irrigation cost. In ability of local farmers to access loans from banks and other financial institutions is a bigger challenge, because only estimated 2% of bank loans go to agriculture because it is considered very risky investment. The main objective of this study is to analyze the situation of Rwandan Agricultural sector and to recommend interventional strategies on the existing challenges. When conducting this situation analysis, the process took cognizance of the general consultations exercise popularly referred to as Stakeholders Engagement Exercise this was at the first stage. The second stage was to interact with all key stakeholders in the agriculture sector, mainly those directly involved in the day today implementation activities, to undertake overall assessment in the performance trend of their respective activities.

1.1 Justification of Sector Review Exercise

This review comes at a time when the agriculture sectors in Africa as a whole are facing various difficulties including the unpredictability of weather pattern and marketing factors. It is estimated that over 66% of small scale farmers in Africa lack access to international Market for their produce. Making it more difficult is that 41% of the vulnerable farmers come from Eastern Africa and these include Rwanda, Burundi, Kenya, Tanzania and Uganda (FAO, 2007). Whereas Kenya, Tanzania and Uganda have explored reasonable levels of modern agricultural techniques, Rwanda and Burundi are yet to embrace better capacity for the modern sector approach (EDPRS, 2007).

In Rwanda, Agricultural policies and strategies have been integrated into the national development planning process anchored on the Vision 2020. The Economic Development and Poverty Reduction Strategy (EDPRS, 2008-2012), as a continuation of PRSP1 (2002) sets targets for Agricultural sector, but some of these targets seem too challenging even after the end of the first phase of the Strategic Plan for Agricultural Transformation (SPAT1, 2005-2008). Currently, efforts are underway to increase quantity and quality of production in the agriculture sector. This sector review is important because it helps to identify the existing gaps in the sector activities and strategies and to recommend how to address the challenges.

1.2. Agriculture Sector Development Framework

The development framework for the agriculture sector in Rwanda reflects the laid down principles in two key documents namely the Economic Development and Poverty Reduction Strategy, Previous Poverty Reduction Strategy papers and the Agriculture related component of Millennium Development Goals. The principles involve the fact that (i) Rwandans must own and implement the sector development agenda within a common strategic framework (ii) Private Sector should be the principle investment of economic growth within the appropriate enabling environment (iii) All sections of rural populations should also participate in decision making (iv) Community based approach should promote this participation (v) Investment in human capital and maximum use of Rwandan expertise is essential to sector growth process (vi) The investment decisions by external funding agencies must sit firmly within the sector framework.

1.3. Sector Objectives

Agricultural sector is responsible for mapping out strategies on which to maintain broad self sufficiency in basic food and at the same time be able to expand export earnings by promoting Coffee, Tea and other horticultural products, thus increasing yield per acre. The sector in consultation with other relevant ones establishes policies that enable market for inputs and products to function efficiently while providing necessary marketing information for both producers and consumers.

The specific objectives for agriculture sector include among others (i) Increasing food production and ensuring optimum food security in the country (ii) Ensure growth of employment creation as the backbone of Rwandan economy (iii) Facilitates expansion of exports in the sector to fetch foreign exchange earnings (iv) strive to ensure resource conservation and poverty alleviation (MINAGRI Technical Report, 2004).

1.4. Objectives of Situation Analysis exercise

The Rwandan Agriculture sector is one of the largest sectors in terms of its share proportion to the GDP of the country; this puts it at a strategic position on issues related to studies which aim at boosting sectoral productivity. The main objective of this study is to analyze the situation of Rwandan Agricultural sector and to recommend interventional strategies on the existing challenges. Specifically the study aims to (i) Asses major agriculture sector and sub sectors performance in Rwanda (ii) Identify challenges facing agriculture (iii) map out agriculture policies and programs (iv) Suggest the recommendations on the way forward.

1.5. The expected Outcomes

The expected outcomes in this process include among others (i) a detailed Situation Analysis Report showing the review of agriculture sector in Rwanda (ii) identified challenges facing the sector (iii) suggested recommendations

1.6. Methodology

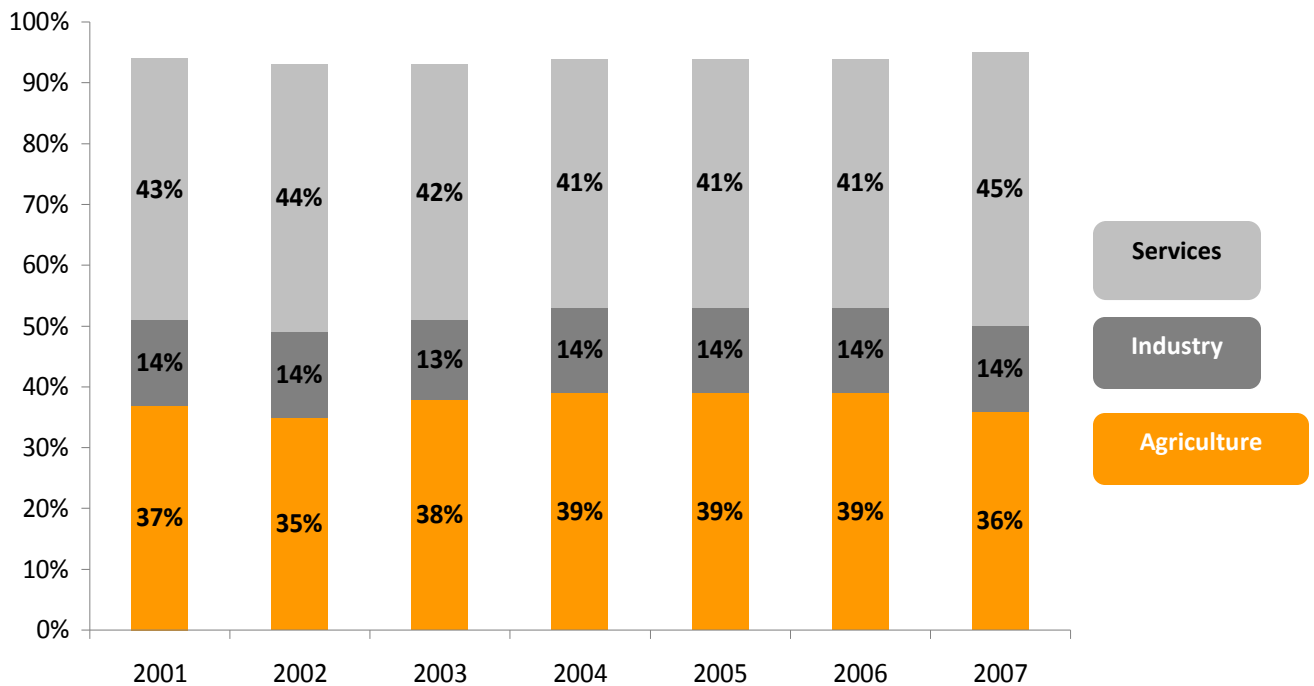
The methodology of conducting this situation analysis took cognizance of the general consultations exercise popularly referred to as *Stakeholders Engagement Exercise*, which observed with concern that poor performance in the agricultural sector poses major constrain in Rwandan development. Policy documents of MINAGRI and other associated agencies were reviewed including their strategies and Business Plans. The aim of this first stage was to identify how all these, would fit into the general

development vision of the entire country as enshrined in the vision 2020. The second stage was to interact with all key stakeholders in the agriculture sector, mainly those directly involved in the day today implementation activities. The main purpose of these interactions is to undertake overall assessment in the performance trend of their respective activities. This specifically concern how the agriculture sector stakeholders contribute to global country’s delivery chain and the key challenges they face in meeting these objectives.

2. The Strength of Agricultural Sector in Rwanda

Agricultural sector has historically been the backbone of the Rwandan economy. In addition to its contribution to GDP as shown on the graph below, the sector typically generates about 90% of employment (especially for women), about 70% of export revenues and about 90% of national food needed¹. This gives the sector much strength as the driver of economic power in the country.

Figure 1. Sectoral contributions to GDP, 2001-2007

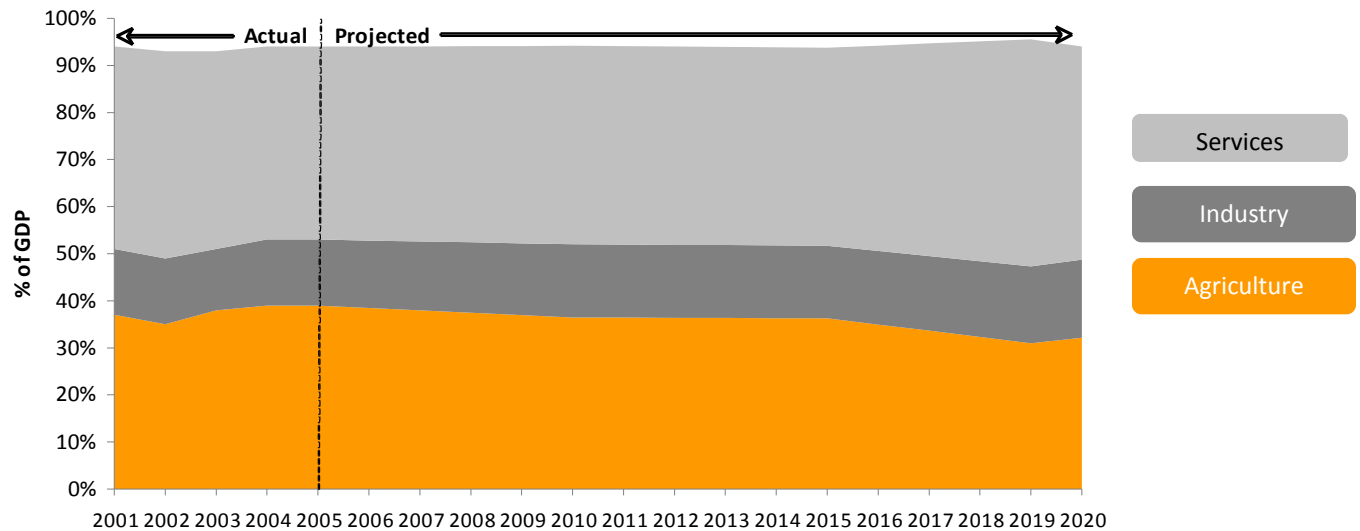


Source: MINECOFIN, 2007

¹ World Bank, 2007

Although Rwanda aims to become a service-led economy, the agricultural sector is expected to keep contributing significantly to the country's long term development process as shown below.

Figure 2. Projected Sectoral Proportion of GDP, 2001-2020²

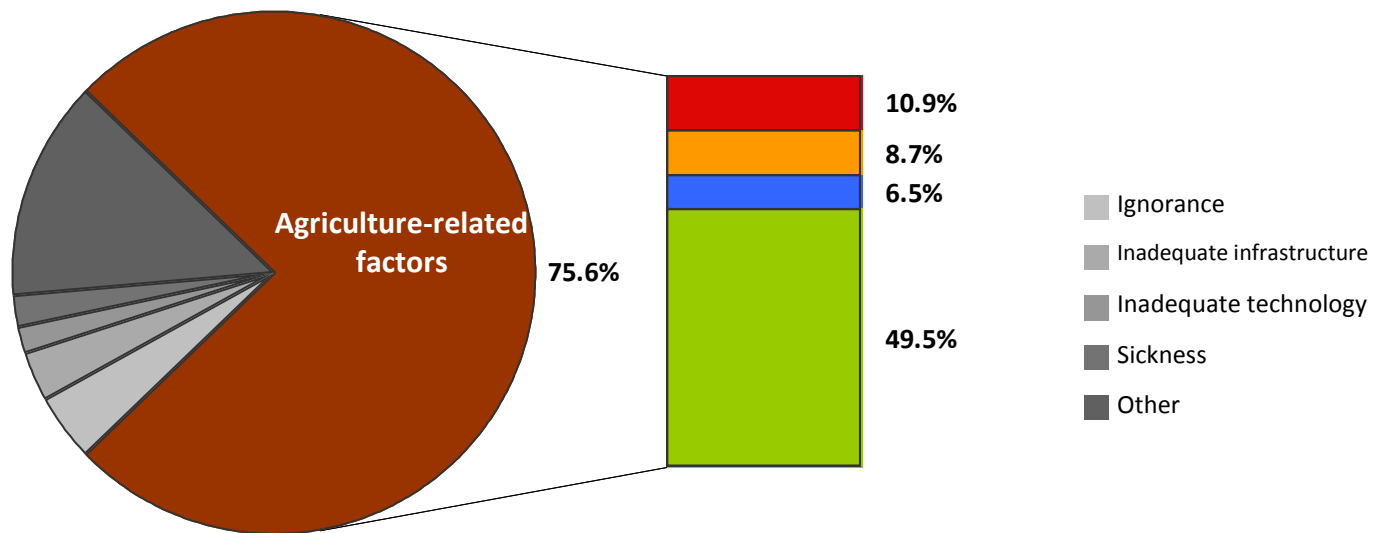


Source: MININTER, 2007; Vision 2020

Because so many livelihoods depend on agriculture, factors linked to agriculture such as lack of adequate land or non productive soils - are widely seen as a major cause of poverty and hindrance to economic development.

² **Note:** Vision2020 assumes agriculture has a 46% share of GDP in 2000. Due to differences in the method of calculation (e.g. allowances for bank charges), this is higher than the data on previous graph. To ensure consistency, we apply the changes in sectoral shares projected in Vision2020 to the observed sectoral shares as of 2005.

Figure 3. Major cause of poverty identified by survey respondents



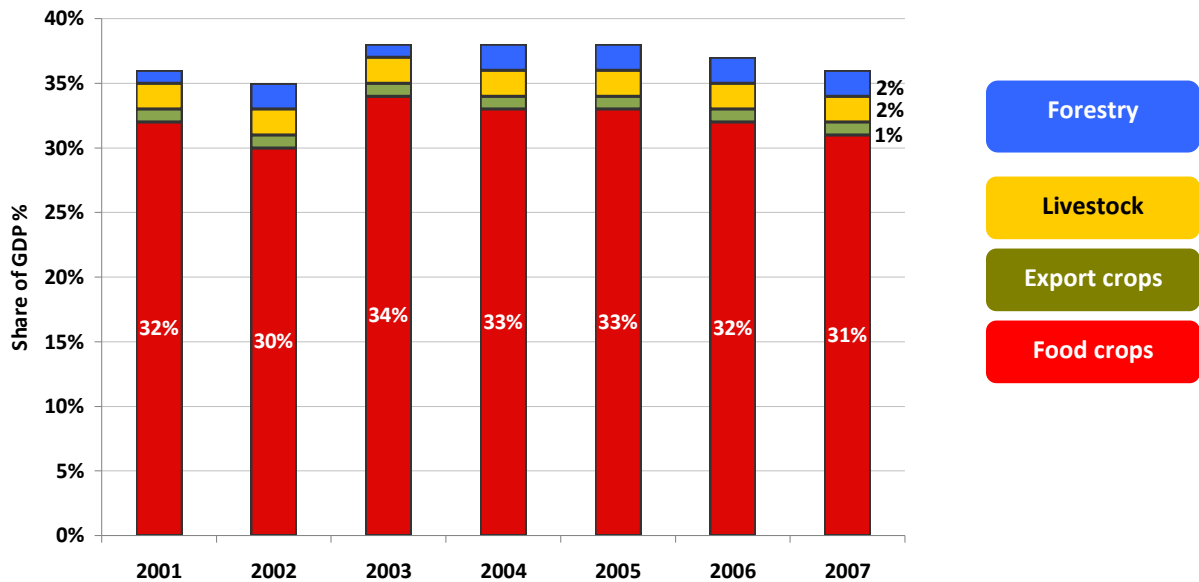
Source: MINECOFIN, 2007

2.1 Agricultural situational analysis

2.1.1 Rwandan Agricultural Sector

Despite its significant contribution to the GDP, Rwandan agricultural production is largely based on subsistence farming. As a result, food crops account for 90% of both output and cultivable land.

Figure 4. Agricultural sub-sectors and their Proportion to GDP



Source: NISR, 2007

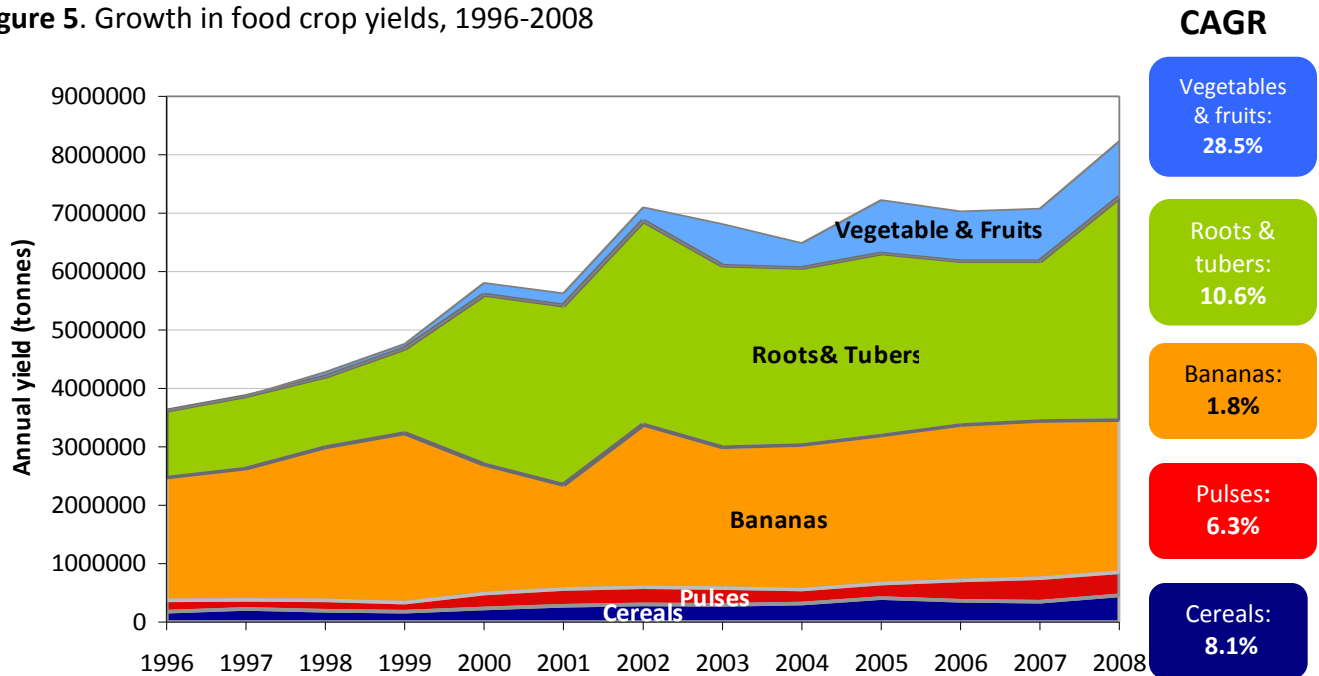
This analysis concentrated mainly on food crops, livestock and major export crops (Tea and Coffee) using available data to assess four different aspects of their performance, these factors include (i) **Quantity** which was observed as a crucial step towards understanding performance especially in assessing food security; (ii) **Land productivity** that was also considered as a key factor to understanding the underlying growth prospects since land is a key factor of production and binding constrain in Rwanda. This is also an important factor to facilitate comparison across countries (mainly in the Eastern Central African region) (iii) **Quality** which stood as an important factor for understanding the proportion of desired produce in overall output. This is a key measure of success to small economy trying to penetrate the market (iv) **Value addition** is an additional factor to understanding the country's capacity to process and add utility to the produce for market penetration.

In this section, detailed assessment of the performance of different sub-sectors of Rwandan agricultural sector is made.

2.1.2 Food crops

In terms of category, food crops include among others Pulses, Roots, Tubers, Bananas, Vegetables and Fruits. Available data has shown that food crop production has increased significantly in the country. However, almost 60% of the increase has come from roots and tubers, with slower growth in other crops as it is indicated in the graphical presentation below.

Figure 5. Growth in food crop yields, 1996-2008



Source: Minecofin, Minagri, 2008

The calculations of the compound annual growth rate (CAGR)³, have shown that the highest CAGR comes from fruits and vegetables (28.5%). However, even if this seems high, the share of fruits and vegetables is still poor compared to the county’s production potential. A significant contribution to the growth comes from Roots and Tubers (10.6%).

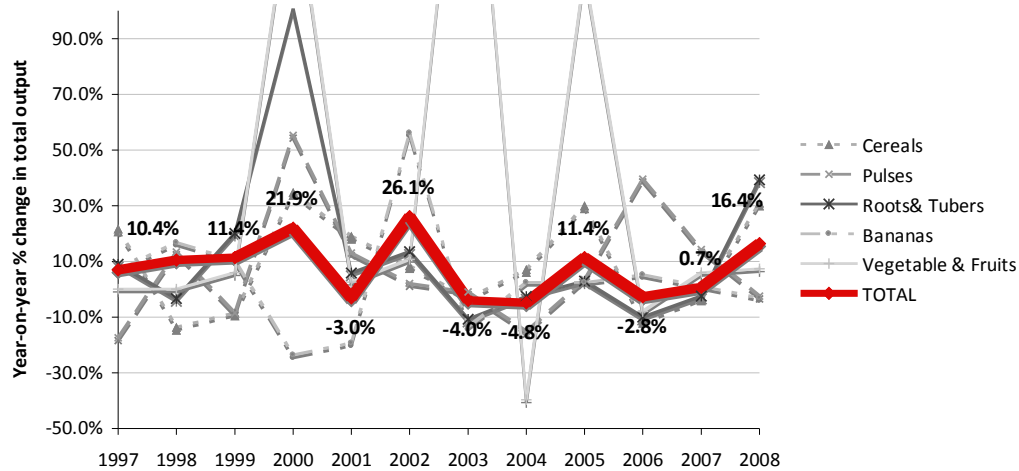
From the above indicated graph, roots and tubers noted two periods of significant growth, the first one being between 1999 and 2002 and the second being from 2007.

³ The CAGR is calculated using following formula: $CAGR(t_n, t_0) = \left(\frac{V(t_n)}{V(t_0)} \right)^{\frac{1}{t_n - t_0}} - 1$, Where $V(t_0)$ is

the production of a specific crop at period T_0 (starting period), and $V(t_n)$ is the production of a specific crop at period T_n (end period).

While roots and tubers are performing well, all other food crops seem to have noted poor performance. This may be seen as a major threat to food security in the country if the situation persists. While the overall trend of food crops is upward, the biggest issue has been high levels of year to year volatility. The figure below gives the details.

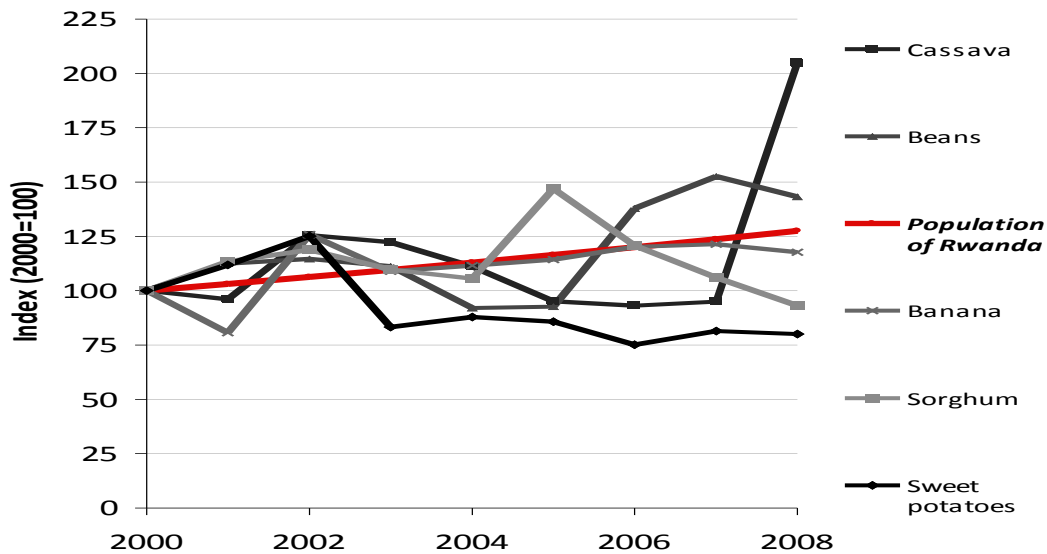
Figure 6. Annual change in food crop output, 1996-2008



Source: Minagri, NISR, Minecofin, 2008

This volatility, coupled with poor performance in some of these most heavily consumed food crops; represent a major threat to food security. In 2006, sweet potatoes, beans, banana, cassava and sorghum accounted for 70% of food consumption in rural areas and 79% of caloric content. The performance of these crops has been both volatile and sluggish, in some cases, could not even keep the pace with population growth.

Figure 7. Food security crops, 2000-2008



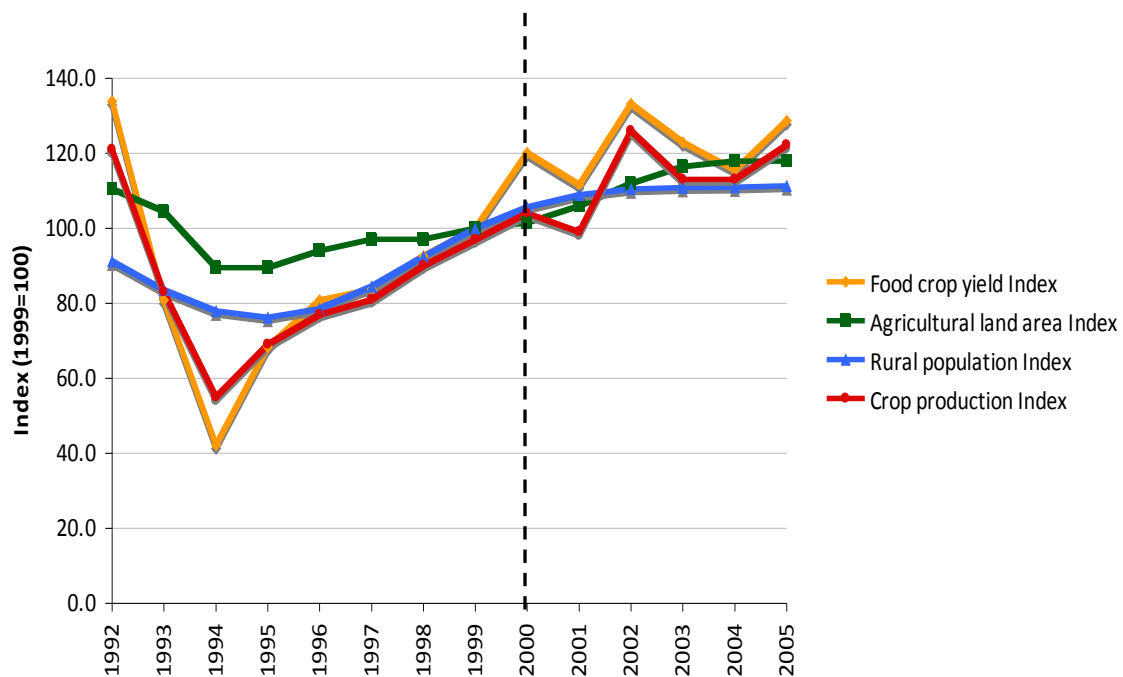
Source: FAO Food security report 2006; Minecofin 2008

The analysis of the food crop sub-sector seems to reflect twin issues including **Post-Conflict Bounce** (1999-2000) which was characterised by the restructuring process after the 1994 genocide. The issues that featured prominently in the sector included rural labour force increased significantly as the population returned to rural areas⁴. Increase in land use and ability to its intensive exploitation which subsequently drove up land productivity. The second issues was **Assertion of structural constraints** (2000-2007) in this aspect, growth in the rural population and land, slowed significantly and Structural constraints to productivity reasserted themselves, in this case the country experienced vulnerability to weather related shocks and limited use of productivity-enhancing inputs and technology.

In short, data reveal that from 1992-2000, crop production closely tracked changes in productivity, land area and population. However, since 2000, it has been correlated with productivity.

⁴ Note: the World Bank (2007) also concludes that the growth of the rural labour force was the major driver of increased productivity

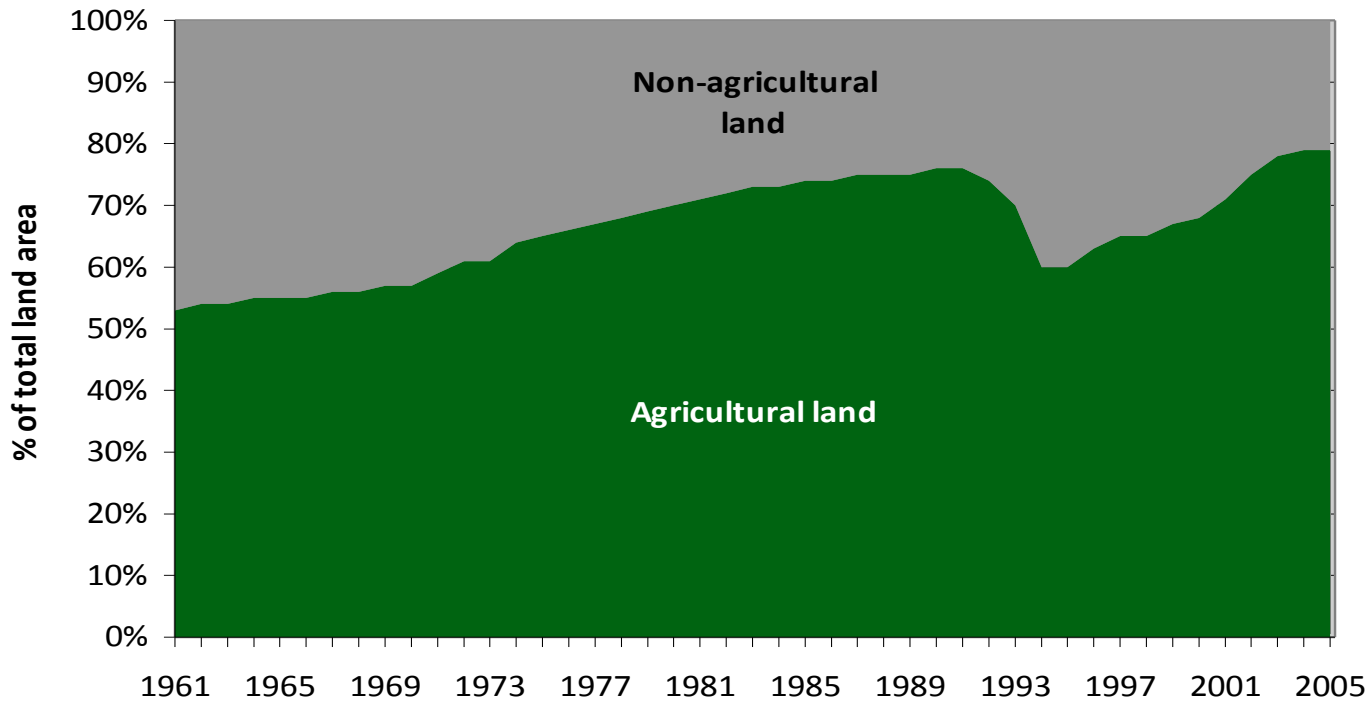
Figure 8. Crop production, productivity, land area and population, 1992- 2005⁵



Agricultural land use grew rapidly in the reconstruction period, driving up output. However, land looks to have peaked at around 79% of total land area which was considered historically high. This could represent the natural limit as already 39.1% of cultivated land is on slopes which occupy over 25% of the total available land. This situation increases vulnerability of the agricultural sector, mainly through soil erosion during rainy seasons.

⁵ Notes/source Indices for food crop yields, land area and rural population calculated by IPAR from World Development Indicators (WDI) 2007 and Minagri. Crop production index already calculated in WDI 2007.

Figure 9. Proportion of land used for agricultural purposes



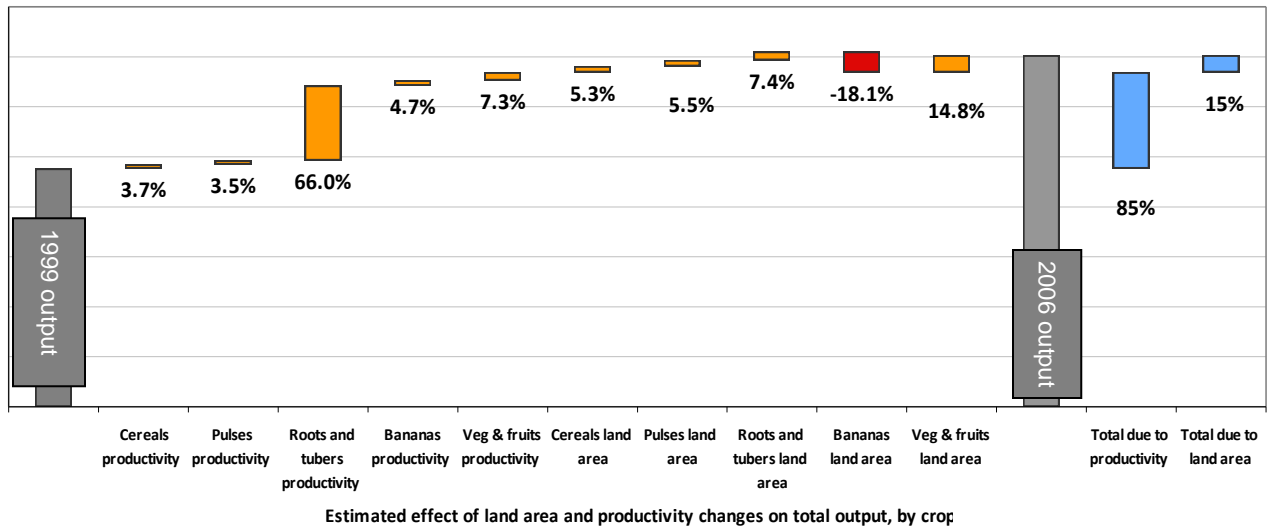
Source: World Development Indicators; 2007

2.1.3 Major Drive of growth in food crop sub-sector

This study assesses the impact of two major drives of agricultural growth as mentioned above, ***Land area and land productivity***. The key objective is to identify the leading factor in contributing to the observed food crops output growth.

This issue is approached by decomposing growth of the food crop output based on simulations of output where land use increases but productivity stays at 1999 levels, and Productivity rises but land use stays at 1999 levels. The results are shown on the figure below.

Figure 10. Growth decomposition of food crop output, 1999-2006



Source: IPAR analysis of Minagri data

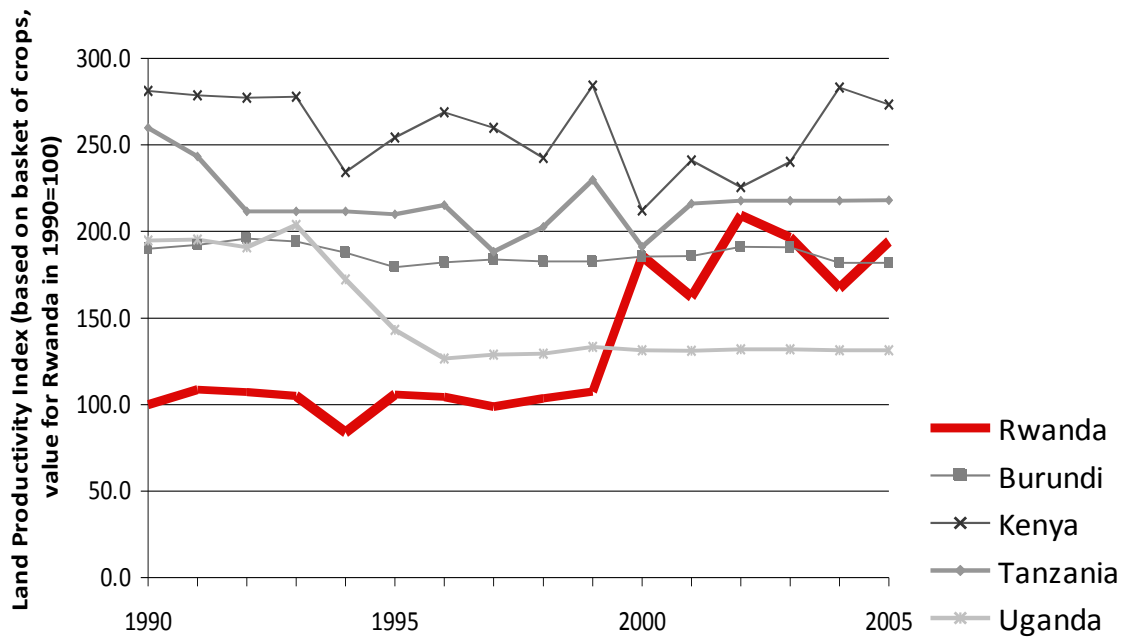
The above decomposition of growth reveals that the food crops output growth is mainly driven by the productivity at 85%, while the increase in land has contributed 15% of the growth.

2.1.4 Regional Comparison

In comparison with other countries in the region, it was discovered that land productivity for Rwandan food crops has risen around the regional average, but has also become much more volatile than in other countries in Eastern Africa⁶.

⁶ Productivity measure based on average yields/ha of banana, cassava, potatoes and cereals. It differs slightly from the measure used on slides 15 and 18 because it is based on a different basket of crops

Figure 11. Trend in food crop productivity in the EAC, 1990-2005



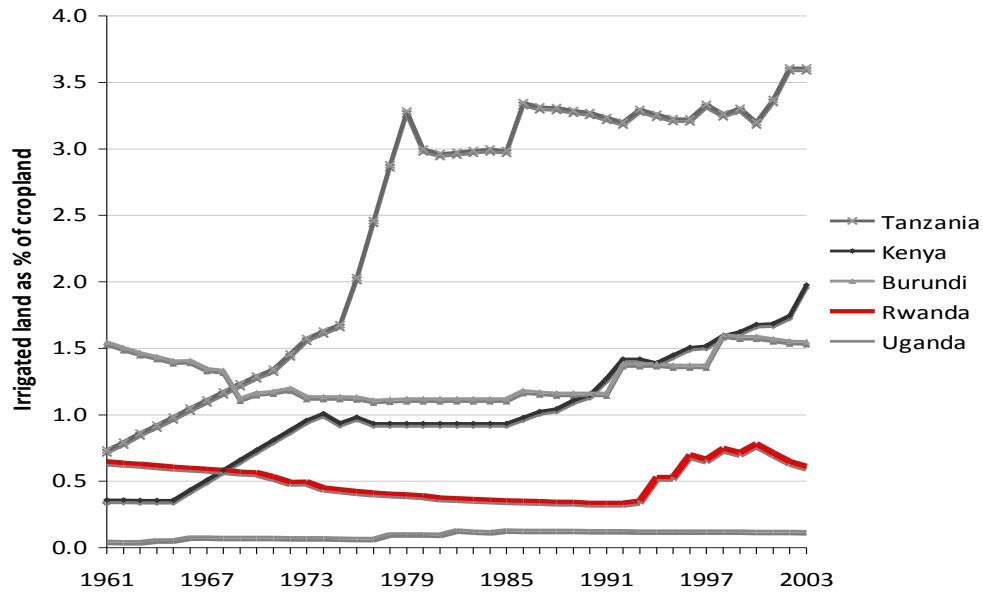
Source: World Development Indicators 2007; FAO 2005

This volatility is also proven by the high coefficient of variation for Rwanda which is 0.32 compared to other countries in the region like Kenya 0.03 while Burundi is 0.09. The fact is that recent food crops productivity growth has been sluggish; without the spike in the productivity of roots and tubers from 1999 to 2006, it would have been even worse.

2.1.5 Land productivity and rainfall

It is believed that land productivity is highly sensitive to climate, but data to demonstrate this seems to be scarce especially for countries such as Rwanda where the meteorological capacity is weak.

Figure 12. Irrigated land as % of cropland, 1961-2003



Source: FAOStat; World Development Indicators 2007; Mininfra & Institut Royal de Météorologie

The above figure shows that Rwanda has not increased its irrigated land as per percentage of cropland for the past 50 years; it remained below 1%. This partly explains the vulnerability of the agricultural sector to weather related shocks and expresses the high dependency of the sector to the climate conditions.

Although more recent Rwandan intensification efforts may have begun to deliver some changes, technology and input use have historically been very low.

Table 1. Key Indicators of Agriculture technology

Key indicators of technology and input use			
Indicator	Value	Year	Notes
Tractors per ha of arable land	0.5	2003	Fell from 1.1 in 1989. In Kenya, there were 27.6 tractors per ha in 2003.
% households using improved seeds	12	2005	Improved seeds covered only 2% of cultivated land. 90% of food crop seeds were produced at the farm.
% households using inorganic fertilizer	8	2005	Declined from 10.5% in 1990
% households using pesticides	8	2005	Mainly used by coffee and potato producers

Source: World Bank, 2007; World Development Indicators, 2007

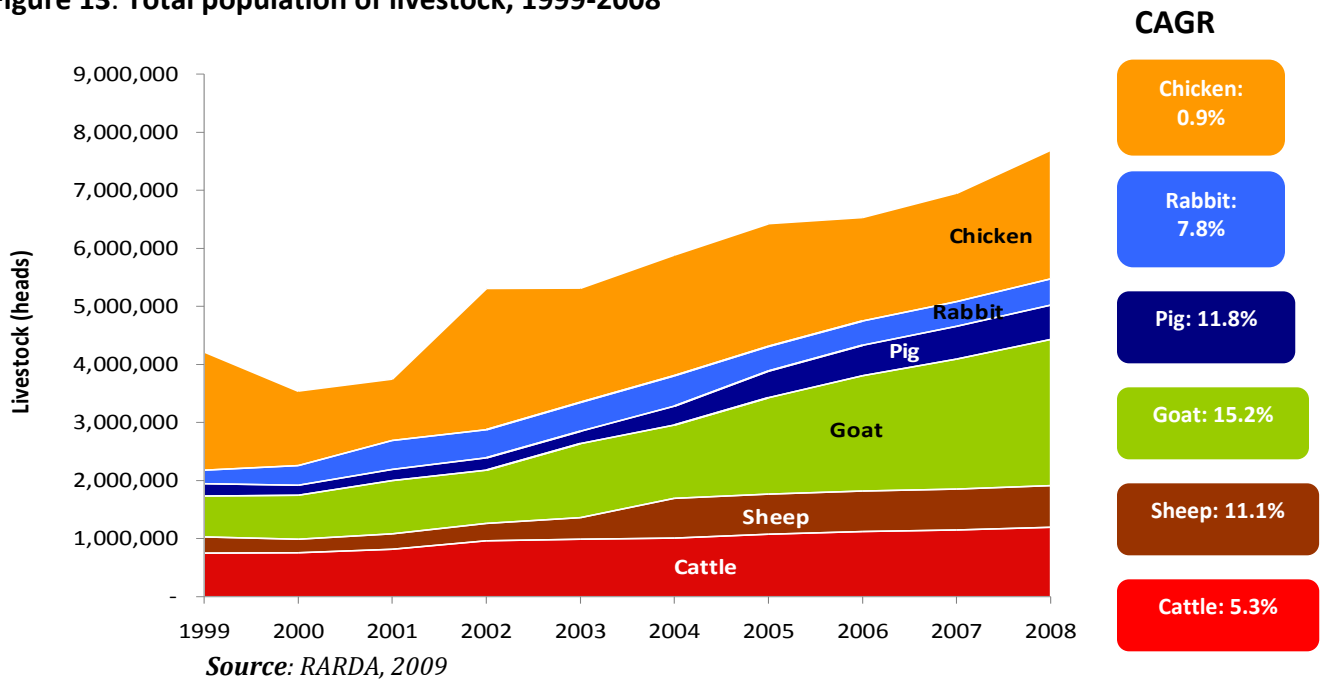
2.1.6 Post Harvest and Value Addition

Despite the high potential of the food crops sub-sector, the development of post-harvest value addition has been limited. Some of the reasons for this under-development are ranked from market oriented agri-business coupled with low processing capacity to the limited financial incentives to support the development of the sub-sector this is visible because 66% of the food crops is for own food consumption (only 34% of food crops production makes it to the markets), Between 1999 and 2008, the proportion of food crops processed never exceeded 6.5%, Only 2% of small enterprises are in agro-processing sector.

2.2 Livestock

Looking at the livestock, data show that the total stock of animals has been growing at around 7% a year, with particularly large increases in the number of goats. The related details are provided on the figure below.

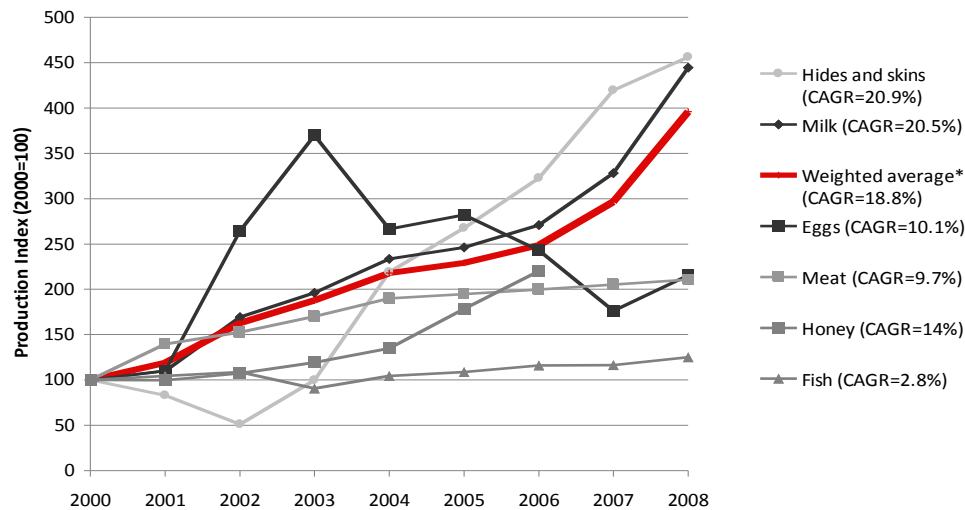
Figure 13. Total population of livestock, 1999-2008



The significant annual animal increase has had an important effect on production increase. This production increase is largely due to major increase in milk production. The milk production has increased from 58,000 tons in 2000 to 257,000 in 2008.

Calculations show that Hide and skins have the highest compound annual growth rate. This is an important opportunity not only for agricultural export diversification but also for job creation once locally tanned.

Figure 14. Animal production, 2000-2008



Source: RARDA, 2009

It is important to mention that the limited ownership of cattle and sheep feeds into the underperformance of the food crops sub-sector as it deprives farmers of key sources of organic manure.

2.2.1 Value addition

There is enormous potential for value addition in animal products, especially dairy, unfortunately much of this remains unrealized and therefore unutilized.

Rwanda produces 25% of the East African Community's fresh cow milk (Eastern province being a major milk surplus producer). Rwandan rural area accounts for 75% of all milk consumed; 91% of the market is for fresh, unprocessed and poor quality milk which is sold through informal channels.

Lack of adequate cold-chain infrastructure makes the distribution inefficient; as a result, almost 38% of milk is lost due to spoilage, while processors are currently operating at 20% of their installed capacity⁷.

⁷ Source: USAID Dairy Sector Competitiveness Project, OTF Group Analysis, 2009

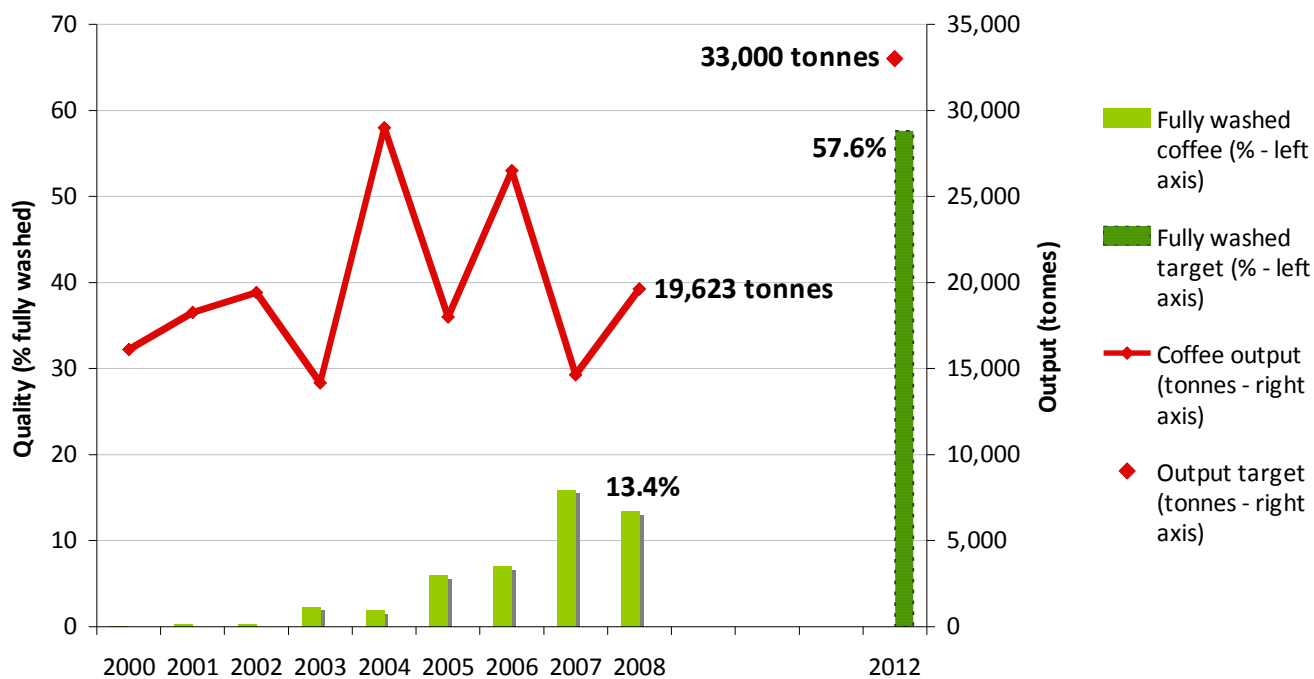
2.2.2 Exports

Coffee and Tea have historically been the major sources of export earnings and they still currently own the largest share in the country's export revenues. In this analysis, emphasis is made on the performance over time of Coffee and Tea.

2.2.3 Coffee

Overall production of coffee has not consistently increased since 2002 and has been very volatile - but a bigger share is now of high quality.

Figure 15. Coffee output and quality, 2000-2008



Source: Ocir-Café, 2008; National Coffee Strategy 2009-2012

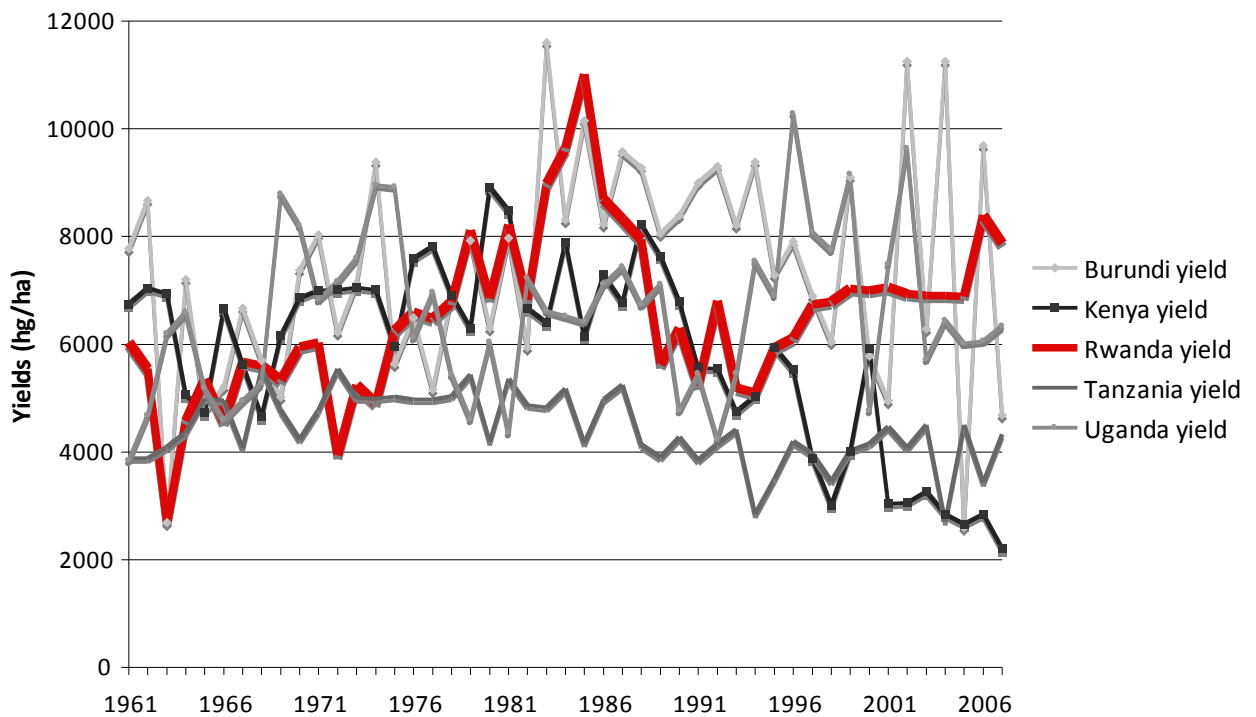
It is obvious from the figure above that Rwanda still has many challenges in meeting its EDPRS targets not only in terms of production (reaching a target of 33,000 tons by

2012) but also in terms of increasing the share of good quality coffee (Rwanda to export 57.6% of fully washed coffee by 2012).

2.3 Regional comparison

Comparison of Rwanda with other East African Community countries in terms of coffee productivity (yield/ha) reveals that Rwandan coffee production has risen to above regional level, despite the mentioned volatility which remains hard to overcome with the rising coffee productivity trend, even though it is rising to above regional level, Rwanda coffee productivity is still below its historical peak

Figure 16. Productivity growth of coffee, 1961-2007



Source: FAOStat

Part of the volatility explanation may be found in the high year-to-year variation in areas under coffee cultivation as well as in the number of coffee trees being grown.

Figure 17a. Coffee land area and output, 1961-2007

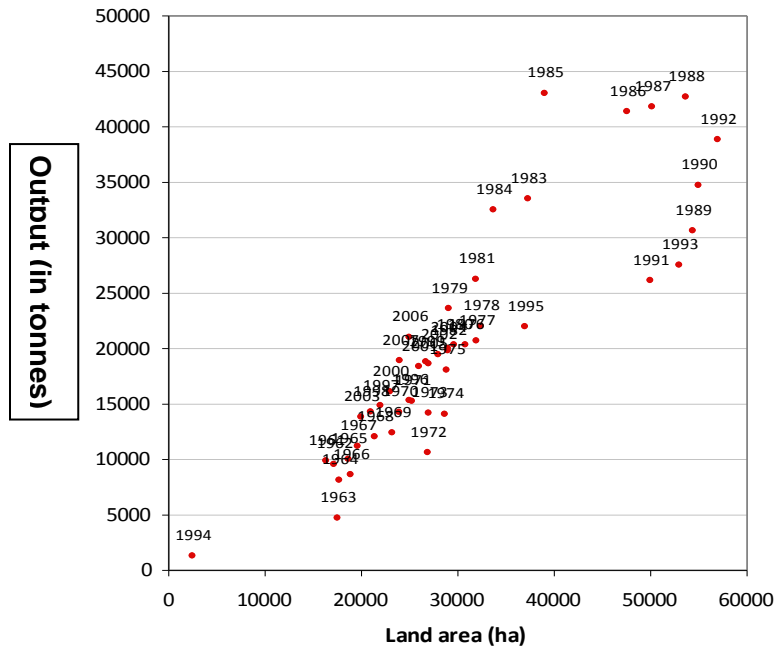
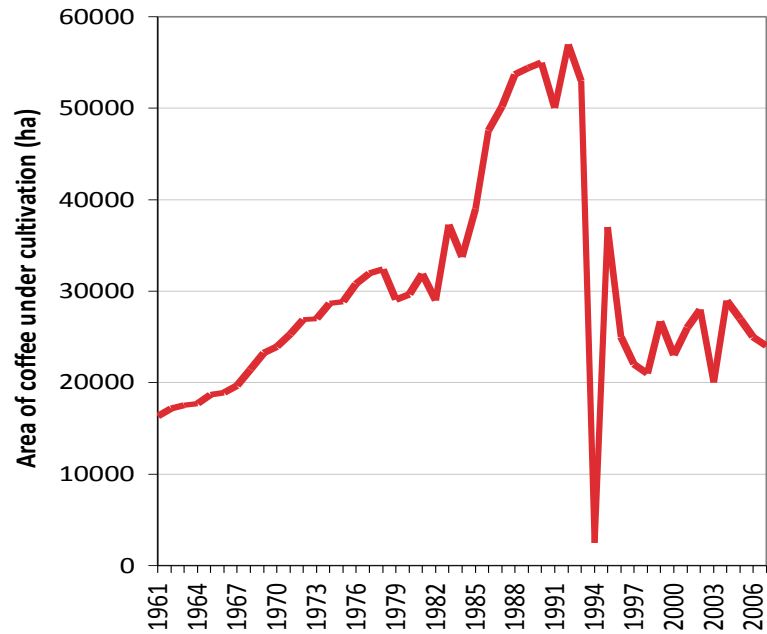


Figure 17b. Coffee land area, 1961-2007



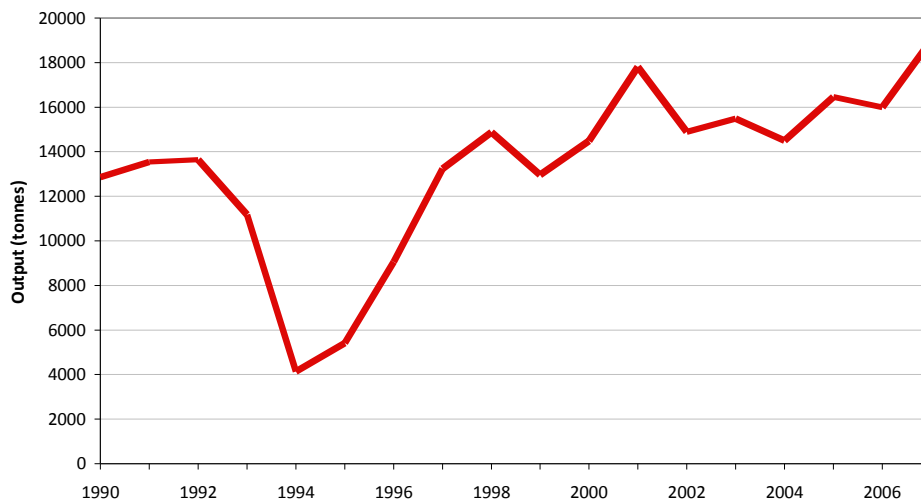
Source: FAOStat. Note that these are broadly consistent with OCIR-CAFÉ estimates of number of trees

The two figures try to give a partial explanation of the volatility of the Rwandan coffee productivity. Holding other factors constant, the figures show high correlation between year-to-year land variation and year-to-year coffee productivity fluctuations.

2.4 Tea

From 1995, the general trend of Rwandan Tea output has been upward. However, as for the case of food crops and coffee, the Tea production data show significant volatility. In comparison to coffee, Tea has not seen significant improvement in terms of quality. The Green leaf tea percentage which is a measure of Tea quality is around 70% which is a modest improvement on the 2003 figure of 67% and in a way short of the 80% target set out in the first tea strategic plan than ended in 2008.

Figure 18. Tea output, 1990-2007

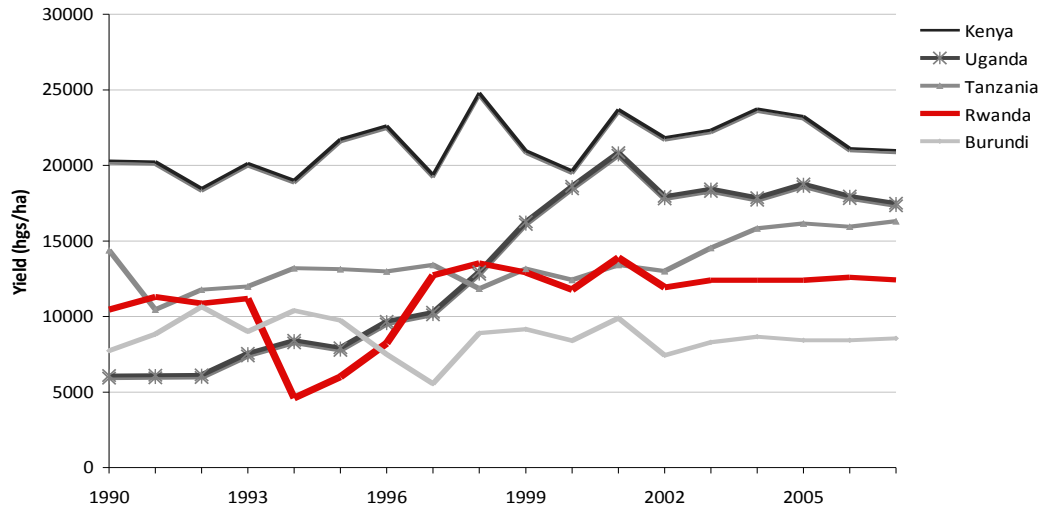


Source: FAO; Minagri & OCIR Tea, *A Revised Tea Strategy for Rwanda*, 2008

2.5 Regional comparison

Tea productivity has recovered from the devastation of 1994, but remains below Rwanda's key regional competitors as shown on the graph below.

Figure 19. Productivity growth of tea, 1990-2007

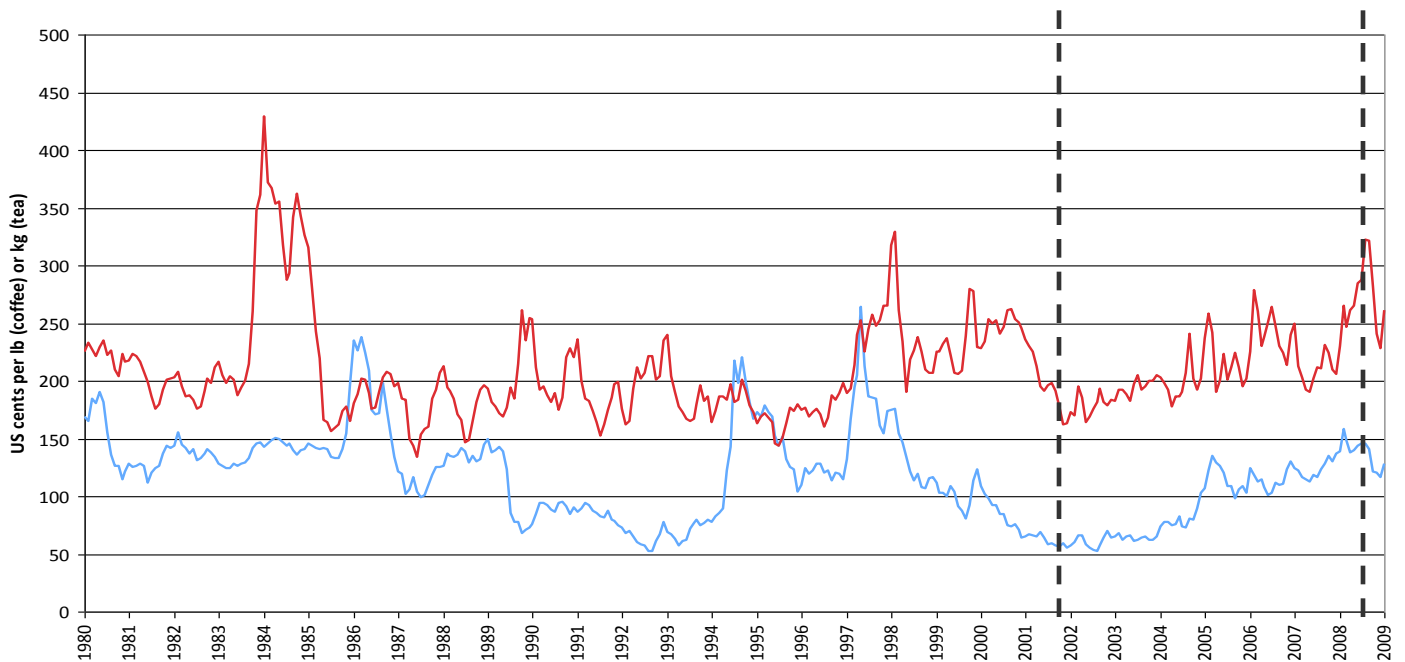


Source: FAO; Minagri & OCIR *Thé A Revised Tea Strategy for Rwanda, 2008*

While the long-run trend is poor, the revised tea strategy for Rwanda suggests that Rwanda will accelerate towards its yield targets due to an increase in the fertilizers use. It is therefore imperative that the use of fertilizers be increased to enhance the targeted volume of production.

2.6 Coffee and Tea prices on international market

Figure 20. International tea and coffee prices, 1980-2009



Source: IMF, 2009

Between 2002 and 2008, coffee and Tea export earnings have been boosted by rising global commodity prices. However, the current global financial crisis is expected to have negative impact on prices as shown by the downward sloping shape after mid-2008.

3. Summary and diagnostics

In summary, Rwandan agriculture has demonstrated a high growth potential, but over the last decade it has not consistently reached that potential. Beginning with food crops, the analysis has shown that there has been significant growth in terms of quantity, but mainly confined to a few crops (mainly roots and tubers). Food crops productivity has shown high year-to-year volatility and little consistent improvement. Value addition has shown high potential, but has unfortunately remained unrealized.

Livestock has shown a significant annual increase in number of heads (mainly for goats). This increase in the number of heads rapidly increased animal production, especially Milk and Hide and Skins.

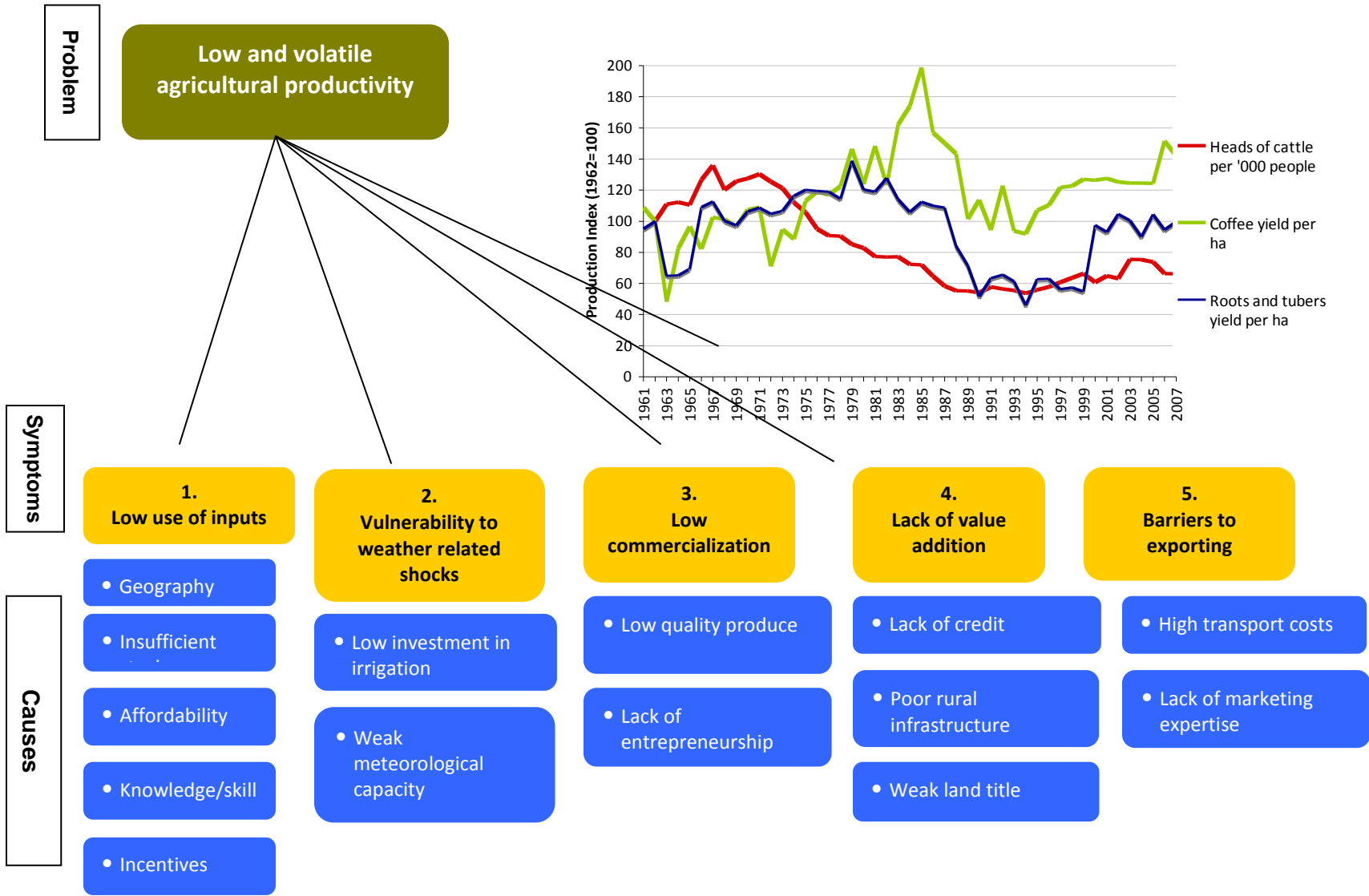
A big challenge in the sub-sector remains however the unrealized significant potential for Dairy due to lack or poor infrastructure (cold storage and low processing capacity).

In export crops, there has been limited and volatile growth for coffee and tea. Major improvement in terms of quality comes from Coffee (very little for tea) but still a long way to go to meet the EDPRS and Vision 2020 targets. Productivity has been poor for tea and better for coffee but still below historic levels. Value addition in the sector still needs heavy investment in order to sustain push into quality levels.

In the agricultural sector analysis, we link the reality on the ground⁸ with observed problem. The general respective trends of the heads of cattle per thousand people, coffee yield per ha, roots and tubers yield per ha, have tended to be downward slopping over the past 50 years as shown on the next figure.

The most pressing problem for Rwandan agricultural sector as identified by this situational analysis is **“The Low and Volatile agricultural productivity”**. However, a deeper analysis of this problem requires looking beyond immediate indicators for a better understanding of the problem.

⁸ Heads of cattle per'000 people, Coffee yield per Ha and Roots and tubers yield per Ha representing respectively Livestock, export crops and food crops.



The analysis pointed out five indicators of the poor performances of the agricultural sector in Rwanda. These indicators included among others low use of agricultural inputs, high vulnerability to weather related shocks, low commercialization, lack of value addition and export barriers.

The indicators underpin multiple deeper causes which clearly explain with details how the observed low and volatile agricultural productivity is deeply rooted not only in the national production structure but also in the minds and practices of an important number of farmers.

As indicated below different causes are linked to the observed problems through various indicators

3.1 Low use of inputs

The five main causes that lead to low use of agricultural inputs include the country's geographical structure, insufficient inputs stocks, affordability, farmers' knowledge and skills and incentives. As in the case of Geographical structure more than 39% of the cultivated land is on slopes which in turn occupies over 25% of available land in Rwanda. This not only increases the risks of soil erosion, but also limits the use of tractors in agricultural activities for example in 2003; Kenya had 50 times more tractors per hectare than Rwanda.

Another issue is Insufficient National Stocks, Rwanda has for a long time lacked indigenous sources of fertilizers and pesticides. In 2005, only 8% of the households used inorganic fertilizers and 12% improved seeds⁹. The Ministry of Agriculture and Animal resources report that imports of agricultural inputs have not been enough to cover the country's demand, and the ability of delivery chain to get bulk purchases to farmers is weak. Affordability is a problem because of lack of domestic sources of fertilizer and high cost of pesticide, while most farmers are poor and lack access to credit to finance inputs. Farmers' knowledge and skills are limited, though a number of farmers understand the fact that better use of inputs could improve the yields. Farmers' incentives are not defined, so there is always no clear link between price and quality. At the same time, there has been some evidence that farmers have been reselling seeds and fertilizer to meet short-term needs.

3.2. Vulnerability to weather related shocks

Lack of irrigation and weak meteorological capacity are major causes of a high vulnerability to weather related shocks of the Rwanda agricultural sector. This is observed in 2003; only 0.6% of land was under irrigation the same proportion as forty years earlier. This is due to the high costs of irrigation, especially at the hillside. However, a new World Bank project to irrigate 12,000 ha of hillside land with a budget

⁹ World Development Indicators 2007; World Bank 2007

of \$36 million is to start this year (2009). Weak Meteorological capacity is also a big challenge. In Rwanda there is lack of adequate meteorological equipment and reliable weather forecasting increase uncertainty of farming activities.

3.3 Low commercialization

The two factors are underlying the low commercialization of agricultural products are inadequate of business skills and entrepreneurial ethic and quality produce. Lack of business skills and entrepreneurship is also a problem since; there is a very limited agribusiness entrepreneurship in Rwanda. Key underlying factors include among others lack of detailed business plans, lack of understanding by banks, lack of information about opportunities, reluctance to use banking services¹⁰. Low quality produce is an issue of concern, with most production intended for own-family consumption; crop farmers have weak incentives to increase quality. In addition, quality standards and processes, which are key determinants of competitiveness on international markets, may be poorly understood by many farmers.

3.4 Lack of value addition

As previously mentioned, almost all the Rwandan agricultural sub-sectors have high but unrealized potential for value addition. This is due to lack of access to credit Facilities, poor rural infrastructure and weak land title. Agriculture has traditionally been seen as a risky investment by banks so only 2% of loans go to agriculture; Rural Infrastructure is poor, due to in availability of adequate energy and water resources, this in turn raises costs. A direct consequence of this is that processing facilities often run below capacity. Besides that, poor qualities of roads (only 6% of non-tarmacked roads are in a good condition). This raises transport costs and waste time to the market. Fragmented, poorly defined land ownership makes it difficult to buy and sell land and creates risk to investors. In 2006, only 1% of land was held under written title (EDPRS, 2007). At the same time 83% of business start-up reported in availability of land and land cost or premises to be major a constraint in Rwanda¹¹.

3.5. Barrier to exportation

Two major issues make it difficult for Rwandan products to penetrate the international markets; they are both transport costs and lack of marketing. Even if compared to other landlocked countries, Rwanda's transport costs are extremely high around 50% of the export value. Transport cost from Kigali to Mombasa is 70% higher than from Kampala to Mombasa. For this specific case of Rwanda, rural transport costs from the farm gate in Rwanda to Mombasa are 80 % of the farm gate price¹². Because many producers lack

¹⁰ PSF, OTF Survey 2008

¹¹ idem

¹² World Development Indicators 2007; World Bank 2007

specialist marketing skills and the small domestic market, farmers may not routinely come into contact with customers limiting their ability to develop this expertise.

4. Policies and strategies

Agricultural policies and strategies have been integrated in to the national development planning process anchored on the Vision 2020. The Economic Development and Poverty Reduction Strategy (EDPRS, 2008-2012), as a continuation of PRSP1 (2002) sets targets for Agricultural sector, but some of these targets seem to be too challenging even after the end of the first phase of the Strategic Plan for Agricultural Transformation (SPAT1, 2005-2008)¹³.

Table 2. Some EDPRS Targets for Agriculture

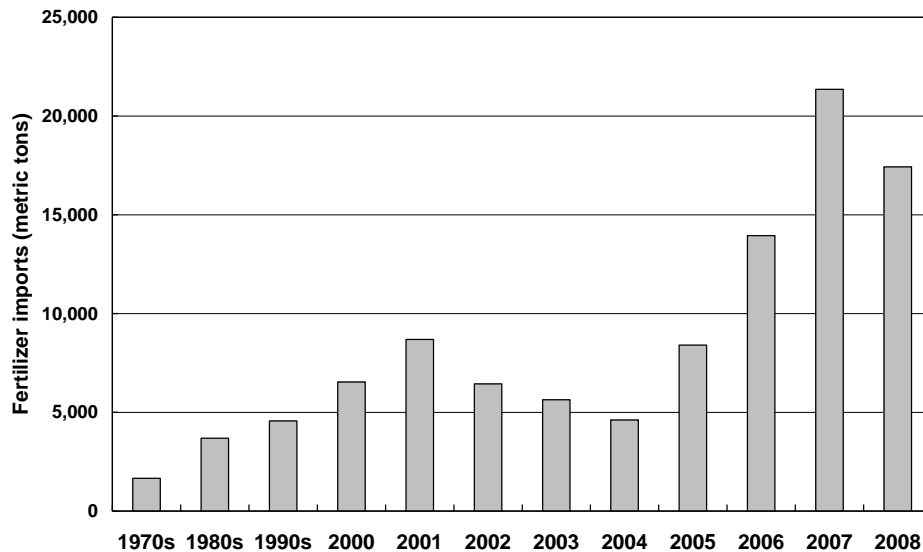
Target	Baseline (2006)	Target (2012)
Credit to the agriculture sector	2%	7%
Marshland reclaimed for agricultural use (ha)	11,000	20,000
% farming households using improved methods (fertilizer)	12% (chemical) 7% (organic)	25% (chemical) 25% (organic)
Farm households to extension ratio	1:3000	1:2250
Output of key food security and export crops	Maize 91,813 Rice 62,932 Wheat 19,549, Tea 73,008	Maize 125,000 Rice 81,800 Wheat 30,000, Tea 94,900
% livestock in intensive systems	16%	60%
Area under irrigation	15,000	24,000
Use of improved seeds	24%	37%
Households with livestock	71%	85%
High quality tea	70%	75%
Fully washed coffee	10%	100%
Horticulture for exports	0.5%	1.6%
Revenue from strategic exports	\$121m	\$332.5m

Source: EDPRS, 2007

¹³ SPAT2 is starting 2009

Compared to the country’s fertilizers import needs (56,000 MT), Rwanda has in the last two years imported respectively 23,000 MT and 16,827 MT in 2007 and 2008 (CIP, 2009). The table bellow shows the evolution of fertilizers imports from 70s.

Figure 21. Rwanda fertilizer imports, 1970s to 2008 (MT)



Sources: MINAGRI 2007, RRA/Customs, BNR, MINAGRI cited by CIP, 2009

So far, the key policy initiative has been the four-year Strategic Plan for Agricultural Transformation (SPAT1), adopted in 2004 and which ran from 2005-2008. SPAT1 had four interrelated programs, Intensification and development of a sustainable production system, Support for Building producers Capacities, Promotion of “commodity chains” and development of agri-business, Institutional development

4.1. Intensification and development of a sustainable production system

This program focuses on soil protection and conservation as well as modern breeding methods for increased livestock production as crucial factors to agricultural transformation. In line with Crop Intensification Program (CIP) which started in 2007 increased the use of inputs for priority crops i.e. fertilizer and improved seeds and promoted land consolidation as part of the Green revolution. Irrigation master plan under scrutiny; Soil erosion control; Marshland development program (more land being reclaimed for cultivation), Animal breeding & nutrition strategies being reviewed; one cow program distributing heifers to poor households (target is 668,763 heifers by 2017),

Food security strategy led to a significant increase in production of main food security crops under the CIP.

The table below clearly indicates the impact of CIP for selected crops (Maize, Wheat, Irish Potatoes and Rice).

Table 3. Impact of CIP and future estimates

	Cultivated Areas (in Ha)				
	2007 A	2008 A	2009 A	2010 A	2011 A
Maize	21,831	62,006	65,241	70,190	77,762
Wheat	6,757	16,297	11,824	16,118	20,241
Irish potatoes	53,088	52,784	51,589	52,487	52,487
Rice	7,396	10,507	14,357	10,753	11,872
	Productivity (Kgs/ Ha)				
	2007 A	2008 A	2009 A	2010 A	2011 A
Maize	780	1,480	2,556	4,203	4,944
Wheat	939	2,209	2,563	2,916	3,269
Irish potatoes	8,954	9,673	12,055	14,436	16,818
Rice	4,759	4,573	3,583	6,500	7,000
	Total Production (MT)				
	2007 A	2008 A	2009 A	2010 A	2011 A
Maize	17,028	91,759	166,757	294,980	384,422
Wheat	6,344	36,006	30,300	47,000	66,173
Irish potatoes	475,347	510,603	621,898	757,709	882,698
Rice	35,193	48,053	51,440	69,896	83,107

Source: MINAGRI, Crop assessment 2008

4.2. Support for Building Capacity of producers

The aim is to reinforce the capacity of farmers as a priority for turning traditional agriculture into a market-oriented and revenue generating activity. This program focused on, Agriculture extension strategy for enhancing professionalism to farmers is in place. Training of farmers in horticulture (mainly sericulture) RARDA (Artificial insemination, bee keeping) and coffee (coffee processing) have been some of the key achievements of the SPAT1. Agasozi ndatwa as pilot and sensitization tool, helped farmers to professionalize their practices, while income generation programs such as HIMO, RSSP played a key role in diversification of income generating activities

4.3. Promotion of “commodity chains” and development of agri-business

The main objective of this program was to increase the competitiveness of agricultural sector through commodity diversification and infrastructure development. This program

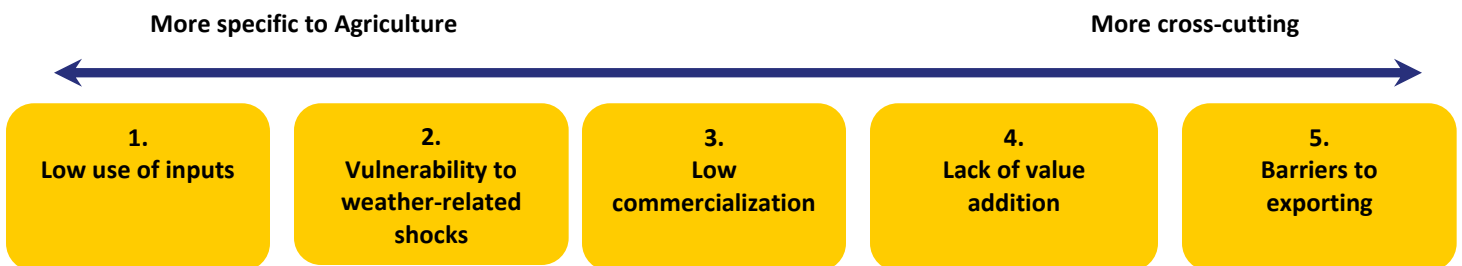
includes Horticulture strategy aiming at generating 20M USD by 2010 as well as diversification of cash crops under horticulture (Patchouli, geranium, sericulture...) are some of the achievements. Another issue was to transform the competitiveness of agricultural products by improving quality e.g. coffee, tea strategies, construction of rearing houses, pack houses and cold rooms was necessary for creation of a conducive business environment and enterprise promotion (Rwanda ranked 139 in 2009 compared to 148 in 2008)¹⁴.

4.4. Institutional development

SPAT1 assigned an important role to MINAGRI and its stakeholders of promoting a regulatory and legal framework that allows effective coordination, monitoring and evaluation within the sector. This had to be done through legal and regulatory framework this saw a number of laws have being adopted (Animal health, fishing and fins farming). Others are yet to be adopted including seed, plant health, agro chemical, reforms and institutional support to public services plus extension services to farmers. Coordination, monitoring and evaluation of the agricultural sector which targeted Restructuring of MINAGRI and its Agencies: RAB, RAEB

4.5. Conclusion

Superficially, it seems that SPAT1 was broadly aligned with the key challenges facing the sector. It has however been more focused on challenges that were specific to agriculture, even though many of the most significant issues related to low and volatile agricultural productivity are of a more cross-cutting nature.



¹⁴ WB, Doing business 2009

4.5.1. Identified GAPS

Even if the existing policies and strategies have improved many things in agricultural sector, it is however important to mention that this assessment has revealed some gaps which still need particular attention from the Ministry of agriculture and Animal resources and its stakeholders.

4.5.1.1. Low use of inputs

Although, the Ministry has significantly improved the use of agricultural inputs, a big gap is that fertilisers and other key inputs remain too costly or difficult to access by many farmers. The analysis points out a number of gaps linked to low use of agricultural inputs as shown in the table below:

Table 4. Gaps in inputs use

Indicators	Causes	Gaps
Low use of inputs (improved seeds, fertilizer, pesticide, soil conservation)	Landscape	-
	Insufficient national stocks	Slow progress in tackling dependence on imported inputs (In 2008, 18,200T of fertilizers were imported at a cost of some \$19m)
	Affordability	Low take-up of flagship BNR credit scheme for farmers (Fertilizers cost 50% higher than in Kenya).
	Farmers' incentives	No clear policy to address farmers' incentives
	Knowledge and skills	
Poor coordination between ISAR and RADA is a constraint to use of improved seeds		

Source: IPAR analysis

This analysis has identified a number of gaps linked to the low use of agricultural inputs. It has been found out that due to lack of national production capacity and insufficient national stock, Rwanda still depends mainly on imported inputs. There have been some attempts by the Government to make agricultural inputs accessible by putting in place a guarantee fund (covering up to 70%) of the investment in inputs. However, there has been low take-up of the mentioned funds, making fertilizers to cost 50% higher than in Kenya for example. Currently, there is no clear policy addressing the farmers' incentives. It is visible that individual MINAGRI implementing agencies (RADA, RARDA, RHODA, ISAR...) have significantly improved their activities. However, gaps remain not only on weak extension services at district level due to limited skills, but also to weak coordination between ISAR as an agricultural research institute and RADA as the main implementing agency.

4.5.1.2 Vulnerability to weather-related shocks

As previously mentioned, the Rwandan agriculture still depends mainly on weather pattern. Currently, major investments to reduce agriculture's vulnerability to weather patterns have not begun yet.

The following table shows the identified gaps which need to be addressed in order to reduce agricultural vulnerability to weather pattern.

Table 5. Gaps in mitigating weather-related shocks

Indicators	Causes	Gaps
Vulnerability to weather related shocks	Lack of irrigation	Feasibility studies have been conducted - but heavy investment is needed
	Weak meteorological capacity	No specific policy on meteorological capacity

Source: IPAR analysis

From the table above, it is realised that not many improvements have been made in the area of reducing the country's vulnerability to weather related shocks. The current gaps rely on not only on heavy investment needed in irrigation, but also lack of an appropriate policy to improve the country's meteorological capacity.

4.5.1.3 Low commercialization

Shifting from subsistence farming to a commercially-oriented approach is difficult for many Rwandan farmers mainly due to lack of good agricultural practices. Specific gaps related to low commercialisation of products are included in the table below.

Table 6. Gaps in agricultural commercialization

Indicators	Causes	Gaps
Low commercialization	Lack of business skills and entrepreneurial mindset	Tendency to focus on mindset rather than skills - but without a clear analysis of what 'mindset' means or how it can be changed.
	Low quality produce	Certification is done on a very small number of co-operatives.

Source: IPAR analysis

It is not clear why farmers and businessmen are not fully exploiting the high potential that the agricultural sector offers. Many tend to think that it is a mindset issue, though the distinction between mindset and knowledge (skills) is difficult to discern. A clear definition of the two concepts would help policies to efficiently address how both mindset and low or limited skills affect the low commercialization incentives.

An additional gap to the low commercialization is the certification process which is too costly, too difficult and done on a very small number of co-operatives in Rwanda. The lack of good agricultural practices leading to low quality produce is one of the key constraints to international competitiveness and market penetration of the Rwandan agricultural products.

4.5.1.4 Lack of value addition

This agriculture sector review has revealed a high potential for value addition. However, investment in agro-processing is currently still too difficult, costly and risky as indicated in the table below.

Table 7. Gaps in Value addition

Indicators	Causes	Gaps
Lack of value addition	Lack of access to credit	Low take-up of flagship BNR credit scheme for farmers
	Poor rural infrastructure	Transport and energy policies have tended to under-emphasize importance of rural infrastructure
	Weak land title	Progress with land title slow: major gaps to EDPRS target

Source: IPAR analysis

The issue of low take-up of BNR credit scheme is also seen as a constraint for the development of the value addition.

Other gaps related to the improvements of agricultural value addition are on one hand, the less importance given to the rural infrastructure by transport and energy policies are on the other hand. These policies tend to target flows amongst different towns and focus less on basic infrastructure linking farms to the big axes leading to markets. Similarly, a big and challenging gap to the EDPRS target (100% by 2012) is still the land title. As previously mentioned, land title and land costs have been reported by 83% as business start-up as one of the major constraints of doing business in Rwanda¹⁵.

4.5.1.5 Barriers to exportation

Besides the mentioned poor quality produce and lack of good agricultural practices, added barriers making exporting difficult to many Rwandan farmers are transport costs and a lack of marketing expertise. The table below summarises the gaps hindering exportation of the local agricultural products.

¹⁵ PSF OTF Survey 2008

Table 8. Gaps to exporting

Indicators	Causes	Gaps
Barriers to exporting	Transport costs	95% of export routes to Mombasa and Dar-es-Salaam lie outside Rwanda’s jurisdiction.
	Lack of marketing	Export certification process is difficult

Source: IPAR analysis

Analysis notes two gaps creating major barriers to exportation. The majority of routes leading to export are not controlled by Rwanda because they lie outside Rwanda’s administrative jurisdiction. This requires Rwanda’s active engagement through the East African Community. A second gap is the reported certification process which not only is difficult to comply with by many farmers, but also limits them from accessing international markets.

5. Sector Opportunities

Even though the sector has various challenges, it is worth noting that Rwandan agriculture sector has certain opportunities which can be utilized during the process of further development. It is evident that such institutions like ISAE provide adequate infrastructural opportunities including research and development programs.

Even though, the financial institutions in Rwanda tend to be strict on provision of loans to the small holder farms, currently more than 2% of loans disbursed are already targeting farmers which provide better opportunity at the start.

The decentralization program in Rwanda has improved access to basic services including the extension programs; this has had positive impact because it has managed to bring services closer to the farmers.

Having been one of the countries that have embraced the practice of good governance in terms of strict transparency and accountability in Africa, Rwandan sector structures are reasonably developed to accommodate any further sector development.

Performance contract (Imihigo) has created motivation to workers who try to improve both quality and quantity of the product output.

Farm inputs are currently being used including imported fertilizers and the development partners are increasingly showing interest in the use of the modern inputs

6. Lessons Learned

Although Supply incentives created by export are a necessary condition for positive balance of trade response, it is not a sufficient condition to affect substantial increase in export output. In addition to improving incentives for farmers, adequate rural infrastructure e.g. Irrigation, Roads etc, are necessary for the success of the entire sector.

Another important lesson learnt was that farmer's education, research and development, credit facilities and availability of inputs are all conducive to agricultural development. Where all these factors are absolutely deficient, realizing policy objectives may be a bigger challenge.

7. Proposed Policy Recommendations

Generally it is important to appreciate the efforts that have been put in place by the agriculture sector to achieve various objectives. However, arising from the findings of the sector review, it is equally necessary to propose recommendations that are felt to be relevant for the achievement of the sector objectives.

I) Improvement on the use of inputs, though the ministry of agriculture has significantly improved in the use of agricultural inputs, there is need to empower farmers by reducing the cost of fertilizers, improved seeds and even pesticides based on acreage one owns. Farmers should also be sensitized on the use of cow dung as farm yard manure to complement fertilizers. Due to lack of adequate production capacity and insufficient stocks in the country, Rwanda still depends upon imported inputs which are too costly for farmers. For example in 2008, 18,200 tones of fertilizers were imported at cost of \$19million. There is need also to have a clear policy on farmers' incentives and to improve on extension services to increase the skills of farmers especially at the district level. Currently, the cost of fertilizer in Rwanda is 50% higher than Kenya and 37% higher than Uganda; this should be reversed.

II) Improve coordination between research and implementing Institutions

MINAGRI agencies like (RHODA, RARDA, RADA and ISAR) have improved in their activities but they still need to improve on extension services to farmers. Coordination services especially between ISAR as a research institute and RADA as the main implementing agency should also be improved.

III) To Embrace Commercialization

Shifting from subsistence farming to a commercial approach appears difficult for many local farmers partially due to lack of business skills and entrepreneurial mindset, but it is the best way through which farmers can benefit both from quality and Economies of

scale. It therefore imperative for the government to come up with incentives and mechanisms of motivation to farmers, this should include strengthening and certification of various cooperative societies in the agriculture sector.

Internally, some of these incentives would be on one hand to adopt an adequate and intelligent price regulation. This means that the government can help put in place strong mechanisms to motivate farmers through price stabilization by buying and stocking agricultural products in periods of harvest and resell them when the demand is high.

On the other hand, access to credit lines should be facilitated to farmers and government should pay a given percentage of the charged interests as a sign of encouragement to farmers.

IV) Consideration of Value Addition

There is evidence of high potential for value addition in the sector, but investment in agro- processing is still weak, difficult, costly and risky. This has been observed to be as a result of lack of access to credit, poor rural infrastructure and weak land title deeds. If these issues can be addressed, for example BNR should encourage commercial banks to offer credit facilities to farmers, the government should target the rural areas with infrastructural policies and proper land demarcation. All the said issues are crucial because over 83% of farmers have reported land title deed problems and land cost as the biggest impediment in acquiring Capital for business development in Rwanda.

V) Removing Export Barriers

Besides the inadequate quality of produce and lack of good agricultural practices, other barriers making exportation difficult to majority of Rwandan farmers are transport cost and lack of marketing expertise. Currently, 95% of export routes to Mombasa and Dar es Salaam are outside the jurisdiction of Rwanda while on the side of marketing, export certification process is difficult and cumbersome. With the emergence of East African Community, the government should negotiate with Kenya and Tanzania who have sea ports to make operations at their ports less tedious for the benefit of local sector entrepreneurs.

VI) Impact of Weather-Related Shocks

Currently, Rwandan agriculture depends wholly on the weather pattern and there is limited investment aiming at reducing Rwandan agriculture vulnerability to weather shocks. It is still evident that with lack of Irrigation schemes and weak capacity on meteorological programs, the sector may not manage to challenge the weather related shocks. Feasibility Studies on Irrigation should be conducted to assess the possibility of irrigation and to approach donors for possible assistance. Meteorological department in the country should be strengthened in order to be more reliable.

8. Identified research areas

Despite existing efforts, this analysis points some key strategic issues that need particular attention of researchers:

1. **Agricultural price volatility:** how is this explained, what are the factors that led to this volatility, who is benefiting from it; how can agricultural prices be stabilised across seasons, production cost analysis;
2. **Modernization of Rwandan agriculture:** mitigation of weather related shocks, land registration and land title reform, rural infrastructure and energy supply, accessibility and affordability of agricultural inputs, value addition and agro-processing, extension and technology transfer, addressing the issue of knowledge/Skills and farmers mindsets; address the coordination failure along the value chain;
3. **Access to credit and rural financing:** mitigating risks and rise public awareness of rural financing opportunities; private investment,
4. **Agriculture as a major cause of poverty:** What can be done to reverse the situation;
5. **Opportunities:** how does Rwanda fully exploit identified agricultural opportunities;
6. **Place of Rwandan agriculture in a dynamic AEC:** Modelling the prediction of the Agricultural sector into the current Rwanda's integration in the EAC and provide decision makers with adequate instruments on which to base decisions;
7. **Micro assessment:** a household-based agricultural situational analysis;
8. **Impact Evaluation:** Evaluation of the impact of different agricultural policies (SPAT1, GIRINKA, CIP,...) on farmers' living conditions.

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Stakeholders consulted

- MINAGRI: Coordinator, PAPSTA (Strategic Plan for Agricultural Transformation); Coordinator, CIP (Crop Intensification Program)
- OCIR Café: Director General; Marketing Director;
- OCIR Thé: Director General
- RARDA: Director General
- RADA: Director general
- RHODA: Chairman of Horticulture taskforce, Director in charge of production; Officer in charge of quality assurance, Coordinator, RHESI (Rwanda Horticulture Export Standards Initiative)
- ISAR: Deputy Director General for Research
- Mr. Sina Gerard, Owner of URWIBUTSO (Nyirangarama) Factory
- Cooperative Abakundakawa