DOCUMENT OF

THE WORLD BANK

REPUBLIC OF RWANDA

PROGRAM-FOR-RESULTS SUPPORT OPERATION

FOR

TRANSFORMATION OF AGRICULTURE SECTOR PROGRAM PHASE 3

TECHNICAL ASSESSMENT REPORT

October 9, 2014

Prepared by The World Bank Group

Contents

List of Abbreviations and Acronyms

ASIP	Agriculture Sector Investment Plan
ASWG	Agriculture Sector Working Group
BRD	Rwanda Development Bank
$C + CO_2$	Carbon and Carbon Dioxide
CAADP	Comprehensive Africa Agriculture Development Programme
CD	Capacity Development
CDD	Community Driven Development
CFSVA	Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey
CIP	Crop Intensification Program
COMESA	Common Market for Eastern and Southern Africa
CPAF	Common Performance Accountability Framework
DDP	District Development Plan
DIP	Decentralization Implementation Plan
DIS	Decentralization Implementation Strategy
DLI	Disbursement-linked Indicator
DP	Development Partner
EAC	East African Community
EDPRS	Economic Development and Poverty Reduction Strategy
EFA	Economic and Financial Analysis
EICV	*Enquête Intégrale sur les Conditions de Vie des Ménages* (Integrated Household Living Conditions Survey)
ERR	Economic Rate of Return
ESW	Economic and Sector Work
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FDI	Foreign Direct Investment
FFS	Farmer Field School
FRR	Financial Rate of Return
GAFSP	Global Agriculture and Food Security Program
GDP	Gross Domestic Product
GoR	Government of Rwanda
ha	Hectares
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFPRI	International Food Policy Research Institute
IMP	Irrigation Master Plan
IPAR	Institute of Policy Analysis and Research - Rwanda
IWUO	Irrigation Water User Organization
JSR	Joint Sector Review
LG	Local Government
LUC	Land Use Consolidation
LWH	Land Husbandry, Water Harvesting and Hillside Irrigation Project
M&E	Monitoring and Evaluation
MCC	Milk Collection Center
MDA	Ministries-Districts-Implementing Agencies
MDTF	Multi-Donor Trust Fund
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government

MINECOFIN	Ministry of Finance and Economic Planning
MINICOM	Ministry of Trade and Industry
MINIFRA	Ministry of Infrastructure
MINISANTE	Minsitry of Health
MINIRENA	Ministry of Natural Resources
MIS	Management Information System
MT	Metric Ton
MTEF	Medium Term Expenditure Framework
MUV	Manufactures Unit Value Index
NAADS	National Agricultural Advisory Services Project - Uganda
NAEB	National Agricultural Export Board
NEPAD	New Partnership for Africa's Development
NFNSP	National Food and Nutrition Strategic Plan
NISR	National Institute of Statistics of Rwanda
NPV	Net Present Value
OM	Ombudsman's Office
PforR	Program for Results
PMO	Prime Minister's Office
PPP	Public-Private Partnership
PRICE	Project for Rural Income Through Exports (IFAD)
PSTA	Strategic Plan for the Transformation of Agriculture
R&D	Research and Development
RAB	Rwanda Agricultural Board
RBS	Rwanda Bureau of Standards
RCA	Rwanda Cooperative Agency
RDB	Rwanda Development Board
REMA	Rwanda Environment Management Authority
RF	Results Framework
RwF	Rwandan Francs
SACCO	Savings and Credit Cooperative
SGR	Strategic Grain Reserves
SHG	Self-Help Group
SLM	Sustainable Land Management
SME	Small and Medium Enterprise
SO	Strategic Objective
SP	Subprogram
SPIU	Single Project Implementation Unit (World Bank, IFAD, AfDB)
SPS	Sanitary, Phytosanitary and Safety
SWAp	Sector Wide Approach
t	(Metric) Tonne
TVET	Technical and Vocational Education and Training
US$/USD	United States Dollar
USAID	United States Agency for International Development
WAAPP	West Africa Agricultural Productivity Program Support Project
WO/P	Without Program Situation
W/P	With Program Situation
WRS	Warehouse Receipts
WUA	Water Users Association

EXECUTIVE SUMMARY

CONTEXT

i. **Rwanda has made impressive performance in the last decade, particularly in the last five years, in promoting significant economic reforms, rapid growth, and poverty reduction.** The agriculture sector's dominant structure and excellent performance have played a major role in making positive contributions. Nonetheless, significant challenges remain to be addressed.

ii. ***Vision 2020*** **(2004-2020) and the Second Economic Development and Poverty Reduction Strategy (EDPRS 2) (2013-2018) outline a sound country-level framework** within which the Third Phase of the Strategic Program for the Transformation of Agriculture in Rwanda (PSTA 3) (2013/14-2017/18) was framed to address the unfinished agenda from a successful PSTA 2 (with over 90 percent completion of key objectives and targets) and to further propel the transformation of the agriculture sector from subsistence to market-oriented production. PSTA 3 is guided by and operationalizes for Rwanda the overall Comprehensive Africa Agriculture Development Programme (CAADP). PSTA 3, its Results Framework (RF), and the resulting Agriculture Sector Investment Plan (ASIP) were also guided by the Economic and Sector Work (ESW)[1] carried out by the World Bank and other key Development Partners (DPs), in close collaboration with Ministry of Agriculture and Animal Resources (MINAGRI). There is a strong strategic and operational rationale for the Bank's support of the proposed PSTA 3 and its ASIP.

PSTA 3 AND THE PROGRAM'S MAIN FEATURES

iii. **The PSTA 3 program's strategic objectives are to**: i) intensify, commercialize, and transform the Rwandan agriculture sector to enhance food security and nutrition, reduce poverty, and drive economic growth; and ii) accelerate sustainable increases and expanded private sector role in production, processing, and value–addition and commercialization of staple crops, export commodities, and livestock products. PSTA 3 has eight major impact-level targets that are ambitious but achievable, building on the excellent performance under PSTA 2. The focus of PSTA 3 is on intensifying core "drivers" of sectoral growth, transformation, and poverty reduction.

iv. **PSTA 3 Programs and Supportive RF**. Building on the above policy-driven impact targets and goals and the identified agricultural "transformation drivers," PSTA 3 comprises four program areas and 24 component subprograms (SPs). The four programs are: i) Agriculture and animal resource intensification; ii) Research, technology transfer and organization of farmers, iii) Private sector-driven value chain development and expanded investments; and iv) Institutional results-focused development and agricultural crosscutting issues. A comprehensive RF, supported by a well-thought-out results chain, underpins PSTA 3's design and credibility. There are also efforts to complete the update of a comprehensive monitoring and evaluation (M&E) system that will be used as a management tool to achieve the objectives and targets and to help guide needed adjustments.

v. **Estimated Costs and Expenditure Framework**. Building on PSTA 3's RF, the estimated total cost for ASIP is about US$1.2 billion, with an additional indicative investment level of about US$550 million from the private sector. This level of public expenditures is ASIP's "medium-cost" scenario; it was endorsed by the Government of Rwanda (GoR) and DPs as constituting a credible financing level and plan in a recent high-level CAADP 2 meeting (June 2014). This level of funding is also consistent with: the increasing trend in public agricultural expenditures; the government's strong commitment to the

[1] World Bank (2014), *Rwanda Promoting Agricultural Growth in Rwanda: Recent Performance, Challenges and Opportunities*, Report No. 86399-RW, Agriculture, Rural Development and Irrigation (AFTA2), Sustainable Development Department, Africa Region.

agriculture sector and to providing enhanced policies and increased public funding in recognition of the sector's vital role in helping to meet country-level goals/targets and the technical soundness of the ASIP; and intentions for substantial increases in DP funding for the sector. Therefore, the expenditure and financing framework and supporting management processes (being improved) are sound, contributing to enhanced expenditure efficiencies and effectiveness.

vi. **Objectives and Key Features of the Program (PforR)**. The proposed objective of the Ag. PforR operation (= the "Program") is to support the efficient and effective implementation of the GoR's strategic objectives of PSTA 3, equivalent to the "medium-cost" expenditure scenario of ASIP. The Program is to be co-financed by the proposed IDA operation (US$100 million) and other DPs (including EU, USAID, IFAD, and DFID), which together will support the entire national PSTA 3 program. The additional co-financing will come within the first year of the PforR operation. The Ag. PforR operation funds will disburse against the proposed disbursement-linked indicators (DLIs), which are based on several explicit strategic criteria. There are four results areas (or PSTA 3 programs) and corresponding monitorable DLIs involving strategic outputs and outcomes (that also constitute "drivers" for other results). The triggering of disbursements is based on a robust verification protocol of the agreed results (DLIs), to be conducted by the Prime Minister's Office (PMO).

vii. **Assessment Results, Emerging Implications and Supportive Program Action Plan (PAP)**. The Bank's assessment mission and subsequent work provided a comprehensive review of PSTA 3/RF/ASIP. The review concluded that the PSTA 3 program is sound from a technical (including economic and risk assessments), integrated fiduciary, social and environmental systems, and risk perspectives. These four assessments identified specific areas of risk and capacity "gaps" and recommended priority actions to enhance the implementation success of the Program. These actions constitute the core of the PAP, which comprises four strategic cross-cutting areas and their risk mitigation actions.

viii. **Economic Assessment**. The Bank conducted a quantitative and qualitative assessment of PSTA 3's ASIP proposal. The analyses showed favorable results, confirming the strong economic soundness and justification of the proposed Program, and highlighting key underlying risks and success factors, also addressed in the PAP. In summary:

- A 25-year cash flow model is used to assess the *ex-ante* productivity, effectiveness, and efficiency of public sector investments;
- A selection of key drivers of agricultural growth is quantified in the model to analyze the impact of changes in public sector investment costs by linking enterprise models and SP costs. The medium-cost scenario yields an economic net present value of US$585 million and a sound economic rate of return of 21 percent. The results are consistent with PSTA's target agricultural growth rate of 8.5 percent p.a.;
- Meaningful poverty reduction is achieved through increased farm income and employment;
- Estimated elasticities indicate the relative impact of different SPs, therefore confirming the soundness of the Program's expenditure balance and composition;
- Linkages between enterprise models and SPs highlight positive synergies;
- Agriculture growth is driven by the nine quantified SPs, with linkages to the other SPs;
- Effective institutions, adapted and implemented legal and regulatory frameworks, and effective targeting of disadvantaged beneficiary groups strengthen inclusive program impact;
- Tracking impacts against a baseline with reliable M&E systems (aligned to the RF) helps decision makers and DPs make better evidence-based investment decisions.

ix. **Overall Risk Rating and PAP**. The detailed technical assessment concludes an overall risk rating of "**Moderate**," considering the ambitious but achievable goals and targets to promote significant transformation in the sector and in the livelihoods of the rural population. Further details on the main risk

areas are presented in an Integrated Risk Assessment. The proposed PAP was designed to address the identified strategic cross-cutting risks, as well as other identified risk mitigating actions for each of the 24 SPs; their risk ratings range from “Low” to “High,” with most of the SPs having a “Moderate” risk.

PART A: Program Description

i. Description of the government program

1. **Rwanda has made impressive performance in the last decade, particularly in the last five years, in promoting significant economic reforms and rapid growth and poverty reduction** (e.g., **an** economic growth rate of 8 percent from 1999-2012 and a reduction in poverty from 59 percent to 45 percent of the population below the poverty line from 2001 to 2012)**.** The agriculture sector's dominant structure and excellent performance have played a major role in making positive contributions. Based on evidenced-based analyses,[2] from 2001-2013 Rwanda's agriculture sector contributed 20.5 percentage points to the overall gross domestic product (GDP) growth (and contributed 33 percent of total GDP in 2013), grew at an average 5.6 percent p.a., and contributed a minimum of 45 percent of the poverty reduction in the country. Propelled by the first two phases of the Strategic Program for the Transformation of Agriculture in Rwanda (PSTA 1 and 2, 2003-2007, 2008-2012), the high-level drivers of agricultural growth and reduced poverty over the last 10 years were: increased productivity and production of food and export crops, marketing of production, and increased off-farm employment through food and export crop commodity value chain development.[3]

2. **Nonetheless, significant challenges remain to be addressed, including:** i) sustaining in the medium to long term the productivity gains that have contributed to strong agriculture growth and raised rural incomes; ii) increasing nutrition security for the rural population; iii) strengthening and deepening market-driven value chain development, including increasing agroprocessing, which has created nonfarm employment; iv) securing and strengthening linkages to domestic and regional/international markets for agriculture production surpluses; v) enhancing the enabling environment to attract private sector investment and add value to the productivity and diversification increases; and vi) strengthening systems and capacities to ensure adequate and effective management and governance of the agriculture sector.

3. ***Vision 2020*** **(2004-2020) and the Second Economic Development and Poverty Reduction Strategy (EDPRS 2) (2013-2018)** outline a sound country-level framework within which the Third Phase of the Strategic Program for the Transformation of Agriculture in Rwanda (PSTA 3) (2014-2018) was framed to address the unfinished agenda of policy and institutional reforms, investments, and transformation of the agriculture sector from subsistence to market-oriented production. PSTA 3's efficient and effective implementation is a high priority of the Government of Rwanda (GoR), under the leadership of the Ministry of Agriculture and Animal Husbandry (MINAGRI).[4]

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[2] *Rwanda Economic Update, Maintaining Momentum with a special focus on Rwanda's pathway out of poverty*, World Bank, May 2013, Edition No. 4.

[3] Ibid.

[4] PSTA 3 is implemented by the Ministry of Agriculture and Animal Resources (MINAGRI), in line with its current organizational and functional structure and actors: four departments (Planning, Inspection, Crop Production, and Animal Resources); two Task Forces (Irrigation and Post-Harvest Infrastructure); two semi-autonomous implementing agencies: Rwanda Agriculture Board (RAB), and National Agriculture Export Board (NAEB); three Single Program Implementation Units (SPIUs) which implement donor-supported projects (World Bank, IFAD, African Development Bank); and 30 Districts (as part of a decentralizing Government structure). The central government, through MINAGRI, provides policy, coordination and financing leadership for the PSTA 3 program, including strong harmonization and alignment of development assistance. Implementation responsibilities rest with the Task Forces, RAB, NAEB, SPIUs, and Districts, which are enabled by various coordination mechanisms. Implementation roles and approaches vary with a mix of national, District, community, and private program delivery. Currently, MINAGRI is completing a restructuring exercise to further streamline and enhance organizational and implementation efficiencies and effectiveness.

4. **PSTA 3 includes various instruments to support the effective operationalization, funding, implementation, and M&E of the program**: a comprehensive Results Framework (RF), underpinned by a strong results chain; an Agriculture Sector Investment Plan (ASIP), with substantial increases in both public and private sector investments over PSTA 2 (2008-2013), together with an expanded role of an inclusive private sector; an updated, integrated and operational M&E framework and action plan to support better and more timely decision making and enhanced implementation, as part of the medium-term and annual budgetary planning and implementation processes; processes and mechanisms to promote an inclusive, expanded private sector role in PSTA 3; and operational financing instruments to support the adequate financing and effective implementation of the ASIP. Additionally, MINAGRI has made concerted efforts to ensure the relevant lessons from PSTA 2[5] have been taken into account and adapted to the requirements of PSTA 3 (see Annex 1 for accomplishments of and detailed lessons learned in PSTA 2).

5. **Outcomes from the implementation of PSTA 2 were highly favorable, with over 90 percent completion of key objectives and targets.**[6] The key impacts achieved were related to the contribution of over 45 percent of the 12 percent reduction in country-level poverty. Key outcomes achieved were improvements in sustainable land management leading to more efficient land use, increased and improved input utilization, and significant productivity increases resulting from expanded irrigation and cultural practices. Several drivers responsible for Rwanda's agriculture growth in the last five years were: i) the establishment of a good business-enabling environment and well-prioritized and directed public investments; and ii) expansion of food production and scaled-up public investments in the Crop-Intensification Program (CIP), Land Use Consolidation Program (LUCP), input subsidies on fertilizers and seeds, and other public activities to promote production of priority crops.

6. **Rwanda's PSTA 3 program is guided by and operationalizes for Rwanda the overall Comprehensive Africa Agriculture Development Programme (CAADP)**.[7] Rwanda was the first country to sign a CAADP Compact and prepare an ASIP strategy (PSTA 2) that was fully aligned with CAADP. Having fulfilled its first CAADP investment strategy (2008-2013), the country launched the second Rwanda CAADP ASIP based on PSTA 3 in June 2014.[8]

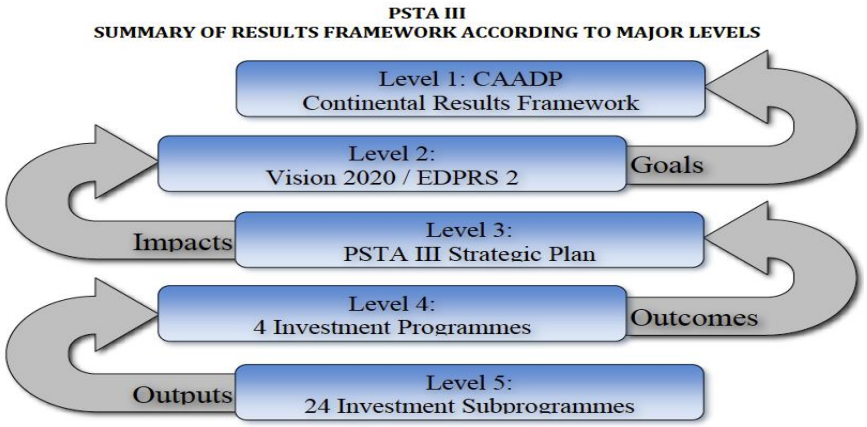
7. **PSTA 3, its RF, and the ASIP were also guided by Economic and Sector Work (ESW) by the World Bank and other key development partners (DPs). Some of the key recommendations from the analyses were**: agriculture will continue in the medium term to be the leading engine for growth and poverty reduction in Rwanda; some agricultural subsectors will grow more rapidly than others (e.g., export crops and livestock); the contribution of each subsector to GDP growth depends not only on the rate of growth achieved in that subsector, but also on the absolute size of the subsector. Taking into account the large absolute size of the food crops subsectors, most of the growth in agriculture should

[5] Associates for International Resources and Development (AIRD), "Rwanda Agricultural Markets, Private Sector Development, Supply and Competitiveness Study," Rwanda CAADP 2 Background Paper #1, Feb 2014.
[6] Ibid. Some of PSTA 2 targets were surpassed by 100 - 200 percent.
[7] CAADP aims to help African countries reach a higher path of economic growth through agriculture-led development. CAADP's vision is to addresses policy and capacity issues across the entire agriculture sector and African continent. CAADP is entirely African-led and African-owned and represents African leaders' collective vision for agriculture in Africa.
[8] On June 9-10, 2014, a two-day meeting was held to mobilize national and international partners around the CAADP. Having successfully implemented the first cycle of CAADP, MINAGRI is now embarking on the second cycle of CAADP to operationalize the country's Second EDPRS (2013-17) and the third phase of the Strategic Plan for the Transformation of Agriculture (2013-18). At the meeting, the achievements of Rwanda's first CAADP and PSTA 2 were presented along with PSTA 3's strategy, program, RF, and the ASIP. Clear sector prioritization of investment needs, funding modalities, harmonization of stakeholder activities for efficient delivery, and stronger accountability mechanisms were also presented. A half-day session was dedicated to policies and priorities related to private sector development. At the meeting an MOU was signed by the government, private sector, civil society, and DPs supporting the principles and objectives of PSTA 3/Rwanda CAADP 2.

continue to come from growth in food crops, especially considering that increased incomes will expand food demand. Export crops will make a significant contribution to growth, but the importance of this contribution will be limited so long as the export crop subsector remains small relative to the food crops and livestock sectors. PSTA 3 needs to: continue to include the development of a targeting strategy for extreme poor rural farmers (focusing on increasing productivity and production of food crops consumed by the poor); expand the CIP and LUCP; increase nonfarm employment and value addition of key and competitive value chains; increase soil conservation coverage, especially in highly depleted soils, with enhanced selectivity in hillside irrigation schemes; increase awareness and development of competitive horticulture opportunities; expand livestock intensification and establish feeding limits for the One-Cow (Girinka) Program; expand coffee and tea production, for which Rwanda demonstrates competitiveness; and increase reliability and utilization of agriculture statistics and an enhanced M&E system.

8. **PSTA's Results Framework.** To operationalize PSTA 3, MINAGRI and its implementing agencies (Rwanda Agricultural Board/RAB, National Agricultural Export Board/NAEB, and Special Project Implementation Units/SPIUs) formulated a comprehensive RF (see Annex 2 for the high-level version of PSTA 3's RF; the detailed version is available on request). It is underpinned by an explicit results chain and recent evidenced-based analysis (including empirical agricultural growth scenarios and market and competitiveness analyses).[9] Figure 1 illustrates the RF and underlying results chain to achieve the key strategic targets, to be supported by the proposed disbursement-linked indicators (DLIs).

Figure 1: PSTA 3 Summary Results Framework According to Major Levels



9. **The PSTA 3 program's strategic objectives are to transform Rwandan agriculture from a subsistence-based to a knowledge-based sector and to accelerate agriculture growth to increase rural incomes and reduce poverty.** The strategy encompasses four broad program areas: i) agriculture and animal resource intensification; ii) research, technology transfer and professionalization of farmers; iii) value chain development and private sector investment; and iv) institutional development and agricultural cross-cutting issues. These are designed to achieve the EDPRS 2 foundational goal of increased food and nutrition security as measured by a target of 90 percent of households having acceptable food consumption. PSTA 3 is supported by a gender strategy that requires addressing and mainstreaming gender issues in all phases of planning, implementation, and M&E of PSTA 3 activities. The strategy also

[9] These two recent studies refer to: (1) The Role of Agriculture in the Fast Growing Rwandan Economy: Assessing Growth Alternatives. Rwanda CAADP 2: Background Paper #2. Prepared by Xinshen Diao*, Godfrey Bahiigwa and Angga Pradesha. IFPRI (Draft paper, January 31, 2014); and (2) Rwanda Agricultural Markets, Private Sector Development, Supply and Competitiveness Study. Rwanda CAADP 2: Background Paper #1. Prepared by Dirck Stryker, Mukhtar Amin, Jonas Munyurangabo (Associates for International Resources and Development (AIRD) (Draft paper, February 14, 2014).

stresses that program design will endeavor to avoid inadvertent negative impacts, for example, upon women's nutrition and control of resources, while moving to a cash economy.

10. **The PSTA 3 program's key impact indicators and targets build** on and are consistent with those outlined in *Vision 2020*, EDPRS 2, and the continent-wide CAADP's RF and its targets. Table 1 highlights four high-level and 16 intermediate-level strategic results.

Table 1: PSTA 3 Program Key Result Indicators and Targets 2013/14-2017/18

Key High-level Results	Baseline (end-2012/13)	Target[a] (end-2017/18)
1) Agricultural growth rate (% p.a.)	5.6%	8.5%
2) Decreased percentage of rural population under national poverty line (2010/2011)	44%	30%
3) Increased agricultural land under "modernized" agricultural use[b]	24%	50%
4) Increased agriculture exports ((% p.a.)	22% [c]	28%
Intermediate-level Results		
1) Increased land effectively protected against soil erosion &, based on agreed technical standards, and sustainably managed (Progressive/P and Radical/R terraces; Total/T)[10]	P: 802,292 ha R: 46,246 ha[11] T: 848,538 ha	P: 953,714 ha R: 81,337 ha T: 1,035, 051 ha
2) Increased land developed with irrigation infrastructure, based on agreed technical standards, with adequate O&M. Main irrigation types: Hillsides/H and Marshlands/M	H: 3,075 ha M: 24,721 ha T: 27,796 ha	H: 7,575 ha M: 32,821 ha T: 42,376 ha
3) Increased average productivity levels (crop yields) of major food and export crops and livestock	Cassava 15 t/ha Coffee: 2.2 kgs/tree/yr Milk 4ltrs/cow/day[12]	25 t/ha 3.0 kgs/tree/yr 8 ltrs/cow/day
4) Increased total milk production	503,000 mt	724,000 mt
5) No. of new technologies developed, released and adopted by farmers[13] (with gender breakdown in adoption rates)[e]	5	2117
6) Increased cooperatives/farmers' organizations graded A and B[14]	5	32
7) Increased value of major competitive value chains[15] (total & exports) (US$)	2.3 b/132 m	3.8 b/231 m
8) Increased private sector investments in agriculture sector (US$)	513[d]	1,263
9) Increased agri-finance lending for ag. investments (% of total)	3.6%	18%
10) Increased agriculture production marketed (as % of total production)	28%	35%
11) Rehabilitated, upgraded and maintained rural feeder roads network (km)	14,374 km	25,061 km
12) Enhanced results-focused institutional capacity of MINAGRI and Districts	Action Plans	Fully Op'al
13) Enhanced and Gender Responsive Management Information System (MIS) Framework and Action Plan for Ag. Sector completed, approved, initiated and fully operational[16]	Partially working, Draft framework	Fully Operational[f]
14) Approved Seeds, Fertilizer and Ag. Finance Policy: action plans prepared,	Drafts	Implementation

10 The main purpose of terracing is to reduce runoff and soil erosion on slopes and to improve soil quality and soil moisture retention. It is a sustainable land use technology for small farmers with limited land holdings. Also, a major aim is to conserve water and reduce runoff. Progressive terracing is carried out on slope gradients of 40-60% and radical terracing (bench like terraces) is used on slope gradients of 16-40%.

[11] This represents a baseline coverage of 73 percent (2012/13) and target of 91 percent by 2017/18.

[12] Milk production per cow.

[13] Which are consistent with Rwanda's comparative competitive advantage. Technologies can come from global or local markets.

[14] Grading will include a number of parameters such as inclusion of small and marginal landholders, number of total households benefiting from input and output markets and services, participation and leadership of farmers/gender in managing cooperatives, and revenue generation.

[15] Food crops, export commodities, livestock products, agroprocessed.

[16] Fully operational means producing quarterly and annual reports and being used by the intended benefactors.

agreed, and initiated (for each of the 3 policies)		of policies
15) Increased women's empowerment in Agriculture index for Rwanda	91%	96%
16) Food Consumption Score (which measures adequacy of food consumption)	75	90

[a] Figures refer to cumulative figures.

[b] Refers to use of improved seeds (30%), fertilizer (30%), and mechanization (13%).

[c] Refers to the growth trends during the PSTA 2 period (2008 – 2012).

Sources of Baseline: includes EICV survey results (2010/11); national accounts; CFSVA Vulnerability Survey (2012); RDB (ref. private sector investments).

[d] Total of agriculture private sector investment from 2000-2013. The average of the last four years was US$103 million p.a.

[e] Based on several empirical surveys and studies, and the economic and financial analysis, it is estimated that by the end of the period an average of about 80% of the farmers will have adopted new and improved technologies. This will be one of the important demand parameters monitored by PSTA 3's enhanced M&E system.

[f] "Fully operational" includes preparation and dissemination of quarterly and annual progress reports on the key outputs, outcomes, and impacts of the agriculture sector, in line with PSTA 3 (including periodic analytical and evidenced-based studies on strategic themes).

11. **PSTA 3 has benefited from recent World Bank ESW on empirical agricultural growth scenarios and market and competitiveness analyses**.[17] The objective of the ESW was to review the performance and results of the First Rwanda CAADP and PSTA 2 as input into the preparation of the Second Rwanda CAADP and review of PSTA 3's investment plan to assure the soundness of its assumptions and the efficiency with which Rwanda will achieve its goals going forward. The policy note recommended agricultural market opportunities at the national, regional, and global levels, analyzing the patterns of competitiveness and comparative advantage in Rwandan agriculture. While some of the crops identified for intensification in PSTA 3 by the GoR do not share equal competitive and comparative advantage, the GoR is pursuing pro-poor crops that can generate immediate income, raise families out of poverty, and build farmers' assets, thereafter allowing them to diversify into more competitive crops.

12. **Core Drivers: The focus of PSTA 3 is on intensifying the following six core "drivers" of sectoral growth, transformation, and poverty reduction**:

(i) Increasing the productivity of crop, export, and livestock commodities, recognizing gender-differentiated approaches that would improve household food security and nutrition and rural incomes, especially of vulnerable rural families (through empowering farmers with **land husbandry actions** including land conservation – terracing, increasing soil fertility – organic and inorganic fertilization, increasing use of improved seeds and varieties, expanding land under irrigation, increasing coverage and quality of extension services, and increasing private sector-led mechanization);

(ii) **Enhancing market-responsive technology introduction** through research, technology transfer, strengthened research-extension linkages, and stronger and more effective farmers' cooperatives and organizations, while addressing relevant sustainability and climate change challenges;

(iii) **Significantly expanding and strengthening accessible and inclusive agricultural finance products** and a sustainable agricultural finance policy framework and system (including savings mobilization and agricultural insurance) that would promote viable and inclusive investments, consistent with Rwanda's competitive advantage;

(iv) **Stimulating expanded and inclusive private sector and market-driven value chain development and integration**, facilitated by expanded models of effective public-private partnerships (PPPs);

[17] World Bank (2014), *Rwanda Promoting Agricultural Growth in Rwanda: Recent Performance, Challenges and Opportunities*, Report No. 86399-RW, Agriculture, Rural Development and Irrigation (AFTA2), Sustainable Development Department, Africa Region. Two background studies for the ESW were: (1) The Role of Agriculture in the Fast Growing Rwandan Economy: Assessing Growth Alternatives. Rwanda CAADP 2: Background Paper #2. Prepared by Xinshen Diao, Godfrey Bahiigwa and Angga Pradesha. IFPRI (Draft paper, January 31, 2014); and (2) Rwanda Agricultural Markets, Private Sector Development, Supply and Competitiveness Study. Rwanda CAADP 2: Background Paper #1. Prepared by Dirck Stryker, Mukhtar Amin, Jonas Munyurangabo (Associates for International Resources and Development (AIRD) (Draft paper, February 14, 2014).

(v) **Expanding market-oriented rural infrastructure** (especially prioritized soil and conservation works, irrigation, rural feeder roads, and post-harvest facilities); and

(vi) **Strengthening institutional development and strategic cross-cutting themes**, including:

- Promotion of effective multi-stakeholder formulation, consensus, and implementation of key policy reforms to enable key drivers of the sector transformation process, which in turn will empower farmers, consistent with Rwanda's competitive advantage;
- Results-focused capacity development of key sector institutions and stakeholders at various levels (national and subnational);
- More efficient, responsive, transparent, and accountable decentralization of key agricultural services and their implementation;
- More effective and evidenced-based planning, budgetary, and M&E systems at various levels;
- Enhanced nutrition and food security;
- Attention to climate change challenges; and
- Strengthened processes and mechanisms for more effective coordination by MINAGRI (especially RAB and NAEB) with other relevant ministries/agencies, Districts (in support of ongoing decentralization), the private sector, and other key stakeholders.

13. **Building on the above impact targets, goals, RF, and "transformation drivers," PSTA 3 is comprises four program areas and 24 component subprograms (SPs).** These are designed and driven according to a results chain that links results at three levels – impacts, outcomes, and prioritized outputs[18] – which are generated by prioritized lines of action/activities. These results are measured by "SMART" (specific, measurable, achievable, relevant, and time-bound) indicators and their corresponding ambitious but achievable transformative targets of PSTA 3 (under the medium-cost scenario; see below).

14. **More specifically, the results chain is underpinned by the following explicit linkages and supporting processes and mechanisms for achieving the specified and measureable strategic goals and objectives**:

- The four programs and their 24 component SPs, in terms of content, "balance," complementarities, and synergies, aim to operationalize the above "drivers" of agricultural growth and transformation by creating a conducive policy and physical environment for enabling accelerated crop and livestock productivity and value addition, driven by an expanded and inclusive private sector role and investments, and facilitated through strengthened and decentralized institutions, and more food secure households;
- Each of the programs and their component SPs involve formulating/operationalizing key policies and mobilizing and enhancing capacities of strategic multi-stakeholder institutions and actors (both state and nonstate) to effectively formulate and implement appropriate: (a) policies; (b) institutional reforms/strengthening; and (c) prioritized public investments and expanded private sector investments;
- Within each SP, the RF outlines a roadmap for achieving the desired strategic objectives and targets, at outcome and output levels, supported by prioritized "lines of action," to be carried out by specifying more sharply appropriate roles for the public and private sectors and PPPs;
- Each SP is designed to contribute to the strategic objectives and outcomes of each corresponding program; and

[18] Five prioritization criteria guided the "medium-cost" scenario in setting priorities and subsequent costing for the PSTA 3 ASIP (2013/14 – 2017/18): i) Degree to which SPs/activities contribute to achieving *Vision 2020* and EDPRS 2 strategic objectives and targets (including poverty reduction); ii) Degree to which SPs/activities contribute to achieving increased crop and livestock productivity and food security; iii) Degree to which SPs/activities contribute to inclusive agricultural private sector investment; iv) Degree to which SPs/activities contribute to promote enhanced market focus commercialization and value addition; v) Degree to which SPs/activities contribute to accelerate agricultural export growth. In addition, the prioritization endeavors to consider a realistic level of financing availability and the implementation capacities of the relevant implementing actor(s).

- Each program works in a complementary manner to contribute to the higher-level PSTA 3 goals and targets; these, in turn, contribute to the goals and targets of EDPRS 2, and are aligned to the continent-wide CAADP's RF and targets.[19]

15. **PSTA 3's Strategic Program Areas and Outcomes are:**[20]

Program 1: Agriculture and animal resource intensification. i) Soil erosion reduced and land sustainably managed; ii) Land productivity for priority crops increased; and iii) Animal productivity increased and animal products diversified.

Program 2: Research, technology transfer and organization of farmers. i) Improved technologies that are responsive to Rwanda's agro-ecological potential, men and women farmers' needs and resources, and market prospects; ii) Enhanced, integrated, and market-oriented research, extension, and advisory services that result in a higher proportion of farmer adoption of improved technologies, for both men and women; and iii) Strengthened inclusive and business-oriented farmers' cooperatives/organizations with enhanced entrepreneurial skills for effective engagement in input and output markets.

Program 3: Private sector-driven value chain development and expanded investments. i) Enhanced business environment for expanded agricultural investments and value addition; and ii) Competitive and private sector-driven value chain development and expanded commercialization of production for domestic and export markets, enabled by expanded access to finance, an efficient and effective agricultural marketing system, and improved rural infrastructure, and expanded successful PPPs.

Program 4: Institutional results-focused development and agricultural cross-cutting issues. i) Enhanced capacity of agriculture and livestock sector and its institutions to deliver efficient and effective agricultural services that expand access to both female and male farmers; ii) Improved policy environment for enabling rapid, private-sector driven, and sustainable agricultural growth; and iii) Enhanced food security and nutrition for a larger proportion of rural and urban households.

PSTA 3 Cost Scenarios and Indicative Financing Plan

16. **PSTA 3 has two costed scenarios representing a mix of public and private sector investments over the five-year period.** The first is a "high-cost scenario" totaling US$1.9 billion of agricultural public investments, and the second, a "medium-cost scenario" totaling US$1.2 billion with a higher level of private sector investment. Projected resources available from both the Treasury and DPs for PSTA 3 are projected at US$1.2 billion. Given an unrealistic budget gap of US$700 million under the "high-cost scenario," the PforR operation will support PSTA 3's "medium-cost scenario." Based on the available information from DPs and the government (Ministry of Finance and Economic Planning/MINECOFIN), this medium-cost scenario is fully funded. In addition, the ASIP's "medium-cost scenario" articulates a set of more sharply defined expenditure priorities (see criteria below) that have strong linkages to strategic outcomes and outputs and the key drivers of PSTA 3's RF and its results chain, thereby enhancing the prospects of achieving the main objectives and targets. The PforR's RF is derived from PSTA 3 RF based on the "medium-cost scenario." The main differences between the assumptions in the two scenarios are as follows:

- PSTA 3's targets were revised significantly downwards to reach more financially achievable levels, especially for the five highest-cost SPs;
- PSTA 3's prioritization criteria were more rigorously applied to a prioritized RF;

[19] For further details, see: CAADP 10-Year Results Framework: Accelerating CAADP Country Implementation: A Guide for Implementers (NEPAD, 2014).
[20] The detailed RF for PSTA 3 shows the baselines and targets for each outcome, as well as the underlying results chain.

- Some unit costs were revised downwards based on savings that could result from -+cost sharing of public projects with farmers. Land conservation terraces and irrigation schemes were identified as areas where greater cost-sharing with farmers could be achieved;
- A strong enabling framework for private sector growth and development with a business-friendly regulatory environment and more aggressive investment promotion following the strategic theme set out above is expected to lead to greater private sector investment, especially in export crops and processed products;
- A review of the RF identified public sector projects that could be implemented by PPP arrangements. Further PPP opportunities were identified in coffee, tea, horticulture, irrigation, milk collection centers and dairy processing, meat processing, and hides and skins;
- Fertilizer, lime, and seed subsidies were fully phased out by 2017/18, with the private sector leading the farm inputs market;
- Agricultural research was significantly scaled up to provide more innovative technologies for farmers, which is critical for achieving yield targets; and
- Extension was improved and expanded to provide support and training for farmers.

17. The medium-cost scenario is therefore one of lower costs, intended to bring costs within an affordable range. The PSTA 3/ASIP costing exercise adopted the prioritization criteria developed as part of the RF for PSTA 3, namely: the degree to which SPs/activities contribute to: i) *Vision 2020* and EDPRS 2 strategic objectives and targets (including agriculture sector growth of 8.5 percent p.a. and reduced poverty levels; ii) increased crop and livestock productivity and food security; iii) inclusive agricultural private sector investment; iv) enhanced market-oriented commercialization and value addition; and v) agricultural export growth.

18. **Based on the medium-cost scenario, the total estimated cost for PSTA 3 public investments is approximately US$1.2 billion (Table 2), with an additional indicative investment level of about US$550 million from the private sector (including an estimated US$137 million for PPP activities).**[21] Overall, this level of funding is consistent with the GoR's trend of increasing allocations to the agriculture sector over the past five years (adjusted for inflation) and the proposed increases of funding by a large number of DPs. The medium-cost scenario also involved improvements in the composition of the proposed expenditure allocations, between and within programs and SPs, to generate more efficient and effective expenditures in relation to contributing to PSTA 3's targets.

19. **Nine of the 24 SPs comprise the key drivers of agriculture growth and poverty reduction – as captured in the results chain – and cover 88 percent of the public ASIP**. Accelerated and inclusive agricultural growth driven by the nine SPs is enabled through linkages to the other 15 subprograms that include expanded and enhanced market access, agricultural finance, and a supporting institutional framework.

[21] Based on consultations with the private sector, the GoR expects that the lion's share of private sector investment will be in irrigation schemes, mechanization, the inputs subsector (primarily seeds and fertilizer), food and export crops (primarily coffee, tea, horticulture, and flowers), livestock, hides and skins; value chain development (food, export crops, dairy/meat), and market-oriented infrastructure for post-harvest marketing and management systems.

Table 2: Projected PSTA 3 Public Expenditures 2013/14-2017/18

Program	US$ million	% of Total
1) Agriculture and animal resource intensification	628	52.3
2) Research, technology transfer and professionalization of farmers	86	7.2
3) Value chain development and private sector investment	382	31.8
4) Institutional development and agricultural cross-cutting issues	104	8.7
Total	**1,200** [a/]	**100.0**

a/ The detailed cost estimate is US$1,213, 516, but for purposes of simplifying the references, this figure is rounded.

20. Table 3 sets out the medium-cost scenario public sector implementation costs for PSTA 3/ASIP by program and subprogram.

Table 3: PSTA 3 (medium-cost scenario) Public Sector Costs by Program and SP (US $000s)

Program/Subprogram	2013/14	2014/15	2015/16	2016/17	2017/18	TOTAL
1. Agriculture/Animal resource intensification	**133,326**	**141,426**	**131,122**	**121,434**	**112,649**	**639,957**
1.1. Land conservation	20,519	21,852	22,424	22,874	23,311	110,980
1.2. Irrigation	56,280	59,958	61,630	62,707	63,904	304,478
1.3. Mechanization	10,016	10,330	8,573	7,715	6,867	43,500
1.4. Improve soil fertility	18,186	24,026	16,103	8,423	1,367	68,105
1.5. Seed improvement	13,874	10,536	7,336	4,357	1,549	37,652
1.6. Livestock development	14,451	14,724	15,056	15,359	15,652	75,242
2. Research and technology transfer	**12,157**	**15,647**	**18,060**	**19,701**	**20,481**	**86,046**
2.1. Research & technology transfer	7,154	7,263	7,453	7,603	7,748	37,222
2.2. Extension services	3,837	7,129	9,247	10,638	11,234	42,084
2.3. Farmer co-operatives	1,166	1,254	1,359	1,460	1,500	6,740
3. Value chain Devt./Private sector	**65,075**	**70,046**	**74,915**	**84,099**	**88,360**	**382,495**
3.1. Private sector development.	600	914	625	638	650	3,426
3.2. Food crops	14,500	14,722	15,107	15,410	15,705	75,444
3.3. Export crops	16,650	16,905	17,347	17,695	18,033	86,631
3.4. Dairy and meat	1,200	1,218	1,250	1,275	1,300	6,244
3.5. Fisheries	250	254	260	266	271	1,301
3.6. Apiculture	120	122	125	128	130	624
3.7. Agricultural finance	1,195	1,213	1,245	1,270	1,294	6,217
3.8. Market infrastructure	30,560	34,698	38,955	47,418	50,978	202,608
4. Institutional dev. / Cross-cutting issues	**18,831**	**20,186**	**21,079**	**21,980**	**22,941**	**105,017**
4.1. Institutional capacity	1,615	1,742	1,683	1,717	1,750	8,506
4.2. Decentralization	1,065	1,437	1,683	1,982	2,291	8,459
4.3. Legal and regulatory framework	100	305	365	319	325	1,413
4.4. MIS/Agricultural statistics and M&E	1,400	1,421	1,459	1,488	1,516	7,284

4.5. Gender and youth	320	325	333	340	347	1,665
4.6. Environmental mainstreaming	115	117	120	123	125	600
4.7. Food and nutrition security	14,215	14,839	15,436	16,011	16,588	77,089
Total Costs	**229,389**	**247,305**	**245,175**	**247,215**	**244,432**	**1,213,516**

21. PSTA 3/ASIP public sector implementation costs under the medium-cost scenario rise gradually from US$229 million in 2013/14 to US$244 million in 2017/18, a total of US$1,213.0 million over the five five-year ASIP period. Costs by program have a very different distribution under the medium-cost scenario. Program 1 remains the largest program, accounting for just over half of all costs by 2017/18. The revision of PSTA 3 targets in land conservation and irrigation down to more financially achievable levels as well as the phasing out of subsidies on fertilizer, lime, and seeds bring Program 1 costs under the medium-cost scenario to more affordable levels. Program 3 remains the next largest, with about 32 percent of implementation costs in the medium-cost scenario, but also with significantly reduced costs arising from more financially achievable targets for the construction of rural roads. Reduction of Program 1 and 3 implementation costs under the medium-cost scenario creates the space to slightly increase the allocation to Program 4 and significantly increase the allocation to Program 2. Agricultural research and extension rises to 8 percent of ASIP implementation costs by the final year of ASIP in 2017/18.

22. **PSTA 3 financing is shown in Table 4, which reflects both existing and future commitments from DPs.** The funding modalities used for PSTA 3 are: i) sector budget support, representing 17 percent of external funding to the sector (EU, DFID); ii) ongoing investment operations/projects, representing 35 percent (IFAD, USAID, Swiss, Netherlands, FAO, World Bank); and iii) the proposed PforR operation, representing 12 percent (World Bank, USAID, with other DPs exploring the viability of providing co-financing as part of ensuring aligned donor support to the sector).[22] However, this co-financing would not change the overall budget envelope and would not bring additional resources, but would mean switching modalities from either sector budget support or project financing to programmatic financing (PforR). The government, including the MINECOFIN, has reiterated its commitment to ensuring that the PSTA 3 is funded in accordance with the medium-cost scenario, as illustrated in the proposed financing plan. To the extent a funding gap emerges during implementation of PSTA 3, the government and DPs are confident that they will be able to close the gap. Enhanced annual planning and budgetary systems and a strengthened sector-wide M&E system will help ensure adequate and prioritized funding to achieve the key targets. Private sector funding levels will be contingent on their specific and individual investment decisions, and will reflect recent trends, coupled with significant improvements in private sector strategies, an enhanced policy environment and sustainable incentive structure, and appropriate and viable models of PPPs. The PforR support operation is helping MINAGRI operationalize this financing strategy.

Table 4: PSTA 3 – Indicative Program Financing Plan ("Medium-cost Scenario")

(2013/14-2017/18)

Source	Amount (US$ Million)	% of Total
Government	300	25.0
EU	160	13.3
IDA (LWH, RSSP, FRDP)	194	16.2
USAID*	138	11.5

[22] In the recently held high-level CAADP meeting (June 9 and 10, 2014), all DPs signed a MOU with MINAGRI endorsing PSTA 3 and indicating their intention to provide financial and technical assistance within the framework of PSTA 3 (and its RF and "medium-cost" scenario).

IDA (Ag. PforR)	100	8.3
IFAD*	120	10.0
DFID*	90	7.5
Netherlands	10	0.8
Swiss	6	0.5
Japan/JICA	32	2.7
AfDB	20	1.7
FAO	30	2.5
Total Program Available Financing	1,200	100.0
PSTA 3 Costs/Requirements	1,200	-
Funding Gap	0	0

* Includes PforR.

23. **To accomplish the Program Development Objectives (PDOs), the Program finances the following types of activities and expenditures**: labor to construct terraces; labor and materials for small-scale hillsides and marshlands irrigation systems; purchase of farmer equipment (tractors, power tillers, planting machines, harvesters, post-harvesting machines, agro-processing machines); labor for training on input use, extension services, and livestock production; subsidies for seeds and fertilizer; purchase of livestock; funding of labor for agro-forestry, value chain research, and technology programs; labor and equipment to expand Farmer Field Schools (FFS); training and capacity building of farmers' and livestock cooperatives and food, export, and livestock entrepreneurs; and equipment, materials and labor for post-harvest infrastructure including storage and drying facilities, and community innovation centers.

24. **There are no high-risk activities in the Program which are or need to be excluded from the PforR operation**. A detailed description of the Program and its scope is outlined below.

25. **PSTA 3 program implementation started strong** in the first eight months of 2013/2014, following the same implementation pace as PSTA 2. PSTA 3 was designed taking into account key lessons from PSTA 2, including the importance of enhancing public investment under PSTA 3 and directing it in the most cost-effective and efficient ways to achieve the goals of EDPRS 2 and *Vision 2020*. Moreover, efficiently directed and managed public investment [23] is critical to induce private investment, along with a more focused approach to promoting foreign direct investment (FDI).

26. **Assessment Results, Emerging Implications and Proposed Program Action Plan (PAP)**. **The Bank's assessment mission (May 2014) and follow-up work involved a comprehensive review of the PSTA 3 program, including review of its RF and the proposed ASIP**. The review concluded that the PSTA 3 program is strategically relevant, technically and economically sound, and well supported by appropriate institutional arrangements from technical, fiduciary, social and environmental systems' perspectives. The agricultural expenditure analysis confirms the rationale for public funding, while helping to rationalize further expenditure areas that can better be carried out with an expanded role of the private sector. The expenditure priorities include inclusionary access and benefits to farmers and other consumers to public sector investments which are classic public goods (e.g., nonexcludable agricultural research) and which have been delayed because of a lack of private sector financing (e.g., post-harvest storage); PSTA 3 will also promote actions that will remove such impediments in the future and PPPs. The three assessments (technical, fiduciary, and environmental and social systems) identified specific areas of risk and capacity "gaps," and recommended priority actions to enhance the implementation

[23] To help ensure enhanced efficient and effective allocations and management, and accountability of the ASIP, MINAGRI has carried out a mini-agricultural public expenditure review (2011-2013, as well as the sectoral MTEF of 2013/14 to 2015/16)), which involved updating and deepening the Ag. PER carried out for the period 2008-2010. The results of this exercise are incorporated in the ASIP, which is supported by the present PforR support operation.

success of the Program. These actions constitute the core of the PAP, which comprises five strategic cross-cutting areas and their risk mitigation actions. Each SP includes priority capacity development activities to ensure the results are achieved, and which also contribute to reduced risks.

ii. Definition of the Program's (PforR) boundaries and the rationale

27. **The GoR's MINECOFIN requested** the World Bank and other DPs to support the implementation of PSTA 3 through a Program-for-Results (PforR) support operation.

28. **The PforR – to be financed by the proposed IDA operation and co-financed by other DPs – will support a time slice (three years out of five) of the national PSTA 3 program ("medium-cost" funding scenario), including funding for the four programs and 24 SPs, as outlined below.** PSTA 3 is a five-year program (from 2013/14 to 2017/18), and the PforR support operation would initially support the first three years (from 2013/14 to 2015/16), with potential additional financing for the last two years (2016/17 and 2017/18). The three-year funding window was requested by the MINECOFIN to align with the IDA funding envelope available to the country.

29. **The main focus of the PforR operation will be to support the delivery of the strategic results of the PSTA 3 program, while also providing value-added contributions to the content and processes required to efficiently and effectively implement PSTA 3**, such as: i) strengthening the implementation of key results and the underlying results chain in PSTA 3's RF, while focusing on the RF for the PforR operation, which emphasizes the "core drivers" of agricultural growth; ii) ensuring a sound balance and composition and effective management of agricultural public expenditures towards key "transformative "outputs/activities; and iii) supporting the action plans for accomplishing the key results and areas where there might be implementation and results risks. Accordingly, the approach taken under the PforR will be to strengthen the operationalization of a strong results chain of the core drivers of the PSTA 3 program at the central level and in all 30 Districts. In this manner, the Bank's support will focus on leveraging strategic results for the overall PSTA 3.

30. The PforR will support core components and activities of PSTA 3, while recognizing important linkages and synergies across the four programs and their SPs. While 88 percent of the ASIP is allocated to nine SPs (considered core components), it must be noted that accelerated and inclusive agricultural growth is being driven and enabled through strategic and operational linkages between the nine SPs and the other 15 SPs. These linkages include expanded and enhanced market access, agricultural finance, and support to PSTA 3's institutional framework. As a result, the six core drivers of agricultural growth and poverty reduction, as captured in PSTA 3's results chain, are integrated throughout all 4 programs and 24 SPs, thus ensuring that the design of PSTA 3 is both strategically relevant and technically sound to deliver on the government's key development objectives and targets. Therefore, the focus of the proposed PforR operation, through the Bank's and other DPs intervention and financing, will be to support the efficient and effective operationalization of these six key "core transformational drivers" of inclusive agricultural growth (see Table 5).

Table 5: Core Drivers of Inclusive Agricultural Growth

Land husbandry	Private sector value chain development
Technology and research	Market-oriented infrastructure
Agricultural finance	Institutional development

31. The objective of the proposed PforR operation is to: increase and intensify the productivity of the Rwandan agricultural and livestock sectors and expand the development of value chains.

32. Table 6 presents the RF being supported by the PforR operation (which is a "core" of the broader RF for PSTA 3).

Table 6: Results Framework Matrix
(Targets are for each year/period and are cumulative)

Results Indicators	Core	DLI	Unit	Baseline 2012/13	Targets			Period	Data source	Data collection
					Yr 1 2013/14	Yr 2 2014/15	Yr 3 2015/16			
Program Development Objective: The PDO *is to increase and intensify the productivity of the Rwandan agricultural and livestock sectors and expand the development of value chains.* The proposed operation supports the Government of Rwanda's strategic objectives of the Transformation of Agriculture Sector Program Phase 3 with aims to enhance food security and nutrition contributing to reduction in poverty and inclusive economic growth. The operation supports four broad program areas: i) agriculture and animal resource intensification; ii) research, technology transfer and professionalization of farmers; iii) value chain development and private sector investment; and iv) institutional development and agricultural cross-cutting issues.										
PDO Indicator 1: Increased agr. land under modernized agricultural technologies[24]	X		%	24	27	31	34	Annual	Seasonal surveys, reports by Districts	MINAGRI
PDO Indicator 2: Increased agriculture exports	X		%	22	23	24	25	Annual	Annual reports	MINAGRI MINECOM
Intermediate Results Area 1: Agriculture and animal resource intensification*: i) Soil erosion reduced and land sustainably managed; ii) Land productivity for priority crops increased; iii) Animal productivity increased and animal products diversified.*										
Indicator 1: Increased soil erosion control, based on agreed technical standards, & sustainably maintained (P: Progressive; R: Radical; T: Total)	X	X	ha	P: 802,292 R: 46,246 T: 848,538	835,941 54,044 889,985	869,590 61,842 931,432	903,240 69,640 972,880	Annual	Reports by Districts, aggregated by RAB	MINAGRI RAB
Indicator 2: Increased land (hillsides/H &marshlands/M) developed with: i) irrigation infrastructure, based on MINAGRI technical standards; and (b) with enhanced O&M	X	X	ha	H: 3,075 M: 24,721 T: 27,796 Annual increases: H: 1000 M: 1800	4,075 26,521 30,596	5,075 28,321 33,396	6,075 30,121 36,196	Annual	Reports by Districts, aggregated by RAB	MINAGRI RAB
Indicator 3: Increased average productivity levels of major food and export crops, and livestock commodity	X	X	t/ha kgs ltrs	Cassava 15 t/ha Coffee 2.2 kgs[25] Milk: 4 ltrs /cow/day[26]	16.0 2.3 4.5	17.0 2.5 5.0	18.0 2.7 5.5	Annual (calendar year)	Reports by Districts, aggregated by RAB, and NAEB	MINAGRI RAB, NAEB
Indicator 4: Increased total milk production	X		MT	503,000	532,467	561,934	591,401	Annual	Reports by Districts and RAB	MINAGRI RAB
Intermediate Results Area 2: Research, technology transfer and organization of farmers: *i) Improved technologies which are responsive to Rwanda's agro-ecological potential, men and women farmer needs and resources, and market prospects; ii) Enhanced integrated and market-*										

[24] Refers to percent of farm families who use improved seeds, fertilizer, and mechanization.
[25] Kgs of cherry per tree/year.
[26] Milk production per cow.

oriented extension and advisory services which result in higher proportion of farmer adoption of improved technologies, for both men and women; and iii) Strengthened inclusive and business-oriented farmers' organizations/cooperatives with enhanced entrepreneurial skills for effective engagement in input and output markets.										
Indicator 5: No. of enhanced technology innovations (TI) introduced by public and/or private sectors, and adopted (A) by farmers (adoption rates to be shown by gender)[27]	X	X	TI # A %	5[28] (25%)	3 (25%)	3 (40%)	4 (50%)	Annual	Reports by RAB	RAB
Indicator 6: Increased % of cooperatives/farmers' organizations graded A and B[29] (includes gender dimension)	X		%	5	15	25	35	Annual	Reports by RCA and Grading reports by MINAGRI	RCA MINAGRI
Intermediate Results Area 3: Private sector-driven value chain development and expanded investments*: i) Enhanced business environment for expanded agricultural investments and value addition; and ii) Competitive and private sector-driven value chain development and expanded commercialization of production for domestic and export markets, enabled by expanded access to finance, efficient and effective agricultural marketing systems and improved rural infrastructure, and expanded successful public-private partnerships (PPPs).*										
Indicator 7: Increased value (total production and exports) of major competitive value chains[30]	X		US$	2.3 b 132 m	2.6 b 154 m	2.9 b 176 m	3.2 b 198 m	Annual	Reports by NISR, RDB and NAEB	RDB NAEB
Indicator 8: Increased agri-finance lending for: (a) farmers (F) (including gender targets); & (b) Ag. enterprise (A) investments (value chain activities)	X	X	Amount (US$ m) & % of total lending	F 3.6 A 65	F 4.8 A 68	F 5.9 A 71	F 7 A 75	Annual	Reports by IPAR, AFR, MINECOFIN and MINAGRI	Central Bank AFR MINAGRI
Indicator 9: Increased private sector investments in ag. sector (domestic and foreign)	X		US$	513	613	713	813	Annual	Reports by relevant export agencies and RDB	MINAGRI RDB
Indicator 10: Increased % of agric. production marketed	X		%	28	29	30	31	Annual	Seasonal surveys, reports by Districts	MINAGRI RAB
Intermediate Results Area 4: Institutional results-focused development and strategic cross-cutting issues*: i) Enhanced capacity of sector and its institutions to deliver efficient and effective agricultural services; ii) Strengthened MIS to support more efficient and effective management of the agriculture sector; iii) Improved policy environment for enabling rapid, private sector-driven and sustainable agricultural growth; iv) Increased public ag. expenditures and enhanced expenditure composition and effective management; v) Improved food security and nutrition; and vi) Enhanced inclusion of women in agricultural activities and expanded access to agricultural services.*										
Indicator 11: Enhanced results-focused institutional capacity development/CD of MINAGRI (M) &Districts (D): Action Plan (AP) updated/ prepared (UP); AP			AP	M NA D NA	M draft AP D AP UP	M AP UP & II D AP UP & II	M AP FO D AP FO	Annual	Reports by MINAGRI and Districts (coordinated via LODA)	MINAGRI (in collaboration with each agency and with

[27] Which are consistent with Rwanda's comparative advantage. Also includes specific innovations to be indicated by RAB, in line with its agricultural research priorities.
[28] Maize, beans, cassava, rice, wheat, soybean.
[29] Grading will include a number of parameters such as inclusion of small and marginal landholders, number of total households benefiting from input and output markets and services, participation and leadership of farmers/gender in managing cooperatives, and revenue generation.
[30] Food crops, export commodities, livestock products, agroprocessed.

implementation initiated (II) & AP fully operational (FO)										MINALOC/ LODA)
Indicator 12: Updated MIS Framework (FR) & Action Plan (AP) for agric. sector: completed (C), approved (A), initiated (I) & fully operational (FO, with key reports, on "core" indicators)		X	FR AP I FO	Initial draft M&E FR	Draft M&E FR	FR/AP C, A, I	FR/AP FO	Annual	Quarterly & Annual M&E report for sector/key entities[31]	Planning Depts. MINAGRI, RAB, NAEB & SPIUs
Indicator 13: Approval of Seeds (S), Fertilizer (F) & Ag. Finance (AF) Policy, action plan (AP) prepared & implemented (I)		X	Policy	S, AF Draft AP AF None F Initial Draft	S A, AP, I AP	F A, AP, I	AF A, AP, I	Annual	MINAGRI	MINAGRI (Planning), RAB, NAEB
Indicator 14: Increase in Women's Empowerment in Agriculture Index for Rwanda[32]			Index (%)	91	91.5	92	92.5	Annual	IFPRI	MINAGRI, RAB,NAEB & SPIUs
Indicator 15: Increased % of households with acceptable levels of food consumption			Food Cons. Score (%)	79	80	81	82		MINAGRI (in collaboration with WFP and Districts	MINAGRI, Districts & NISR

[31] Reporting on key indicators from RF, key thematic studies completed.

[32] The Women's Empowerment in Agriculture Index was developed and is currently being compiled by IFPRI, with a focus on the countries supported by the Feed the Future Programme (supported by USAID). Rwanda is included in the coverage and tracking of this index. The index includes the increased percentage of women in the total membership and leadership positions of agricultural farmers' organizations and cooperatives.

33. Disbursement-Linked Indicators (= "Driver" Linked Indicators). The PforR operation funds will disburse against the proposed agreed disbursement-linked indicators (DLIs). The DLIs focus the disbursement of funds in accordance with evidence of achieving a selective set of strategic and monitorable targets, hence encouraging the achievement of predetermined and tangible results. The selection of the specific DLIs takes into account the following criteria: realistic balance between output and outcome indicators; focus on "highly" strategic interventions whose effective implementation will help operationalize the "drivers" of achieving PSTA 3's goals and also contribute towards the higher-level impact targets of PSTA 3 and help address some of the key risks of the Program. Accordingly, Table 7 highlights the proposed DLIs and the rationale for each; Table 8 presents the DLI matrix (with an indication of the allocation of IDA resources for each of the agreed results); Table 9 shows the DLI verification protocol arrangements; and Table 10 presents the disbursement of Bank funds.

Table 7: Indicative List of Results and Associated DLIs (2013/14 – 2015/16)

Result (Outcome/Output Levels)	**Disbursement-Linked Indicator (Baseline and Targets - figures refer to cumulative amounts)**
1. Increased soil erosion control	**DL1**: Annual increases in terraced land area (progressive and radical), based on agreed technical standards (figures are cumulative) ▪ Baseline 2012: 802,292 ha progressive; 46,246 ha radical Target by end of 2015: 903,240 ha (progressive); 69,640 ha (radical) **Rationale**: Expanded terraced land comprises the key source of sustained productivity increases for vast areas of depleted soil (and also contribute toward reduction of productivity losses).
2. Increased area under irrigation and adequately maintained	**DL2**: Annual increases of irrigated area (ha) in marshlands and hillsides, based on agreed technical standards, with adequate O&M (figures are cumulative) ▪ Baseline 2012: 3,075 ha hillsides, 24,721 ha marshlands Target by end of 2015: 6,075 ha hillsides, 30,121 ha marshlands **Rationale**: Expanded irrigated area comprises a strategic source of increase in crop productivity, diversification and value-added activities.
3. Increased average productivity levels of major food and export crops and livestock	**DLI 3**: Increases in average crop yields per ha. for key food and export crops and livestock (dairy) ▪ Cassava Baseline 2012: 15 MT/ha Target for 2015: 18 MT/ha ▪ Coffee: Baseline 2012: 2.2 kgs of cherry per tree per year Target for 2015: 2.7 kgs of cherry per tree per year ▪ Milk per cow Baseline 2012: 4 ltrs/day: Target for 2015: 5.5 ltrs/day **Rationale**: Increased crop and livestock productivity is vital to achieve overall sector growth rate target and reduced poverty; the proposed crops/livestock commodities are cultivated primarily by smallholders.
4. Improved generation and adoption of agriculture technologies, sensitive to agro-ecological potential, farmers' needs, and market prospects.	**DLI 4**: No. of innovation technologies introduced and released, and adopted by farmers[33] ▪ Baseline 2012: 5 technologies Target by end of 2014/2015: 10 additional innovation technologies (Adoption rates for the 3 years: 25%, 40% and 50%, respectively) **Rationale**: Enhanced technology introduction/transfer/dissemination/adoption from global, regional and national markets, in an integrated and coordinated manner, comprise core drivers of agricultural growth and generate strong synergies with rural infrastructural investments and policy reforms supported by PSTA 3.
5. Increase in agricultural	**DLI 5**: Percentage increase in agricultural finance available out of total finance

[33] Improve policy framework to enhance enabling environment to encourage private sector investment. Innovative technologies can come from world or local markets.

finance lending for agriculture sector (including production, agrotraders and agroprocessing)	▪ Baseline 2012: 3.6% Target by end of 2015: 7.0% **Rationale**: To enhance private sector investment in agriculture, including farmers and other private entities, and to increase agriculture productivity, a key and critical factor is accessibility to sufficient, affordable, and timely finance is necessary to purchase capital goods including equipment and post-harvest infrastructure, and to secure improved inputs and technical assistance.
6. Strengthened gender-sensitive MINAGRI agriculture sector management information system, including its operationalization and utilization	**DLI 6**: Enhanced Gender-Sensitive MIS Framework /Action Plan for agric. sector: completed, approved, initiated and fully operational ▪ Baseline 2012: draft M&E framework (fragmented and partial) Target 2015: Enhanced MIS for ag. sector and action plan completed, approved, fully operational and utilized (with periodic reports disseminated) **Rationale**: The achievement of ambitious targets under PSTA 3, especially considering the large proportion of women farmers, requires a significantly enhanced and effective operational MIS for the agriculture sector, at various levels.
7. Enhanced operational policy environment for enabling rapid and sustainable agriculture growth	**DLI 7**: Approval of Seeds, Fertilizer and Ag. Finance Policy, and preparation and initial implementation of action plan (based on agreed milestones): ▪ Seeds: Baseline 2012: Draft of Policy exists Target: by mid-2015/16: Seeds Policy Approved, action plan prepared and initiated ▪ Fertilizer: Baseline 2012: Draft of Policy exists Target by mid-2014/15: Policy Approved and action plan prepared (end 2014) and initiated (by mid-2015). ▪ Ag. Finance: Baseline by 2012: None exists Target by end-2015/16: Approved and action plan prepared and initiated (by mid-2016). **Rationale**: Expanded access to and effective utilization of seeds, fertilizer and agricultural finance by a larger number/proportion of smallholders, coupled with expanded role of the private sector, require important policy enhancements and their effective implementation.

Table 8: DLI Matrix

DLI	Total DLI IDA Allocation (Million US$)[34]	As % of Total Financing Amount	DLI Baseline (2012/13)[35]	Indicative Timeline for DLI achievement (figures are cumulative)		
				Year 1 (2013/14)	Year 2 (2014/15)	Year 3 (2015/16)
DLI 1: Soil Erosion Protection. Annual increases of land protected against soil erosion, according to agreed technical standards. Annual increases of 41,447: 33,649 has/yr progressive (P) & 7,798 has/yr radical (R)[36]	P 10.0 R 10.0	10 10	P 802,292 ha R 46,246 ha	P 835,941 ha R 54,044 ha	P 869,590 ha R 61,842 ha	P 903,240 ha R 69,640ha
Allocated amount:	20.0	20		9.0	5.0	6.0
DLI 2: Irrigation Area. Increases of irrigated area (ha) in marshlands and hillsides, according to agreed technical standards. Annual increases of 2,800 ha per year: 1,000 ha hillsides (H) & 1,800 ha marshlands (M)	H 5.0 M 5.0	5.0 5.0	H 3,075 M 24,721 T 27,796	H 4,075 M 26,521 T 30,596	H 5,075 M 28,321 T 33,396	H 6,075 M 30,121 T 36,196
Allocated amount:	10.0	10		4.0	2.5	3.5
DLI 3: Crop and Livestock Yields.[37] 3.1 Increases in average crop yields per ha. for key food crop - cassava (CA)[38] 3.2 Increases in average crop yields per ha. for key export crop – coffee (CF) 3.3 Increases in average daily yields of milk per cow (CO)	 CA 5.0 CF 5.0 CO 5.0	 5 5 5	**2012** 15 MT/ha 2.2 kgs[39] 4 ltrs/day[40]	**2013** 16 MT/ha 2.3 kgs 4.5 ltrs/day	**2014** 17 MT/ha 2.5 kgs 5.0 ltrs	**2015** 18 MT/ha 2.7 kgs 5.5 ltrs
Allocated amount:	15.0	15		4.0	5.0	6.0
DLI 4: Enhanced Ag. Innovation Technologies.[41] Number of enhanced innovation technologies	15.0	15	5 (25%)	3 (25%)	3 (40%)	4 (50%)

[34] The allocation of funds refers to the IDA contribution. To the extent other DPs participate in supporting the PforR, it is understood that their funding would be allocated to the same DLIs, according to a similar pattern of distribution (in agreement with the Common Framework of Engagement of the Multi-Donor Trust Fund-MDTF). DLIs 1, 2, 3 and 8 have 2-3 subindicators with different targets. The allocation of funds will be equally distributed among the subindicators based on 75 percent minimum completion.

[35] Baseline is 2012/13, unless otherwise indicated (e.g., yield levels to be reflected, measured and reported on a calendar year basis, in line with current practices).

[36] It is understood that appropriate and sustainable approaches and models of land development with respect to soil erosion protection may involve some afforestation to accompany progressive and radical terracing, which would be determined on a requirement basis (for both progressive and radical technologies). Targets refer to cumulative total;

[37] Crop yields are reported on a calendar year basis (January to December), hence it is understood that the verification of the yield results would take place during the first two months of each year.

[38] For purposes of accurate measurement, the figures refer to average yields (based on official statistics) of the major cassava growing Districts (estimated to cover about 20 Districts --- these are to be specified).

[39] Of cherry/tree/yr.

[40] Milk production per cow.

[41] Innovation technologies refer to improved or new methods/practices of production (internationally or nationally generated), including more efficient input usage, that lead to increased productivity (e.g., new/improved varieties of crops introduced and released, improved breeds of livestock, improved input usage such as improved seed varieties,

introduced, & released by public and/or private sectors & adopted by farmers (with targets for each year.[42] Figures refer to incremental technologies and % to adoption rate. (Adoption rates to be shown by gender)						
Allocated amount:	15.0	15		4.0	5.0	6.0
DLI 5: Agricultural Finance. Increase in agricultural finance lending for agriculture sector (production and agroprocessing) (% of total)	10.0	10	3.6	4.8	5.9	7.0
Allocated amount:	10.0	10		2.5	3.75	3.75
DLI 6: MIS for Agriculture Sector. Updated gender-sensitive MIS Framework (FR) and Action Plan (AP) for the agriculture sector: Completed (C), Approved (A), Implementation initiated (II) and Fully Operational (FO)	10.0	10	Draft M&E FR & partial MIS in MINAGRI	Draft M&E FR	FR/AP (C, A, II)	FR/AP FO
Allocated amount:	10.0	10		2.0	4.0	4.0
DLI 7: Agricultural Policy Reforms. 7.1 Approval of Seeds (S) policy (P), prepare action plan (AP), begin implementation (I) of action plan (based on agreed milestone(s): 7.2 Approval of fertilizer (F) policy (P), prepare action plan (AP), begin implementation (I) of action plan (based on agreed milestone(s): 7.3 Approval of agricultural finance (AF) policy (P), prepare action plan (AP), begin implementation (I) of action plan (based on agreed milestone(s):	20.0	20	S None exists F Initial draft exists AF None exists	F Complete & approve P, AP, I	S Complete & approve P, AP, I	AF Complete & approve P, AP, [43]
Allocated amount:	20.0	20		5.0	7.0	8.0
Total Financing Allocated (IDA):	100.0	100		**30.0**	**32.5**	**37.5**

Verification Process of DLIs. The Prime Minister's Office (PMO) will verify and validate all results achieved, including attainment of the targets for the DLIs, which is required for the disbursement of funds (see Tables 9 and 10). Discussions with the PMO confirmed the following conclusions: i) conducting the independent verification of the DLIs is in line with the PMO's institutional mandates (including promoting economy, efficiency, and effectiveness of the use of public resources); ii) PMO has the required technical and financial capacities to carry out this verification task; iii) if needed, the PMO can contract the services of a specialized technical assistance entity to provide technical support in the independent assessment of the DLIs. For example, the PMO currently contracts the support of such an institution (IPAR) for verification of

fertilizers). RAB's draft Strategic Plan outlines the priority research technologies to be introduced and released for four major types of technologies, including: i) land mgt/soil erosion control: agroforestry practices; composting and liming technologies to enhance site-specific recommendations; soil testing technologies to enhance fertilizer efficiencies; ii) agricultural research: new improved crop varieties which would be higher yielding, disease and pest resistant, and drought-responsive (e.g., Irish potato, rice, maize, cassava, horticulture); improved animal breeds/genotypes; iii) agricultural extension: enhanced extension models/approaches to promoting enhanced fertilizer application methods; improved seeds/varieties; composting; and iv) Livestock: improved animal breeds (building on current traditional stocks); improved animal feeds; enhanced technologies for small stock.

[42] Adoption rates refer to farmers who adopt these improved/new innovations (as defined above), and those introduced two years previously (to account for the lag in adoption rates). Innovations can come from abroad or can be generated within the country.

[43] Key milestones of action plan to be implemented will need to be agreed (within two months after submitting the action plan).

performance contracts; and iv) PMO has expressed a positive response to undertaking this task (which will be formalized by government). Since the PMO is already doing this type of performance assessment task, has implementation capacity, and its performance assessment capacity can easily be strengthened, it is agreed by the government and the Bank that the PMO carry out this function (other options were also considered).

34. Accordingly, the PMO would: i) perform *ex-ante* site visits and conduct field survey measurement and assessment; ii) confirm that specified achievements have been completed based on relevant documentation, and standards specified in the verification protocol (i.e., policy work, M&E reports); and iii) provide independent technical verification of the yield statistics of national averages, for the baseline period and for figures generated and agreed by MINAGRI/RAB/NAEB and District agronomists (in line with current practices, which are expected to be improved over the next two years). Once confirmed, MINAGRI will present a verification report to the World Bank, upon which the agreed full disbursement or portion thereof will be made to the GoR.

Table 9: DLI Verification Protocol Table

#	DLI	Definition/ Description of achievement	Scalability of Disbursements (Yes/No)	Protocol to evaluate achievement of the DLI and data/result verification		
				Data source/ agency	Verification Entity	Procedure
1	Annual increases of land protected against soil erosion, based on agreed technical standards; ha of land terraced according to 2 main types of technology: progressive and radical	Completion of terracing infrastructure works generating the incremental ha of terraced land for the following 2 types of technology utilized: a) progressive terracing: 100,948,422 ha: b) radical terracing: 23,394 ha	Yes	MINAGRI	Prime Minister's Office	MINAGRI will present to the PMO a report of developed areas of increased land protected against soil erosion for verification. If needed, field verification for achieved results will be done by sampling at least 15% of increment of terraced land in implementing sites and/or Districts.
2	Annual increases of irrigated area (ha) in hillsides and marshlands based on agreed technical standards	Completion of irrigation infrastructure works generating the incremental ha of irrigated area, covering hillsides (2,999 ha) and marshlands (5,400 ha)	Yes	MINAGRI	Prime Minister's Office	MINAGRI will present to the PMO a report of developed areas of increased irrigated area for verification. If needed, field verification for achieved results will be done by sampling at least 15% of increment of terraced land in implementing sites and/or Districts.
3	3.1 Increases in average crop yields per ha. for key food crop –cassava	3.1 Increase of average crop yields (MT per ha.) cassava (using average yield during 2012 for the major cassava growing Districts): Cassava (MT/ha.) 2012 (BL): 15 MT/ha. By end of 2013: 16 MT/ha. By end of 2014: 17MT/ha. By end of 2015: 18MT/ha.	Yes	MINAGRI	Prime Minister's Office	Increased crop yields to be verified against consolidated sites (with 15% of the consolidated sites in growing areas/Districts) with provision of reduction factor of yield due to climate change variability and unpredictable disasters in relation to crop insurance.
	3.2 Increases in average crop yield per ha. for key export crop – coffee	3.2 Increase of national average crop yields (kgs cherry per tree/year, on calendar year basis) for coffee export crop (using national average yield during 2013 season; it is understood that these yield figures reflect variable yields, farmer conditions on the ground, and exogenous factors): Coffee (kgs/ha.) 2012 (BL): 2.2 kgs of cherry per tree per year By end of 2013: 2.3 kgs of cherry per tree per year By end of 2014: 2.5 kgs of cherry per tree per year By end of 2015: 2.7 kgs of cherry per tree per year	Yes	MINAGRI	Prime Minister's Office	Increased crop yield (coffee) to be verified against consolidated sites (with a 15% of the consolidated sites in growing areas/Districts) with provision of reduction factor of yield due to climate change variability and unpredictable disasters in relation to crop insurance.
	3.3 Increases in daily average yields of milk per cow	3.3 Increase of national daily average yields of milk per cow (liters) (using national average yield during 2012/13 season, considering an accurate estimation of the distribution of quality breeds of milk cows) : 2012/13 (BL): 4.0 ltrs By end of 2013/14: 4.5ltrs By end of 2014/15: 5.0 ltrs By end of 2015/16: 5.5 ltrs	Yes	MINAGRI	Prime Minister's Office	Milk production will be verified with a sample of 15% of beneficiaries that received a full package for proper livestock/animal husbandry in milk productive areas/Districts.
4	Number of enhanced	Increase in the number of innovation technologies	Yes	MINAGRI	Prime	New technologies that are under introduction/piloting and/or scaling up

	innovation technologies introduced by public and/or private sectors, and adopted by farmers (adoption rates to be shown by gender)	introduced and adopted by farmers 2012/13 (BL): 5 (improved seed varieties of maize, beans, cassava, rice, wheat, soybean) (figures refer to incremental innovations) By end of 2013/14: 3 additional total of 8 By end of 2014/15: 3 additional total of 11 By end of 2015/16: 4 additional total of 15 Confirmation of new technology generated and introduced to farmers. A sample of target farmers will be queried to assess if they have used new technology. Improved innovation technologies can include any from the following categories and drawn nationally, regionally, and globally (e.g.: soil conservation techniques; extension innovations; livestock innovations; and research innovations). Adoption rates to be measured, in reference to the agreed targets for each year (25%, 40% and 50%, respectively)			Minister's Office	phases will be verified by taking 15% of sample of tested technologies on research stations and/or farmers' fields.
5	Percentage increase in agricultural finance lending for agriculture sector (production, agro-trading, agroprocessing)	Increase in agricultural finance lending for agriculture sector (% of total) 2012 (BL): 3.6%. By end of 2013: 4.8% By end of 2014: 5.9% By end of 2015: 7%.	Yes	MINAGRI	Prime Minister's Office	MINAGRI to provide written confirmation to PMO on increases of rural finance. PMO to confirm the figures from the Central Bank.
6	Updated Mgt. Info System/MIS Framework (FR) and Action Plan/AP for Agriculture Sector: Completed (C), approved (A), implementation initiated (II) and fully operational (FO)	Updated MIS Framework and Action Plan for agriculture sector completed, approved, begin implementation and fully operational. 2012/13 (BL): draft M&E Framework/partially op. By end of 2013/14: M&E Framework/partially op. By end of 2014/15: Integrated MIS Framework and Action Plan/AP completed; AP initiated By end of 2015/16: MIS fully operational	Yes	MINAGRI	Prime Minister's Office	MINAGRI to provide written evidence to Prime Minister's Office that the M&E framework and action plan have been developed and approved, evidence that implementation has begun and that the system is fully operational (reports and information being generated from the system). Prime Minister's Office will conduct an audit of the system once fully operational confirming with at least one user from each category of users that the system if operational.
7	7.1 Approval of Seeds policy, prepare action plan, begin implementation of action plan (with agreed milestone(s) completed); 7.2 Approval of fertilizer policy, prepare action plan (with milestones), implementation of action plan (with agreed key milestone(s) completed): 7.3 Approval of agricultural finance policy, prepare action plan (with milestones), implementation of action plan (with key agreed milestone(s) completed).	7.1: (a) Formal government approval of seeds policy (by Cabinet). (b) Completed action plan of seeds policy (c) Compliance with agreed implementation milestone (to be specified and agreed with GoR) 7.2: (a) Formal government approval of fertilizer policy. (b) Completed action plan of fertilizer policy (c) Compliance with agreed implementation milestone (to be specified and agreed with GoR) 8.3: (a) Formal government approval of fertilizer policy. (b) Completed action plan of fertilizer policy (c) Compliance with agreed implementation milestone (to be specified and agreed with GoR)	No	MINAGRI	Prime Minister's Office	World Bank to endorse the content of the policies (before submission to Cabinet), action plan and key milestones (ref. items 7.1, 7.2 and 7.3). Prime Minister's Office to confirm the specified achievements are completed (ref. items in column 2), based on relevant documentation (ref. items 7.1, 7.2 and 7.3).

Table 10: Bank Disbursement Table

#	DLI	Bank financing allocated to the DLI (US$ million)	Of which Financing available for (US$ million)		Deadline for DLI Achievement	Minimum DLI value to be achieved to trigger disbursements of Bank Financing	Maximum DLI value(s) expected to be achieved for Bank disbursements purposes	Determination of Financing Amount to be disbursed against achieved and verified DLI value(s) (the minimum value of 75% of the agreed target value needs to be accomplished to obtain 100% disbursement target).
			Prior results	Advances				
1	Annual increases in soil erosion control, with terracing: Progressive method: 33,649 ha. Radical Method: 7,798 ha.	10.0 10.0	1.88 1.87	5.0	No deadline. Results will be verified annually and reported in the month of July.	> 0	Progressive: additional 100,948 ha/accumulative total 903,240 ha Radical: 23,394 additional ha/accumulative total 69,640 ha	Payments will be made in proportion to the achievements (And an agreed minimum value of a least 75% of the agreed target value to obtain the 100% disbursement target).
2	Annual increases of irrigated area (ha) in hillsides and marshlands (Hillsides: 1,000 has./yr) (Marshlands: 1,800/has./yr)	5.0 5.0	1.88 1.87		No deadline. Results will be verified annually and reported in the month of July.	> 0	Hillsides 2,999 ha Marshlands 5,400ha Total 8,399 ha	Payments will be made in proportion to the achievements (And an agreed minimum value of at least 75% of the agreed target value to obtain the 100% disbursement target).
3	3.1 Increases in average crop yields per ha. for key food crop - Cassava 3.2 Increases in average crop yields per ha. for key export crops – coffee 3.3 Increases in daily average yields of milk per cow	5.0 5.0 5.0	1.25 1.25 1.25		No deadline. Results will be verified annually and reported in the month of July.	> 0	Cassava crop yield increase to 18 MT/ha Coffee crop yield increased to 2.7 kgs Milk yield increase to 5.5 liters per cow	Payments will be made in proportion to the achievements (And an agreed minimum value of at least 75% of the agreed target value to obtain the 100% disbursement target). If either crop or yield insurance payouts are made during the year for these crops, the 75% will be lowered to 40%.
4	Number of enhanced innovation technologies introduced by public and/or private sectors, and adopted by farmers (at least 25%, 40% and 50%, for each year, respectively) (adoption rates to be shown by gender)	15.0	3.75		No deadline. Results will be verified annually and reported in the month of July.	> 0	Innovative technologies introduced and adopted by farmers increased to 15	Payments will be made in proportion to the achievements (And an agreed minimum value of least 75% of the agreed target value to obtain the 100% disbursement target).
5	Annual increases in agricultural finance lending for agriculture sector	10.0	2.5		No deadline. Results will be verified annually and reported in the month of July.	> 0	Increase in ag. lending for agriculture from 3.6% to 7%	Payments will be made in proportion to the achievements (And an agreed minimum value, of at least 75% of the agreed target value to obtain the 100% disbursement target).
6	Updated Gender-Sensitive MIS Framework (FR) and Action Plan/AP for Agriculture Sector: Completed (C), approved (A), implementation initiated (II) and fully operational (FO)	10.0	2.5		No deadline. Results will be verified annually and reported in the month of July.	> 0	Agriculture sector MIS framework fully operational	Payments will be made in proportion to the achievements (And an agreed minimum value of at least 75% of the agreed target value to obtain the 100% disbursement target).

7	7.1 Approval of Seeds policy, prepare action plan, begin implementation of action plan (with agreed key milestone(s) completed):: 7.2 Approval of fertilizer policy, prepare action plan, begin implementation of action plan (with agreed key milestone(s) completed):: 7.3 Approval of agriculture. finance policy, prepare action plan, begin implementation of action plan (with agreed key milestone(s) completed)::	20.0	5		No deadline. Results will be verified annually and reported in the month of July.	> 0	3 policies approved 3 action plans prepared 3 action plans with key milestone(s) implemented	Payments will be made in proportion to the achievements (And an agreed minimum value of at least 75% of the agreed target value to obtain the 100% disbursement target).

35. An overview of the proposed Agriculture PforR support operation is provided in Table 11.

Table 11: Overview of PSTA 3 and Ag. PforR Operation

PforR Development Objective: The proposed program development objective (PDO) *is to increase and intensify the productivity of the Rwandan agricultural and livestock sectors and expand the development of value chains.*

The proposed operation supports the Government of Rwanda's strategic objectives of the Transformation of Agriculture Sector Program Phase 3 with aims to enhance food security and nutrition contributing to reduction in poverty and inclusive economic growth. The operation supports four broad program areas: i) agriculture and animal resource intensification; ii) research, technology transfer and professionalization of farmers; iii) value chain development and private sector investment; and iv) institutional development and agricultural cross-cutting issues.

Programs and Subprograms/Key Activities

Program 1 Agriculture and animal resource intensification: soil conservation and land husbandry; irrigation and water management; agricultural mechanization; agrochemical use and markets; seed development; and livestock development.

Program 2 - Research, technology transfer and professionalization of farmers: Research and technology transfer; extension and proximity services for producers; farmers' cooperatives and organizations.

Program 3 - Value chain development and private sector investment: enhanced environment to attract private investment, encourage entrepreneurship and facilitate market access; development of priority and competitive value chains: food and export crops, dairy and meat, fisheries, apiculture; agricultural finance; market-oriented infrastructure for post-harvest.

Program 4 – Institutional development and agricultural cross-cutting issues: institutional capacity building, decentralization in agriculture, legal and regulatory framework, agricultural communication statistical systems, M&E and knowledge management, gender and youth in agriculture and environmental mainstreaming in agriculture; and enhanced nutrition and household vulnerability reduction.

Geographical Scope: National (including 30 Districts).

PSTA 3/ASIP Implementation Period and Cost: 2013/14-2017/18. Medium-cost scenario is US$1.2 billion (US$1.750 billion with private sector investments).

Ag. PforR Implementation Period and Funding Sources: 2013/14-2015/16. Funding sources: government, DPs (including IDA for US$100 million), and private sector (IDA). See Table 3 for further details on the financing plan of PSTA 3 (medium-cost scenario).

36. **In February 2011, the Global Agriculture and Food Security Program (GAFSP) Public Sector Window approved a US$50 million grant** to co-finance the Rwanda Land Husbandry, Water Harvesting and Hillside Irrigation Program (LWH), whose objective is to increase the productivity and commercialization of hillside agriculture in target areas. GAFSP resources have funded activities identified in Rwanda's ASIP to help farmers transform hillside agriculture to reduce erosion and bolster productivity in an environmentally sustainable manner. GAFSP support has assisted in increasing

production of high-valued horticultural crops on irrigated portions of hillsides by smallholders, and improved productivity and commercialization of rainfed food and export crops on the nonirrigated portions. GAFSP funding allowed expansion of the program to seven additional catchment sites. GAFSP additional financing increased the areas protected against soil erosion by 5,775 ha and increased land under irrigation by 1,155 ha. This brings the project total to 10,375 ha of sustainably managed hillsides, including a new total of 2,055 ha of irrigated land. GAFSP additional financing will allow the project to reach an additional 6,000 households, from an expected 5,000 households to a total of 11,000 households (or 44,000 direct and indirect beneficiaries).

37. **The GoR intends to scale up the program to the national level. Depending on further financial requirements, the government may apply for additional GAFSP financing.** Also, during implementation of the GAFSP-funded LWH program, a number of potential private sector investments were necessary to reach the full impact of the public sector funding and recent policy reforms (i.e., development of the seeds, fertilizer, and mechanization markets, post-harvest infrastructure, and agricultural finance). Thus, the GoR would like to facilitate access to the GAFSP Private Sector Window for US$50 million for 5-10 potential private sector investments where equity investments, guarantee, and IFC involvement would help to catalyze the needed private sector investments.

38. **Role of the DPs**. **DFID, IFAD, FAO, EU, and the Netherlands are already providing technical assistance (TA) to address capacity gaps and actions defined in the PAP. These DPs are planning to expand their TA support over the PSTA 3 period to cover these same areas and other aspects that will achieve the PSTA 3 targets.** These same DPs are also part of the ASWG, which provides an important forum to coordinate the complementarity of TA interventions, also as part of the annual planning and budgetary processes. As part of the CAADP process, DFID, USAID, IFAD, and the EU made a MOU commitment (June 2014) to MINAGRI to support the programmatic approach to PSTA 3. Discussions are underway to explore the most appropriate modalities to be followed by these DPs, including co-financing the PforR operation. While these commitments would not bring additional resources for PSTA 3 (apart from the figures shown in Table 3 to fund PSTA 3 costs), they would potentially change the modality from sector budget support and project financing to programmatic support (i.e., PforR). Having multiple DPs finance the PforR operation would streamline and reduce transaction costs for the Ministry by having one mechanism with agreed upon results and a common set of disbursement-linked indicators (DLIs). It would also simplify the financing to support strategic results, whether policies, impacts, outcomes, and/or outputs. DPs who wish to provide co-financing under the proposed PforR operation will follow the same procedures as the PforR.

39. **Development Partner Co-financing. Once co-financing of the PforR by other DPs is confirmed, the most appropriate mechanism for their co-financing will be established (i.e., parallel financing, co-financing, establishment of a multi-donor trust fund, etc.)** To the extent that other DPs participate in co-financing the PforR, it is understood that their funding would need to fit in the overall program envelope under PforR financing and would be allocated to the same DLIs, according to a similar pattern of distribution (in agreement with the Common Framework of Engagement/CFE) of the MDTF. All existing procedures of the PforR mechanism (i.e., DLIs, verification protocols, PAP, Program Implementation Support, etc.) would apply to all co-financing provided to and from the MDTF.

PART B: Description and Assessment of Program Strategic Relevance and Technical Soundness

40. See Annex 3 for detailed description and assessment of Program strategic objectives and relevance, Annex 4 for detailed description and assessment of Program technical soundness, and Annex 5 for detailed description and assessment of Program institutional arrangements.

i. Strategic relevance

41. **Overview. In spite of the progress in reducing the number of poor households, the challenge of poverty reduction remains high, as 80 percent of the rural population consists of subsistence farm families with an average land size of 0.59 ha (EICV 3).** Between 2008-2012, increased productivity and production along with increased commercialization of production and increased off-farm self-employment generated by increasing the number of food and export crop value chains were responsible for: i) over 45 percent of poverty reduction (and up to 58 percent if all off-farm self-employment is the direct result of increased self-employment associated with farm commodities); and ii) facilitating over 1 million Rwandans to lift themselves above the poverty line. Given these facts, the strategic objectives of PSTA 3 are both critical and relevant and with the right focus will lift an additional 3 million Rwandans out of poverty.

42. **The four programs of PSTA 3 and their associated SPs are similar to PSTA 2 in structure and content, with increased emphasis on increasing private sector investment in the sector and mainstreaming some strategic themes (e.g., gender, capacity development at all levels)**. PSTA 2 was highly successful and delivered on over 90 percent of the planned results. In addition, many of the results and targets were exceeded and some by as much as 200 percent.

43. **The World Bank technical team reviewed and evaluated all four programs and their SPs and concluded that both the high-level PSTA 3 strategic objectives and the strategic objectives and content of each of the four SPs and 24 SPs are of high-level strategic importance, necessary, and relevant to achieving PSTA 3's key results and desired impacts.** They also address the key developmental issues in the sector to promote sustainable economic development and reduce poverty. They are of critical importance to transforming small subsistence farmers into commercial and market-oriented farmers and to promoting the development of value chains, which provide off-farm employment, and to securing improvements in food and nutrition security. The program has a suitable focus of proposed allocations of public expenditures which are complementary to policy reforms and to promoting private sector investment, with an appropriate mix of planned PPP investments. The public expenditure planning processes (medium-term and annual) also are sound and are expected to play an important role in ensuring funds are allocated to the priority expenditure programs/activities. The proposed strengthened MIS is expected to help ensure that sound expenditure priorities are efficiently and effectively allocated and managed. A detailed review of the relevance of each program and its SPs, as assessed by the World Bank are as follows.

Program 1: Agriculture and animal resource intensification

44. **The SPs of soil conservation, land husbandry, irrigation and water management, agricultural mechanization, agrochemical and organic fertilizer use and markets, improved seeds, and increased productivity of animal resources are all of strategic relevance to the achievement of PSTA 3's objectives**. To transform the farming and livestock subsector into a productive, high-value, market-oriented subsector, increased soil conservation and land husbandry, increased coverage of irrigation, improved water management, improved agricultural mechanization, increased use of both agrochemical and organic fertilizers, increased access to markets, improved seed varieties, improved productivity of animal resources and quality of animal products for improved transformative growth of the livestock subsector, with a focus on smallholders, are all highly relevant and are of critical importance.

45. **Soil conservation and land husbandry are of the utmost importance to increase agricultural productivity since most Rwandan soils are depleted in nutrients and subject to higher rates of erosion**. Rwanda loses up to 40,000 tons of soil per year to erosion and only 73 percent of arable land is covered with some type of erosion control infrastructure. However, the effectiveness of this infrastructure is only 53 percent.[44] Reducing erosion and improving the quality of the soils is of strategic importance to increase productivity and achieve PSTA 3 objectives. Irrigation and water management is also extremely important to address pressing climate change and reduce dependency on rainfall, which can be erratic and cause crop failure. So far only 23,000 ha of land are irrigated and the target is to increase this to 63,000 ha over the PSTA 3 period through irrigation development in marshlands and hillsides. Currently, 13 percent of farm operations are mechanized in Rwanda, including land preparation, planting, crop treatment, harvesting, post-harvesting, and agroprocessing. Nutrient depletion rates in Rwanda are estimated to be in the order of 77 kg/ha, among the highest in Africa. Increasing and sustaining agricultural productivity growth requires a deliberate effort to ensure large-scale increases of inorganic fertilizers from 35 kg/ha to 45 kg/ha by 2018. Seed is an essential, strategic, and relatively inexpensive input to agriculture with a high rate of return on investment that often sets the upper limit for crop production. In a landlocked, mountainous, and high population density country, limited arable lands and access to natural resources, including pasture and water, remain the major constraints and bottlenecks to livestock development and competitiveness. Therefore, livestock intensification, productivity increase, and animal production diversification (fisheries/beekeeping) are the best strategy for livestock development.

Program 2: Research, technology transfer and professionalization of farmers

46. **Research, technology transfer, professionalization of farmers, and extension services for producers are of key strategic relevance towards the achievement of PSTA 3's strategic objectives and targets**. No credible productivity and commercialization gains can be made without an effective technology development and transfer system, tailored to Rwandan conditions. Equally, the envisaged expansion of private sector investments will only occur if investors are assured of enough trade volumes and of the organization of farmers into formalized groups, able to mobilize and collect adequate trade volumes. Professionalization of smallholder farmers and their organization into cooperatives and other farmer groups are necessary to ensure economies of scale in input and output markets, and to give farmers the necessary clout to bargain and benefit from market-driven trade relationships.

47. **The current research and technology transfer functions are dominated by the public sector through the Rwanda Agriculture Board (RAB)**, which has the mandate to undertake agricultural research for crops and livestock, agricultural development (mainly extension and input supply), animal resource development, and provision of rural infrastructure (mainly storage facilities) and mechanization. The 30 District administrations also play a key role in delivery of extension services at the local level (based on a 3-tier structure and outreach system—District, Sector, and Cell levels). Community participation and community-led solutions were highlighted as good practices throughout the PSTA 2 period. Rwandan agricultural policies and strategies focus on intensification and increased market orientation of the smallholder agriculture sector, and farmers' cooperatives are seen as an important and principal vehicle to achieve this goal. The number of agricultural cooperatives in the country expanded rapidly over the past few years – from 645 in 2008 to 1,877 in 2013. PSTA 3 envisages increasing the number of cooperatives to 2,500 by 2017-18, as well strengthening them to be more effective in serving their members.

Program 3: Value chain development and private sector investment

[44] From soil erosion baseline, RAB 2012.

48. **Creating an environment to attract expanded and inclusive private investment to the agriculture sector, encourage entrepreneurship, and facilitate market access to both inputs and outputs is strategically important for agriculture sector development**. Continued intensification and commercialization of the Rwandan agriculture sector is essential to drive inclusive economic growth and reduce poverty. Developing, rapidly expanding, and diversifying competitive food and export crops remains one of biggest contributors to the theme of rural development and economic transformation of EDPRS 2. Program 3 implements programs aimed at expanding and diversifying food and agricultural exports in areas where Rwanda has a proven comparative and competitive advantage to accelerate economic growth and increase rural incomes and food security. Expanded and inclusive access to viable agricultural loans and enhanced recovery rates are increasing the volume, variety, and accessibility of agricultural finance products; hence, aiming to increase the number of commercial loans extended by the commercial banking industry is strategically sound. Market-oriented infrastructure (including rural feeder roads and post-harvest infrastructure) is considered a critical factor for stimulating increased agricultural production and commercialization.

49. **Enhancement of food security and nutrition remains a key strategic objective of the GoR. Food crops, which include commodities that can be regionally and internationally tradable but exclude crops produced for export only, account for 85 percent of agricultural GDP**. Another GoR objective is to double per capita milk consumption, from about 36 liters/person/year to 80 liters. This cannot be achieved by only increasing milk production; milk processing (an estimated 10 percent of milk is currently processed) and marketing along the value chain also need to be promoted. Tea, coffee, horticulture, pyrethrum, meat, and hides and skins are among the key export value chains prioritized for support in PSTA 3 and this Ag. PforR. Rwanda has a proven comparative advantage in these four value chains as confirmed by recent analyses (2014) and expanding private sector activities. The GoR envisions a significantly greater role for the private sector in leading the planned expansion and intensification programs in the priority value chains. Private sector feedback confirms that private investors are ready and interested to take on an expanded role in all four value chains. Demand for fish and poultry products is relatively low, but is fast growing and currently mainly fulfilled by imports (about half of the fish and two-thirds of the eggs consumed, for instance). Therefore, the development of these value chains has a strong potential for import substitution. The sustainability of any improvements in this sector will be affected by the performance of agricultural loans, which will in return be reflected in the interest rates. Having a supportive policy framework is particularly relevant in the context of agricultural and livestock insurance, as the most convenient form of insurance (in terms of premium and coverage). Expanded feeder road development will also contribute to social protection by promoting employment generation through public works. Investments in storage capacities to hold the surplus production and reduce post-harvest losses, and consequently maximize net profits for small-scale farmers and reduce food insecurity are both key and necessary. MINAGRI estimates that farmers experience between 15-22 percent annual post-harvest losses in cereals.

Program 4: Institutional development and agricultural cross-cutting issues

50. **Derived from the RF for PSTA 3, the strategic objectives of institutional capacity building, agriculture decentralization, legal and regulatory framework, agriculture communications, statistical systems, M&E, gender and youth in agriculture, environmental mainstreaming in agriculture, nutrition, and reducing household vulnerability are sound and highly relevant in their contribution to agriculture growth and poverty reduction**.

51. **Strengthening institutional capacity to fulfill its intended strategic role and to meet the ambitious targets of PSTA 3 at impact, outcome, and output levels, as well as to ensure enhanced governance in the sector, including significantly improved M&E systems and follow-up mechanisms, are key.** During the past year, a number of important initiatives have further

operationalized MINAGRI's decentralization strategies at the operational level. Many of these activities are ongoing, and are generally making good progress.[45] The legal and regulatory framework, including compliance with international sanitary, phytosanitary, and safety (SPS) standards, is a key cross-cutting program of PSTA 3. Formalization of the National Irrigation Policy after the elaboration of the Irrigation Master Plan (2010) is essential to put in place the foundation for sustainability of publicly developed irrigation schemes and to allow the private sector to increase participation in development and operation in irrigation. The gross value of production of organic agriculture is relatively small. However, given the growing demand for organic products in the U.S., the U.K., local markets, Europe, and South Africa, the potential for rapid growth exists. The low use of pesticides can be traced to demand-side as well as supply-side factors. Weak demand for pesticides results in part from farmers' poor knowledge of pest and disease control methods, which in turn is compounded by the lack of research being done on chemical pest control practices. The GoR recognizes the need to overcome small farmers' challenges in obtaining access to credit. The objective of having diversified agriculture and private sector-led agriculture result in the need for investing in strong value chains especially for the export commodities. Developing the legal basis for an agricultural catalytic fund will also ensure transparency and accountability while increasing sources and methods of financing for new ventures.

52. **Agricultural Management Information System/MIS: M&E, Agricultural Statistics and Knowledge Management. Based on the RF for PSTA 3, the strategic objective of the MIS, and its component M&E, Statistical Systems, Knowledge Management, and Agricultural Communication, is to strengthen the efficiency, effectiveness, access to and utilization of an enhanced management information system (MIS) for the agriculture sector, which would contribute to enhanced evidenced-based decision making**. This would involve the following component systems (with the RF outlining relevant outcomes and outputs): i) Monitoring and Evaluation system; ii) Agricultural Statistical System, including enhanced national food security and nutrition information system; and iii) Agricultural Communication System. Currently, these MIS components are operating in a fragmented manner, with partial systems also operating in RAB, NAEB, and the three SPIUs, to meet their specific institutional requirements. MINAGRI prepared an integrated M&E framework (in 2011) that is currently being updated in support of implementing the recently prepared ASIP. This evaluation framework needs to be aligned and harmonized with the RF of PSTA 3, and then operationalized so that it can serve as a useful sector-wide tool to support the sectoral MTEF and MINAGRI's integrated annual work plan and budget, and also to help support and guide the relevant annual work plan and budgets and the M&E systems for RAB, NAEB, and the three SPIUs.

53. **Environmental mainstreaming in agriculture through appropriate soil conservation measures is of great importance and should be done through the promotion of integrated soil fertility management programs combining the use of chemical and organic fertilizers to improve productivity but also to preserve soil's physical and chemical characteristics. Different techniques implemented, such as composting, green manure, and organic mulching, will need to be scaled up and promoted throughout the entire MINAGRI structure**. These techniques improve soil's organic matter content, soil water retention capacity, infiltration rate, and microorganism activity. Environmentally sound water management in irrigation schemes is very crucial to the sustainability of

[45] Several useful documents outline the decentralization strategy with respect to the agriculture sector, including the main components, primary challenges and "gaps," and ongoing actions. These documents include: Review of Decentralization in Rwanda's Agriculture Sector to Inform the Sector Strategy 2013-2018 (prepared by Landell Mills/ Veteffect for the European Union), 2012; Progress Report of Technical Assistance to MINAGRI in Decentralisation, prepared by Aimable Rusingizankekwe, March 2014 (this report provides the most up-to-date assessment of progress and further operational recommendations); Supporting Fiscal Decentralisation in the Agricultural Sector Developing Guidelines and a Training Manual for Utilization of Earmarked Grants to Districts, prepared by ETC East Africa Ltd, 2008; Sector Policy, Planning and Budgeting Guidelines for the Agriculture Sector, prepared by MINAGRI (2008).

these schemes, and will be done through the adoption of appropriate irrigation schedules determining the correct irrigation amount and answering the typical questions of what, when, how, and how much to irrigate. This will lead to improved water use efficiency and avoid deep percolation and leaching of specific nutrients that can harm soils over time.

54. **Environmental considerations in rural roads. The rehabilitation and upgrading works can involve significant earthwork and construction of slide protection and drainage structures, as well as embankments crossing marshlands**. Potential adverse impacts include: loss of agricultural land and vegetation due to excavation of land in road expansion and borrow areas; slope instability due to soil and water erosion and operation of machinery; disruption of natural drainage/flow and flooding; pollution of water bodies due to improper disposal of solid waste and spoil; and increased noise and air pollution in the vicinity of construction sites. Climate change, if not mitigated, remains a major risk to agriculture sector, considering that most (90 percent) of Rwanda's crop and livestock production is rainfed. Food security and nutrition is one of Rwanda's key priorities. EICV identified that in 2012, about 460,000 households (21 percent) had poor or borderline food consumption patterns (82,000 households or 4 percent had poor consumption patterns, while 378,000 households or 17 percent had borderline). These households are vulnerable to seasonal shortages and also have inadequate provision in the case of drought or excess rainfall. The identified solution is coordinated, strengthened, and scaled-up, community-based nutrition programs and information campaigns across the country.

ii. Technical soundness

Program 1: Agriculture and animal resource intensification.

55. **The SPs of soil conservation, land husbandry, irrigation and water management, mechanization, agrochemicals and markets, seeds and livestock development were reviewed and found to be technically sound and of high relevance in accomplishing PSTA 3 strategic impacts**. These SPs are a continuation and refinement of those carried out under PSTA 2, which accomplished over 90 percent of its targets and surpassed many by up to 200 percent.

56. Given that most Rwandan soils (90 percent) are on hillsides and that there are still soils that are old and depleted in nutrients either due to erosion or overcultivation, the achievement of PSTA 3 will be highly dependent on more effective use of soil. The programs under PSTA 3 aim at provision of infrastructure for erosion control and rejuvenation of soil health. Tremendous achievements have been documented in significantly enhancing soil conservation technologies, especially under World Bank-financed projects. These technologies will need to be scaled up in a larger area of Rwanda.

57. Most Rwandan agriculture is rainfed and climatic and seasonal variations negatively affect agricultural production. For this reason, PSTA 3 has set ambitious targets of developing an additional 20,000 ha of irrigation, to reach a target of 48,000 ha of irrigated land nationally. This will comprise both marshland and hillside irrigation. So far the maximum amount of irrigation infrastructure has been developed by the GoR and has a significant amount of public good element. Since 2008, the GoR has made irrigation development a key national priority to achieve sustainable production levels and to mitigate climatic shocks. Institutions and policies have been put in place gradually to work on this key priority.

58. The total area suitable for mechanization is estimated at 1 million ha, which represents around 60 percent of the total cultivatable area. The expectation under PSTA 3 is to have about 25 percent of Rwanda's 2 million farmers' farm operations mechanized by 2017; i.e., 500,000 Rwandan farmers would either own and/or hire mechanization services. Initial experience suggests that the mechanization strategy

is technically sound, but has to be expanded to include simple mechanized tools to cater for smallholder farmers who cannot access large-scale mechanization without financial support from the government and/or DPs.

59. MINAGRI's focus on increasing the adoption of improved inputs is predicated on the belief that current fertilizer consumption is well below levels that could be profitable. In general, fertilizer could be used profitably in a wider range of zones and communes in the production of maize, sorghum, Irish potatoes, sweet potatoes, and climbing beans as well as for irrigated rice, horticultural crops such as cabbage, and inoculated soybeans. Some progress has been made at the national level to support seed sector development. To produce, conserve, and treat seeds to be kept safely for a long time, a Rwanda Seeds Enterprise (RSE) was established in 2010. Beyond these national endeavors, RAB's Seed Project program has formed strategic alliances with various continental and regional bodies to add value to their activities. RAB links up with New Partnership for Africa's Development (NEPAD) and Common Market for Eastern and Southern Africa (COMESA) frameworks. Within the EAC, RAB collaborates with ECAPAPA (Eastern and Central Africa Programmes for Agricultural Policy Analysis) and ASARECA (Association for Strengthening Agricultural Research in Eastern and Central Africa) for harmonizing Rwanda's seed policies. It is also involved in the EAC seeds standards harmonization effort being led by the Rwanda Bureau of Standards (RBS). Rwanda is also a member of African Regional Intellectual Property Organization (ARIPO). In other words, Rwanda has laid the foundation for establishing a technically sound seed sector linked to regional and subregional initiatives. These roles and arrangements are reflected in a new seeds policy currently under discussion.

60. For the livestock sector, PSTA 3 and its overall results chain are technically sound and most of the proposed indicators would measure well the progress towards achieving PSTA 3's strategic objectives and the PforR operation's results. The growth of some subsectors of animal production (such as dairy) has been impressive in the past 15 years, demonstrating a sound strategy and overall good implementation. It is worth noting that the lack of lands and pasture as well as availability and accessibility of feed are identified as key bottlenecks to livestock intensification and productivity increase in the country.

Program 2: Research, technology transfer and professionalization of farmers

61. The SPs of research, technology transfer, and professionalization of farmers are key in supporting the main drivers of agriculture and animal resource intensification and food and export value chains. The SPs were found to be technically sound in their focus on improving, refining, and scaling up key investments in research, extension, and professionalization of farmers to support agriculture growth targets.

62. RAB is mandated to conduct scientific and technical development of agricultural and animal resources in Rwanda to improve the livelihoods of low-income farmers. The institute carries out research and promotes technologies in crop production, livestock, forestry, agroforestry, post-harvest management, land conservation, and water management. Research is grouped under three main program areas: crops, livestock, and natural resources management. The research is conducted through multidisciplinary teams and has moved from traditional research-extension linear processes to Integrated Agricultural Research for Development (IAR4D), based on an "innovation platforms approach." In this system, stakeholders (farmers, scientists, traders, local authorities, NGOs, and the private sector) are becoming increasingly involved in the research process, from priority setting and technology development to technology transfer. The research program is therefore found to be technically sound and in line with the objectives of the PSTA 3 program.

63. Extension for producers is a key intervention implemented under the CIP, which is based on three pillars: i) land use consolidation; ii) improved seed and fertilizer use; and iii) proximity of extension

service to farmers. RAB and Districts have adopted a Farmer Field Schools (FFS) approach, which emphasizes farmer-to-farmer extension. In the changing context for rural smallholders, where no blanket recommendations exist in agriculture and collective action is required to access markets, farmers need to organize, be innovative, and be able to adjust to changing situations. In this context, FFS have an important role to fill in the development of locally-based innovations, to create knowledge for a framework of action, and to boost local management and leadership skills, aspects not normally catered to in regular training and extension based on technology transfer concepts. Despite the challenges that accompany FFS in general, the Rwandan model is found to work well and is technically sound, especially given the past recorded productivity gains, strong government support both at national and local levels, and its effective dovetailing with other government community initiatives.

64. The farmers' cooperatives and organizations SP builds on the successful development of farmers' cooperatives under PSTA 2, and ongoing flagship projects in the sector, such as LWH and RSSP 3. Five key objectives highlighted in PSTA 3 are to: i) develop management and entrepreneurial capacities in farmers' cooperatives and organizations; ii) support farmers' organizations' participation in activities of higher value, both at the farm level and in post-harvest handling and agroprocessing; iii) develop farmers' organizations as vehicles to improve farmers' access to inputs in a demand-driven way; iv) develop rural women's organizations and groups within cooperatives; and v) promote the growth of social capital to provide farmers' organizations with an enduring foundation for the longer run. MINAGRI has already addressed the key issues of harmonization of various approaches and has a bottom-up institutional model of cooperatives as part of preparation for the Ag. PforR; a policy to this effect has been approved in principle by the Cabinet on institutional aspects of farmers' organizations and farmer-to-farmer extension systems. The key challenges now are to operationalize the new approach and mobilize necessary technical assistance required to build capacity at the farmer and staffing level. The SP is found to work well and is technically sound, especially given the past record on strengthening farmers' cooperatives and organizations.

Program 3: Value chain development and private sector investment

65. The specific objectives of increasing overall production, productivity, and value addition in target value chains as well as creating an enabling environment conducive to increased private sector participation are well aligned with the set target of increasing the value of exports in priority value chains by 28 percent p.a. by 2018. Creating an environment to attract private investment, encourage entrepreneurship, and facilitate market access, develop priority food and export crop, dairy, meat, fisheries, and apiculture value chains, increase access to agri-finance and market-oriented infrastructure for post-harvest (including expanded coverage of rural feeder roads and post-harvest infrastructure) are key areas of focus in the agriculture sector that have been found to be both strategically relevant and technically sound to accomplish the key strategic objectives and results defined in PSTA 3's RF.

66. Early engagement with the private sector suggests intensification should be considered as a first priority over expansion, given Rwanda's land constrained environment, particularly in terms of expansion of well-established, more traditional export value chains (tea and coffee). Intensification efforts could very well be supplemented by expansion based on a clear value proposition for farmers in target areas. The promotion of the eight priority food crops (bananas, wheat, maize, rice, Irish potatoes, cassava, soya beans, and beans) is of critical importance to food security and nutrition, growth, and poverty reduction. The emphasis of the value chain approach is found to be the best, especially since most farmers have started to produce surpluses for the market after satisfying their consumption needs.

67. Success in achieving export value chain targets will hinge on addressing infrastructure and logistics challenges (e.g., cold chain) and successfully identifying promising PPP and greenfield investment opportunities. For the tea, coffee, and horticulture subsectors, the expectation is that the

market can absorb the increased export volumes planned. In case of the pyrethrum subsector, the market dynamics need to be better researched and understood to allow for a proper validation of the feasibility of the targets set. The overall approach for the development of dairy, meat, fisheries and apiculture value chains is technically sound, with a focus on feed-producing and -processing infrastructures (with strong private sector involvement), but also development or enhancement of the legal and policy framework and SPS standards.

68. The action items to achieve expanded and inclusive access to viable agriculture loans and enhanced recovery rates outcome include: i) development of a national agricultural finance policy; ii) passage of a warehouse receipts (WRS) act and regulations; iii) M&E of existing agricultural financial instruments; iv) construction of warehouses; v) MINAGRI's facilitation of a value chain finance relationship through contract farming; vi) in collaboration with agriculture financial stakeholders, MINAGRI's establishment and convening of agricultural finance forums; vii) in collaboration with other stakeholders, MINAGRI's provision of specialized training for bank officers in providing credit to agriculture, including support in preparation of business plans; and viii) in collaboration with other stakeholders, MINAGRI's public awareness-raising regarding available financing instruments. These actions are comprehensive, well-targeted, and technically sound.

69. Market-oriented infrastructure for post-harvest, including promoting an efficient and equitable transport system for feeder rural roads investments, is a key strategic objective for both MINAGRI and the Ministry of Infrastructure (MININFRA). A common framework of engagement was prepared along with the Transport Sector Master Plan, which provides strategic direction for development of feeder rural roads throughout the country. A comprehensive feeder roads development strategy and program that provides the framework for prioritization of investments, maintenance of feeder roads, and definition of the institutional arrangements is currently under preparation. Rwanda has a road network of about 19,055 km, of which about 15,055 km is classified, and consists of: 1,211 km and 58 km paved national and District roads, respectively; 1,538 km unpaved national roads; and 12,248 km unpaved District roads. The unclassified roads network is estimated at about 4,000 km of predominantly very low engineering standard earth roads; these principally constitute the feeder rural road network. However, these roads are in a dismal state, and represent a major constraint to the mobility of the rural population, agricultural inputs, and marketable surplus outputs. Farmers' transport to markets relies predominantly on human transport and Intermediate Means of Transport (IMT).

70. Reducing staple crop post-harvest losses at the producer and first aggregator level is important for increasing the volume and value of staple crops within the market and available for consumption and for increasing rural incomes. Post-harvest activities mostly occur before consumption. To reduce post-harvest losses and at the same time improve intertemporal food consumption, the GoR initiated strategic grain reserve activities in 2010. MINAGRI purchased approximately 7,000 metric tons (MT) of maize and 3,000 MT of beans from Season A production. In 2011, the Post-Harvest Taskforce purchased about 60,000 MT of maize and beans as a strategic food reserve with a potential to reach 200,000 MT. The Post-Harvest Taskforce within MINAGRI has oversight and responsibility for the reserve activities. These efforts provide a firm foundation and are technically sound for the management of post-harvest losses.

Program 4: Institutional development and agricultural cross-cutting issues

71. Institutional capacity building, decentralization in agriculture, a legal and regulatory framework, agricultural communication statistical systems, M&E and knowledge management, gender and youth in agriculture, environmental mainstreaming in agriculture, and nutrition and reducing household vulnerability are key enabling SPs that support the key drivers of agriculture growth and poverty reduction and catalyze the achievement of PSTA 3's strategic objectives and impacts.

72. The PforR assessment mission findings and various recent capacity development diagnostic assessments and their corresponding recommendations[46] for this capacity development SP concluded the following main points: i) there are adequate recent assessments of the capacity priority needs and required strengthening actions of MINAGRI and its main agencies (RAB, NAEB) to carry out the proposed Ag. PforR support operation. While there have been some assessments of Districts' capacities to formulate and implement agricultural programs, these have been limited in scope and depth. Nonetheless, there are several recent assessments supported by the EU for both overall District capacities and agricultural-specific[47] capacities and required priority actions (2013 and 2014), also as part of support for enhanced decentralization efficiencies and effectiveness; ii) in addition, a forthcoming exercise (later in 2014) for a MINAGRI/District Working Group to consolidate and update the priority capacity needs and strengthening actions, with special reference to ensuring the effective implementation of key actions which will help achieve the proposed outcomes and outputs and targets of PSTA 3 as articulated in the RF; and iii) the RF for this SP, including its underlying results chain, is technically sound.

73. PSTA 3's proposed SP on Decentralized Agricultural Services and its articulation in the RF is technically sound. Each of the four components are appropriately linked to each other, and together will contribute to the envisioned decentralization strategic objectives. A clear decentralization strategy and road map (as reflected in the Decentralization Implementation Plan (DIP)) is propelling progressive increases in fiscal decentralization to the 30 Districts. Ongoing reforms of MINAGRI and its agencies/units (RAB, NAEB, and the three SPIUs) will further integrate its centralized structures and staff into the subnational structure (especially at the District level) and its *modus operandi* in the provision of expanded and enhanced quality of agricultural services, accompanied by specific capacity development programs and interventions. Howerver, there is a need to further strengthen CD activities at the District and sector levels; and expanded participation and transparency at the District levels.

74. An Irrigation Master Plan (IMP) launched in 2010 established the baseline for required irrigation development and identified the potential for developing irrigation infrastructure nationwide. The national irrigation policy will allow operationalizing the IMP. Both the IMP and the national irrigation policy are technically sound and provide both the framework and foundation for implementing key investments in this subsector. Laws and regulations have direct consequence for inputs marketing, including registration procedures, packaging and labeling requirements, quality control measures (e.g., pre-shipment inspection and final retail inspection and enforcement) but these are critically inadequate currently. The Rwanda Seed Law n°14/2003 was promulgated on May 23, 2003, and six Ministerial Orders (or regulations) related to seeds adopted (the most recent one in 2011), while a national seed policy was promulgated in October 2007. The law is under review consistent with the EAC harmonization protocols and contains Plant Breeders Rights (PBR). More recently, Rwanda actively participated in the harmonization of EAC seeds standards, now under public review before they are signed by the EAC Council of Ministers for adoption by individual member states. Rwanda has yet to ratify the EAC SPS protocols. Once ratified, a Presidential Order would have be required for implementation. A developed crops protection law has been in Parliament for approval for about seven years now.

[46] Agriculture Sector Capacity Building Plan: 2013- 2018 (MINAGRI, RAB, NAEB), prepared by the Govt. of Rwanda Public Service Commission (2013); Capacity Needs Assessment for MINAGRI, prepared by Coffey International Development, July 2013;

[47] 'See above footnote for detailed references. In addition, there is a useful assessment exercise that includes relevant recommendations for enhancing the program cycle (and can provide useful inputs for the proposed capacity development assessment exercise): Institutional Architecture for Food Security Policy Change: A Case of Rwanda (prepared by Development Alternatives Incorporated, for USAID), 2014.

75. Rwanda developed a fertilizer policy in 2007, but this is largely about the increased use of chemical fertilizers without any recommendations and actions targeting the better use of organic fertilizers. Such recommendations are important to improve extension system to raise farmers' awareness on the importance of organic fertilizer, demonstrate better methods of producing and applying organic manure, reinforce investment in soil erosion control measures, particularly efficient radical terraces, and reinforce integration of livestock production with crop production so that animal manure can be used for crop production and crop byproducts can act as feed for animals. Currently, MINAGRI is finalizing a more comprehensive fertilizer policy that aims to address these gaps.

76. Based on the RF for PSTA 3, the strategic objective of the MIS (and component M&E, Statistical Systems and Agricultural Communication) is to strengthen the efficiency, effectiveness, access to and utilization of an enhanced management information system (MIS) for the agriculture sector that would contribute to enhanced evidenced-based decision making. This would involve the following component systems (with the RF outlining relevant outcomes and outputs): i) Monitoring and Evaluation system; ii) Agricultural Statistical System, including enhanced national food security and nutrition information system, and disaggregation of gender data; and iii) Agricultural Communication System. Based on information provided in the RF, the overall strategic objective (SO) and supporting details (of outcomes, outputs, indicators, baselines and targets) are sound, although they need to be further operationalized at national and subnational levels.

77. The overall goal of the Agricultural Gender Strategy (AGS 2012) is to contribute to poverty reduction and sustainable development through institutionalization of a gender-responsive programming, implementation, monitoring, and reporting system and to improve gender equality in the agriculture sector. For MINAGRI, the strategic objective is to improve gender equality in the agriculture sector and redress the existing disparities. The Ministry's strategy aims at mainstreaming gender within MINAGRI's institutional and operational framework. The AGS covers all aspects of gender, from policy and strategy to staffing and implementation, to ensure that women farmers have equal access to program benefits.[48] MINAGRI's strategy and plan for mainstreaming gender throughout all agriculture sector activities and functions are found to be technically sound.

78. Mainstreaming environmental management in soil conservation and irrigation practices being undertaken in PSTA 3 are key for sustainability of the various investments and for the environment. They are necessary to maintain and restore ecosystems as close as possible to their natural state. The GoR has put in place sound and strong environmental governance structures and systems that are also rooted throughout the PSTA 3 program. The rural roads to be improved in PSTA 3 follow the existing alignment and remain within the existing right-of-way, hence limiting adverse environmental and social impacts. The policies state that to avoid adverse negative environmental and social impact, when a road proposed for improvement has to be widened, no road contract tender should be launched before a road-specific Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) are prepared and an Environmental and Social Management Plan (ESMP) with mitigation measures is incorporated in the bidding documents. Also, the 2011 National Strategy for Climate Change and Low Carbon Development is technically sound and will be used to guide overall planning for climate change.

[48] The main objectives of the AGS are to: i) institutionalize gender in the agriculture sector so that policies, processes, planning and operational mechanisms and structures/programs are gender-sensitive; ii) develop capacities in the agriculture sector to enable gender-sensitive programming so that technical, program and management of MINAGRI staff and stakeholders, and decentralized entities have adequate capacity to engender MINAGRI programs; iii) enhance gender-responsiveness in delivery of agricultural services; iv) promote equal participation in decision-making processes; and v) develop and coordinate partnerships and collaborative mechanisms amongst government institutions, CSOs, private sector, and DPs and integrate appropriate actions to respond to practical and strategic gender needs in the agriculture sector.

79. MINAGRI recognizes its role and accountability to ensure availability of and access to affordable, nutritious foods - to ensure food and nutrition security for all Rwandan citizens. One key target of PSTA 3 is to ensure that at least 90 percent of Rwandan households have acceptable food consumption. MINAGRI recognizes two approaches to improving access and availability of nutritious foods. The first is increasing overall agricultural productivity, recognizing that increasing income will result in more money spent on higher nutrient quality foods, including meat, dairy, fruits, and vegetables. The CIP, started in September 2007, focuses on six core staple crops: maize, wheat, rice, Irish potatoes, beans, and cassava. Under the CIP, farmers, who are organized in Self-Help Groups (SHGs), synchronize the cultivation of crops. Farm inputs such as improved seeds and fertilizers were imported and distributed to farmers through PPPs, and extension services on the use of inputs and improved cultivation practices were rendered to farmers. The second approach is to increase diversity of available foods and "upgrade" the nutrient quality of foods. The former was done through the promotion of home gardens, and the latter by using biofortified staple crops wherever possible. Biofortified crops are bred with better nutrient profiles by exploiting the natural variation between varieties of the same crop. The GoR has committed to disseminating and promoting all biofortified staples that are or could be available in Rwanda. MINAGRI encouraged and disseminated the first available biofortified staple crop, high-iron beans, within the CIP. It also promotes cultivation of biofortified vitamin A-rich sweet potato. MINAGRI has requested the vitamin A biofortified cassava currently available in the Democratic Republic of the Congo, and is completing trials of vitamin A maize for release in 2015. In addition, soya was incorporated in the CIP to increase its productivity to at least 1.3 MT /ha. Interventions focus on increasing the supply of soya for processing, and potential use in a locally produced corn-soy blend, a nutritious supplemental food for children. The Nutrition Action Plan addressing the above two areas is well prepared and costed for recommended action lines and is technically sound.

iii. Institutional arrangements

80. PSTA 3 is implemented by MINAGRI in line with its current organizational and functional structure and actors: four departments (Planning, Inspection, Crop Production, and Animal Resources); two semi-autonomous implementing agencies (Rwanda Agriculture Board/RAB and National Agriculture Export Board/NAEB); two Task Forces (Irrigation and Post-Harvest Infrastructure, which merged into RAB as of July 1, 2014); three Single Project Implementation Units (SPIUs), which implement donor-supported projects (World Bank, IFAD, African Development Bank); and 30 Districts (as part of a decentralizing government structure). The central government, through MINAGRI, provides policy, coordination, and financing leadership for PSTA 3, including strong harmonization and alignment of development assistance. All other implementation responsibilities of PSTA 3 rest with the Task Forces, RAB, NAEB, SPIUs, and Districts, which are enabled by various coordination mechanisms. Implementation roles and approaches vary with a mix of national, District, community, and private program delivery. Currently, the government is completing a government-wide restructuring exercise to further streamline and enhance organizational and implementation efficiencies and effectiveness. MINAGRI's restructuring plan is currently under review for formal approval and its launch is expected later in 2014. Some of the key guiding principles are to ensure an organizational and functional structure that will promote and balance efficient execution and sustainability, including the integration of the SPIUs in RAB and NAEB, and to establish a central-level SPIU to handle/coordinate central functions for efficient implementation of PSTA 3 (including the PforR).

Program 1: Agriculture and animal resource intensification

81. **Soil conservation and land husbandry** activities are now implemented by different agencies (RAB, Rwanda Environment Management Authority/REMA), local administration (Districts) and SPIUs (LWH/RSSP, Kirehe Community-Based Watershed Management Project/KWAMP). While there is an excellent amount of good work, there is also an apparent lack of coordination, harmonization, and

standardization of the different works and approaches for soil conservation and land husbandry. RAB has set an established methodology for monitoring the coverage of soil erosion control infrastructure and will report on the situation every two years, but RAB does not coordinate the implementation of different works being carried out in other implementing agencies.

82. **Irrigation and water management** are carried out by various agencies with different mandates, such as GoR-funded programs (GFI, QWM) implemented by the Irrigation and Mechanization Task Force (IMTF) and donor-funded projects (RSSP3, LWH, PAIRB, KWAMP). When projects close, the infrastructure is handed over to beneficiaries under the guidance of the relevant District, but no single national authority oversees irrigation schemes. The establishment of such a body is urgent, especially as the IMTF's term ended on June 30, 2014. The law establishing Water Users' Associations (WUAs) was approved and gives beneficiaries of irrigation infrastructure the obligation to maintain them. There are provisions to provide training to both male and female members of WUAs on key issues, including: dealing with schistosomiasis; applying lessons from Integrated Watershed Management (IWM) experiences and developing IWM in additional watersheds; and developing hydrological information for watershed management.

83. **Agricultural Mechanization.** To popularize mechanization and achieve a target of 25 percent mechanized farm operations by 2017, the GoR, through the IMTF, has driven the mechanization program since 2008. An internally financed project, the IMTF was mandated to: i) promote mechanization options for rural farmers; ii) develop local skills and strengthen capacity in agricultural mechanization; and iii) promote mechanization in post-harvest activities. On June 30, 2014, the Task Force was phased out and its activities absorbed within RAB. After the initial wave of investments, GoR plans to gradually withdraw and hand over procurement and distribution of mechanization equipment to the private sector. The government would scale down to 60 percent within the next three years and then phase out completely thereafter, but would continue to ensure a conducive environment for private sector investment through enabling policies and provide soft services such as extension, thematic studies, and capacity building of relevant stakeholders. In a drive to attract private investors into the mechanization sector, MINAGRI secured the services of three private investors: Way-Invest Ltd; Yanmar-Japan (through Akagera Motors); and Mahindra-Indian (through ETC Agro). In addition, around eight manufacturing companies, mainly of post harvesting equipment, were established.

84. **Agrochemical use and markets.** Rwanda depends on imports for all of its agrochemical fertilizer requirements because the country has no local production. MINAGRI has been the active importer and distributer of fertilizer since 2008. However, it is gradually reducing its fertilizer subsidy with the target of being completely phased out of it by 2018. It is also exploring ways to make the subsidy more efficient and opening it up to all crops. The sector is committed to liberalizing the fertilizer subsector and having the entire fertilizer value chain (from importing to supplying to farmers) operated by the private sector, based on farmers' demand. All of these reforms are reflected in a fertilizer policy paper expected to be completed during 2014 and approved in 2015.

85. **Seed development.** Seed production in Rwanda is dominated by producer cooperatives (60 percent) and individual farmers (40 percent). Under an input subsidy scheme, the GoR, through RAB, purchases seeds of maize, wheat, rice, and Irish potatoes and through private agro-dealers delivers them farmers free of charge to plant 0.5 ha. RAB floats tenders for the distribution of seed to beneficiaries after procurement. Currently, pre-basic and basic seed multiplication is carried out in RAB stations located in various Districts under the Agriculture Zone Division responsibility. Seed inspectors operate on all seed fields registered after planting through the crop declaration. Each Province has a technical assistant in seed production and a quality officer reporting to the National Seed Coordinator. Although RAB's seed program has a mandate to produce and market seed, in the spirit of private sector development, the

government decided to lessen its control of the seed sector, promote private investment, and phase out the seed subsidy, all welcome news to the private sector.

86. **Livestock development**. The human resources are inadequate in number (for instance, there is one public veterinarian for all 416 sectors and one per District) and skills required. The World Organization for Animal Health (OIE) Performance of Veterinary Service (PVS) evaluation report seems to confirm the same for the animal health sector. Past experiences and implementation of livestock-related projects (e.g., the AfDB-funded Livestock Infrastructure Support Project/LISP) have shown that the GoR, through MINAGRI and RAB, knows how to implement and monitor results-oriented investments in the livestock subsector.

Program 2: Research, technology transfer and professionalization of farmers

87. **Research, technology transfer and extension for producers**. RAB has the mandate to undertake research on all crops and livestock. To execute this mandate, RAB has a Directorate of Research, headed by a deputy director general (DDG). The DDG is supported by senior scientists at the national level and four zonal directors who lead the research and extension programs on crops, livestock and natural resources. The extension function is implemented by the Directorate of Extension, also headed by a DDG. The DDG of Extension is supported by a number of coordinators and specialists at the national level. At the local level, extension services are implemented as part of the CIP with implementation facilitated through Local Government (LG) structures working together with RAB. The implementers include District agronomists and contracted service providers to support cooperatives/producers engaged in CIP activities. RAB provides national support and oversight, while the LG is charged with implementation at the District and lower levels. During 2014, RAB undertook an institutional review, and proposed changes based on the need to improve the efficiency, accountability, and sustainability of the delivery system, and to devote more earmarked funds to the local level. Through the institutional changes, more RAB staff will be deployed to the zones and Districts to support implementation and decentralization policies and directives. The research programs are also to be consolidated to 16 at the zonal level. These changes are expected to be implemented from July 2014.

88. **Farmers' cooperatives and organizations.** At the village level, lead farmers and farmer promoters will be responsible for farmer mobilization and capacity building. MINAGRI has defined criteria for selection of farmer promoters, and has provided a platform for exchange and sharing of knowledge (based on the health worker model). They have also recently connected with the cooperatives in the sector. The FFS facilitators trained through the FFS approach are mapped at the Cell level (one per Cell) to train farmer promoters. Agriculture committees are established at all levels to act as command post and the roles and responsibilities include coordination, monitoring, reporting, mobilization, and advisory. A permanent operation center/secretariat, composed of two to three members drawn from MINAGRI and Ministry of Local Government (MINALOC), is established in each District and at the national level for day-to-day monitoring of activities. A national Agriculture Steering Committee oversees the implementation of activities and provides policy guidelines. Cooperative training activities also include nutrition training in collaboration with the Ministry of Health, involving community health workers. MINAGRI already has experience (SPIU LWH/RSSP) and proven results with this field-level training and technical assistance but this existing capacity needs to be mainstreamed and included in MINAGRI's capacity-building strategy.

Program 3: Value chain development and private sector investment

89. **Creating an environment to attract private investment, encourage entrepreneurship, and facilitate market access**. NAEB is the key institution mandated to deliver the strategic objectives of program 3 of PSTA 3. The institution has two main departments "Production Support & Value Chain

Development" and "Export Operation & Market Development," which deal with the production and marketing sides, respectively, of priority export crops. NAEB has wide-ranging responsibilities including a regulatory function, conducting research and agricultural extension, licensing operators, setting quality standards, issuing certificates of origin, training farmers and cooperatives (including men and women), international marketing, and providing market intelligence. The new strategy envisions NAEB increasingly focusing on its core function as regulator and creating a conducive environment for encouraging the private sector to take on a bigger role in research, extension, and marketing of export crops. NAEB is in the process of finalizing a medium-term export strategy firmly aligned with the five-year EDPRS 2, PSTA 3, and the National Export Strategy.

90. **Development of priority food crop value chains.** RAB has the institutional mandate to promote food crop productivity interventions. To do this, RAB has identified several drivers of productivity which include: the use of improved seeds, agrochemical fertilizers, and compost/manure; control of pests and diseases; timely planting, maximum use of consolidated land; and promotion of banana production. The GoR, through MINAGRI, RAB, and other agencies, has a subsidy program that targets maize, wheat, beans, rice, Irish potatoes, and soya. Smallholder farmers growing these crops receive subsidized fertilizers, seeds, and other planting materials. The level of subsidy varies with the type of crop and input. While in the past government agencies were responsible for procurement and distribution of fertilizer and other subsidies, there is a gradual move to directly bring on board private sector players. MINAGRI has also intensified training of agro-dealers, including women, throughout the country to ensure farmers have access to their services. Plans are underway to reduce the subsidy level for most inputs, with an objective of phasing out direct subsidies by 2017/18. These government strategies for promotion of food crops and the measures being taken to entice private sector players are considered adequate and robust to ensure that PSTA 3's targets are met.

91. **Development of priority export crop value chains.** The capacity of NAEB could be described as sufficient, considering the complementarities with LG structures to follow-up and support delivery of all planned interventions. Coordination issues might arise where Ministry of Trade and Industry (MINICOM) and MINAGRI intersect in processing activities and trade facilitation, but a coordination mechanism (Industrial Development and Export Council/IDEC) was put in place to tackle the issue. There is strong commitment, at all relevant agency levels, to implement the program, including having export targets a key part of results performance agreements of the agencies involved. There is also considerable experience and sector expertise with the key counterparts (MINAGRI and NAEB) around planning for and supporting expansion of the coffee and tea subsectors.

92. **Development of priority dairy, meat, fisheries and apiculture value chains.** In "small" subsectors and value chains (but with high potential), such as fisheries and beekeeping, the capacity to implement such a program is weak due to the lack of human resources (for instance, for beekeeping, there are only two specialists in MINAGRI and four in RAB at the central level, and the subsector relies on general veterinarians at the local level). Similar assessments are made in very specific areas that would contribute to the overall objectives, such as milk quality and food safety.

93. **Agricultural finance.** Currently, only one staff member in MINAGRI is in charge of the agricultural finance agenda. While the individual is extremely competent and proactive, given the requirements of the next steps to achieve the Program targets. this capacity is inadequate. Moreover, while the Access to Finance Rwanda (AFR) is a unique platform through which pilots and assessments to enhance agricultural finance can be implemented, it is not yet well positioned to support MINAGRI to achieve its strategic objectives in this area.

94. **Market-oriented infrastructure for post-harvest.** This SP promotes efficient and equitable transport systems. The engagement of multiple institutions (i.e., a decentralized road administration at the

District level with limited experience in managing development feeder roads investments) and not being able to rely on good support from national institutions leads to an implementation challenge and requires significant resource allocation to build capacity. MINAGARI, Ministry of Infrastructure (MINIFRA), and MINALOC have capacity-building activities[49] within each sector program and should be sufficient to strengthen the Districts and national entities responsible for feeder roads oversight.

95. **Reduce staple crop post-harvest losses at the producer and first aggregator level**. To reduce post-harvest losses, MINAGRI's Post-Harvest Taskforce is implementing the Post-Harvest Strategy, which involves a number of measures to address losses such as developing training materials, training delivery, and provision of drying and shelling facilities and equipment to cooperatives and individual farmers, as well as the adoption of quality standards. The Task Force has a Post-Harvest Extension Department whose role is to undertake post-harvest extension work. The strategy is implemented through Provincial Coordinators, who supervise District post-harvest extension officers. NGOs liaise with MINAGRI to implement post-harvest handling and storage activities covering developing training materials, training, and installing storage and drying facilities.

Program 4: Institutional development and agricultural cross-cutting issues

96. **Institutional capacity building**. MINAGRI and its two agencies (RAB and NAEB), its three SPIUs, and the Districts have a designated focal person to coordinate capacity development (CD) needs and initiatives, especially since various DPs are providing several types of CD assistance. For example, MINAGRI has a designated Coordinator for the Strategic Capacity Building Initiative (SCBI). Given the large number of Districts (30), the institutional arrangements for coordinating these CD initiatives vary. It is envisioned that one of the outputs of the above CD assessment exercise is to recommend enhanced institutional arrangements for coordinating and enhancing the M&E of the CD initiatives, with a stronger results focus. A recent CD assessment (supported by USAID, 2014, reference cited above) concluded that with respect to the food security system, there is a need for MINAGRI to improve the alignment, consistency, and inclusive institutional arrangements and mechanisms for promoting effective dialogue, evaluation platforms, and mechanisms for the public sector, private sector, civil society, and research institutions. This type of strengthening would help sustain evidenced-based policy design and implementation processes, which would enhance implementation of PSTA 3 and achievements of its targets.

97. **Decentralization in agriculture.** The GoR has a clear decentralization strategy and supporting institutional arrangements and roles at the subnational level. However, there is less clarity at the level of MINAGRI and its entities (RAB and NAEB) and SPIUs in terms of ensuring that their organizational and functional structure and systems are well integrated and supportive of the envisioned expanded decentralization of agricultural services. Currently, RAB and NAEB are finalizing their Strategic Plans to be strongly aligned with PSTA 3's RF, and the recently prepared ASIP. This includes working out appropriate organizational, functional, and staffing structure reforms (including gender aspects) to enhance decentralized agricultural services. During the Ag. PforR assessment mission, three key elements were identified that will need continued strengthening at the District level, consistent with recent progress reports – the need to strengthen the planning, budgetary, and M&E aspects of decentralization, which involves all sectors, including agriculture. It will be important for MINAGRI to coordinate closely with

[49] Support to the Districts and national coordination entities' capacity building, includes: i) technical assistance to Districts' infrastructure, finance, procurement, environmental management, and planning units through adoption of systems and manuals and provision of training to District staff; and ii) strengthening the capacity of national coordination entities through provision of training on feeder roads development planning, monitoring, and maintenance for MINAGRI and RTDA staff.

MINALOC and its CD initiatives at the District level, which include activities to address these three key elements.

98. **MIS: Agricultural M&E, statistics and communication.** Currently, the agriculture sector MIS operates at the national and subnational levels, involving a relatively large number of diverse actors who have specified and complementary roles in data collection and reporting, utilize various reporting processes and mechanisms, and exhibit varying levels of capacity to deliver on their expected roles and outputs. In addition, MINAGRI has a number of other data collection, reporting, and monitoring systems and mechanisms that contribute to various reporting and communication requirements (especially to monitor the annual performance contracts with various entities). Key actors at the national level include MINAGRI (coordinated by the Planning Department) and its main implementation agencies (RAB, NAEB, and three SPIUs). Each of these implementation agencies has its own M&E system; these are in the early stages of being integrated into an overall sectoral MIS. The recent M&E framework assessment exercise highlighted some of the challenges in the extent of fragmentation of M&E activities carried out by the above actors, which tend to focus on monitoring the expected outputs outlined in their performance contracts. MINAGRI's recent initiatives to strengthen an integrated and sector-wide MIS need to be continued, with an aim to meet the performance contract requirements, as well as PSTA 3 requirements in tracking the impact and outcome level targets outlined in its "core" RF.

99. **Gender and youth in agriculture**. A number of agencies are currently involved at the District level in gender and youth issues (e.g., Ministries of Gender and Family Planning, National Council of Women, and MINAGRI) and are working together. The focus is on building the capacity of agricultural staff such as agronomists, livestock specialists, and local service providers (LSPs) to have gender-responsive service delivery. The Ministry of Gender and Family Planning is the focal point and coordinates gender-related work with other ministries. MINAGRI has prepared various training modules for extension service agents and LSPs in gender-responsive service delivery.

100. **Environmental considerations in rural roads**. REMA provides both guidelines and monitoring implementation of national environmental safeguard measures including rural feeder roads oversight. RTDA also has environmental and social specialists that monitor safeguard issues related to rural feeder roads works. Districts also have environmental officers within their Environment and Water Resource Management Units responsible for environmental and social safeguard aspects of rural feeder roads.

101. **Planning for climate change**. Planning for climate change adaptation is done in accordance with the 2011 National Strategy for Climate Change and Low Carbon Development, with MINAGRI taking the sector responsibility. Currently the focus is on risk assessment and vulnerability mapping through modeling and creating a database. Several research programs towards enhancing climate change adaptation and mitigation are also ongoing. Apart from these activities, there is limited institutional capacity in the sector to promote and coordinate climate change issues. The greatest challenge is raising various stakeholders' awareness on climate change issues, particularly the farming community. MINAGRI needs to enhance its capacity to promote and coordinate climate change issues with other GoR ministries (e.g., Environment, MINALOC) and agencies such as RAB and NAEB.

102. **Nutrition and household vulnerability**. While the GoR's National Nutrition Policy can be seen as top-down, implementation is at the District and local level –reflected by MINALOC being one of its core owners. It is also reflected in the building of strategies based on District and sector strategies such as the development of EDPRS 2. Seven ministries coordinate at the District level – there is a nutrition sector working group with representation from MINISANTE, Education, Local Government, Gender, Disaster, and Agriculture, with overall coordination under MINISANTE. Both MINISANTE and MINAGRI rely on community-level implementation mechanisms. Health workers are the main agents of change at the village level – there are two to three health workers per village. In MINAGRI, implementation is done

through the formation of farmers' SHGs consisting of 12-20 farmers. MINAGRI staff are trained and sensitized on gender, and both members and officeholders within the SHGs have to include 30 percent women, with many exceeding this requirement. SHGs form the crux of MINAGRI's implementation strategy. Each SHG has five lead farmers trained in various aspects to help the group. One farmer is trained in conflict management and social welfare to whom MINAGRI links community health workers. In some cases, community health workers are also part of SHG, and are the lead farmers. Through this system, all members of the farmer group are trained on healthy eating and food preparation, especially for young children, using the production from their farms and home gardens. This is consistent with the goals of the community health workers to reduce malnutrition in their communities. This could be extended to more formal delivery of services by community health workers in the cooperative centers.

Part C. Description and Assessment of Program Expenditure Framework

103. Public expenditure on agriculture through MINAGRI has shown a rapidly increasing trend in recent years. Table 12 gives recent expenditure and the current MTEF budget for MINAGRI separated into its recurrent and development components. MINAGRI's expenditure and budget had substantial increases in 2010/11 and in the current MTEF period starting in 2013/14. It is welcome that the government has started to devote a greater share of its resources to agriculture. It should be noted that the figures shown below do not reflect the total amount of public funds to the agriculture sector, given the expenditures by other central ministries and by the 30 Districts. Around three-quarters of expenditure is development expenditure due to the large internal and donor financed projects funded from the development budget. The recurrent budget largely covers operational costs, including salaries and wages.

Table 12: Budgetary Expenditures and Allocations for MINAGRI (2009/10 to 2016/17)

	Expenditures in US$ Millions[a/]				**Allocations[b/] & MTEF in US$ Millions[c/]**				
	2009/10	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/17**	**2017/18**
Recurrent	13.0	31.8	21.3	11.9	15.5	46.1	70.0	74.2	78.7
Development	33.6	49.5	54.1	73.6	88.3	120.9	100.3	99.3	104.3
Total	**46.6**	**81.4**	**75.4**	**85.6**	**103.9**	**167.1**	**170.3**	**173.6**	**183.1**

Source: MINECOFIN.
Notes: [a/] Figures refer to actual expenditures; [b/] Figures for 2013/14 refer to revised budgetary allocation figures for 2014/15, and refer to approved budgetary allocation; [c/] Figures for 2015/16 and 2016/2017 refer to latest MTEF allocations.

Proportion of government expenditure on agriculture

Table 13: Proportion of Government Public Expenditure Allocated to MINAGRI and Other Entities (US$ 000s)

Institution	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
1. MINAGRI	54,848	63,360	64,116	79,158	103,935	155,730	160,950
2. RCA (support to producer organizations)	1,245	3,319	3,268	35,327	11,836	NA	NA
3. MINIRENA (Sustainable land management & forest management)	2,002	1,465	17,888	47,303	94,962	NA	NA
Total agriculture sector	**58,095**	**68,144**	**85,272**	**161,788**	**210,733**	**NA**	**NA**
Total national budget	**1,166,090**	**1,427,235**	**1,592,100**	**2,066,395**	**2,284,910**	**2,594,050**	**2,819,960**
Agriculture sector as % of national budget	5.0%	4.8%	5.4%	7.8%	9.2%		
MINAGRI as % of national budget	4.7%	4.4%	4.0%	3.8%	4.5%	6.00%	5.70%

104. The proportion of government expenditure allocated to the agriculture sector through MINAGRI is rising and projected to reach 6.0 percent in 2014/15 (see Table 14). As stated above, MINAGRI does not provide all public funding in the agriculture sector. MINIRENA has significant soil conservation programs under its mandate to protect the environment and is also responsible for the forestry subsector, with MINAGRI only responsible for agro-forestry. MINALOC is responsible for Districts, the main vehicle for local service delivery including agricultural support services. When this funding for agriculture through other ministries is included, Rwanda surpasses the CAADP target of government spending on agriculture of at least 10 percent of total public expenditures. The ongoing Ag. PER will provide more accurate estimates of total public expenditure allocations to the agriculture sector.

105. Table 14 shows MINAGRI's expenditures by program while Table 15 summarizes MINAGRI's expenditures by agency. MINAGRI's two implementing agencies (RAB and NAEB) are funded from MINAGRI's budget. Most MINAGRI funds are retained centrally, reflecting the large internal and donor-funded SPIUs managed by MINAGRI. All agencies have seen a trend of increasing expenditure and budgets as the government has devoted increasing resources to agriculture.

Table 14: MINAGRI's Expenditure and Budget by Program (US$ millions)

	Expenditure				Budget		
	2009/10	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
Administrative and support services					5.9	7.8	9.4
1. Agriculture/Animal resource	36	54.1	44.7	50	96	115.4	117
2. Research and technology transfer	3.5	5.2	4.3	4.5	5.1	5.1	5.2
3. Value chain dev./Private sector	3.5	3.2	11.3	11.1	21.6	25.9	26.5
4. Institutional dev. / Cross-cutting	2.1	3.2	4.4	4.4	1.1	1.9	2.8
Total	**45.1**	**65.7**	**64.7**	**70.1**	**129.7**	**155.9**	**160.9**

106. Slightly under three-quarters of program expenditure and budgets are through the agriculture and animal resource intensification program. This program covers large internal and donor-funded projects in land conservation, irrigation, provision of farm inputs, and agricultural mechanization. The second largest program addresses value chain development and private sector investment. With the increasing focus of government on the private sector, this program has received significant additional funding in recent years. The research and institutional development programs are funded at far lower levels.

107. It is important to consider budget execution rates, especially in the current context of rapidly increasing budgets in agriculture. MINAGRI's budget execution rates are consistently high, with rates close to 100 percent for RAB and NAEB. Execution rates are significantly higher for MINAGRI's central budget, reflecting high expenditure by the large internal and donor-funded projects managed from the center. Good performance on these projects means that they consistently spend more than their initial budgets for the year, resulting in MINECOFIN providing additional funds during the budget revision in the later part of the fiscal year.

Table 15: MINAGRI Budget Allocation and Execution by Agency (2009/10 to 2012/13)[a/] (US$ millions)

Year	2009/2010			2010/2011			2011/2012			2012/2013		
	Budget	**Execution**	**% (Ex)**	**Budget**	**Execution**	**% (Ex)**	**Budget**	**Execution**	**% (Ex)**	**Budget**	**Execution**	**% (Ex)**
MINAGRI Central	54.8	46.4	85	41.7	60.6	145	42.5	54.2	127	51.9	59.3	114
RAB				13.6	13.2	97	12.5	12.2	98	14.6	14.6	100
NAEB				1.1	1.14	98	2.6	2.6	99	3.1	3.1	100
Transfers to Districts				6.7	6.3	94	6.3	6.3	100	9.4	8.4	89
Total MINAGRI	**54.8**	**46.4**	**85**	**63.3**	**81.4**	**128**	**64.1**	**75.4**	**118**	**79.1**	**85.6**	**108**

Note: [a/] Refers to actual budget execution figures for the years 2009/10, 2010/11, and 2011/12 and to approved budget allocations for 2012/13.

ASIP Program Structure and Cost Estimates

108. ASIP's program structure and cost estimates of PSTA 3, based on two cost scenarios, as well as the indicative financing plan, were summarized and presented in paras. 16 – 22 (and associated Tables 2 - 4).

109. In summary, the ASIP program structure and expenditure levels build on the structure and expenditure trends during the PSTA 2 period and recent budgetary allocations and projections, while reflecting enhancements in the program structure, content, and increased expenditures to achieve PSTA 3's targets (medium-cost scenario). This pattern also reflects the recent increases in budgetary allocations to MINAGRI, which are expected to be sustained in the medium term. Further details on the expenditure framework for PSTA 3 are presented in Annex 6.

Part D. Description and Assessment of Program Results Framework and M&E

110. **During the initial identification mission of the PforR operation, the Bank team worked closely with and supported MINAGRI's PSTA 3 team to prepare a comprehensive and summary RF**, underpinned by an explicit results chain specified at three levels, measured by "SMART" indicators, with their corresponding baselines and targets: impact level for the overall PSTA 3 (and medium-cost scenario); outcome level for each of the four programs; and outcomes and output levels for each of the 24 SPs (see PforR file for the copy of PSTA 3's RF). Once the targets for all outputs were costed, there was an excessive financing gap for the "high-cost scenario"; this led to a reduction in the targets for various outputs based on the consistent application of five prioritization criteria to develop a "medium-cost scenario." There were several iterations of PSTA 3's RF, resulting in enhanced capacity and strong ownership by key MINAGRI counterparts. Based on this PSTA 3 RF, the Bank team derived a modified version of the RF for purposes of the Ag. PforR support operation, in line with the PforR RF template.

111. **The team also supported the formulation of the strategic objective (SO) as outlined in the RF for SP 4.4** to strengthen the efficiency, effectiveness, access to, and utilization of an enhanced MIS for the agriculture sector that would contribute to enhanced evidenced-based decision making. This SO is highly relevant for supporting the effective implementation and governance of PSTA 3, with support from the PforR operation.

112. **The Bank team's review of MINAGRI's current M&E system [50] identified and consolidated the main constraints, which were**: i) there is no unified system in place to link the various institutions/organizations performing M&E in the agriculture sector. Each of the institutions/organizations focus on input/output indicators as specified in their performance contracts and not relating to PSTA 3; ii) MINAGRI functions to a certain extent as lead agency for M&E operations but does not link them to PSTA 3 as of yet. Neither does it cover the level of strategic objectives, but instead remains at an operational level; iii) the formats used are not harmonized and are oversimplified, so questions arise as to the validity and reliability of the collected data; and iv) M&E at all agricultural institutions suffers from shortages of adequately trained personnel as well as of budgetary means.

113. **At the subnational level, The M&E assessment highlighted an additional set of constraints at the District and sectoral levels, which included**: i) a focus on the priorities determined at a higher level (national and District); ii) some reliability issues in the way that crop production/productivity harvest data are generated and reported; and iii) the diverse reporting formats used at various levels, which pose additional challenges to the reliable aggregation of production data.

114. **In the light of the above assessment, the PforR operation includes a framework for updating and consolidating an action plan for strengthening the M&E system for MINAGRI**, in a manner which is integrated and supportive of the M&E systems for each of MINAGRI's entities (RAB, NAEB, the three SPIUs), while taking a sectoral approach, in line with the RF for PSTA 3.

Part E. Program Economic Evaluation

115. **This section presents the economic assessment of the Ag. PforR support operation for PSTA 3.** The rational for public sector financing as well as the World Bank value added are presented, followed by a quantitative and qualitative assessment of the ASIP. Results are also presented to inform the relative prioritization of the different SPs in the ASIP medium-cost scenario totaling US$1,195 million over five years in constant 2014 prices (equivalent to US$1,214 million with inflation and projected changes in RwF/US$ exchange rates).

116. **Public sector rationale.** The rationale for public sector investments includes that cash-poor farmers are unable to cover large unit development costs combined with long-term and downstream benefits that provide inclusionary access to expected benefits by beneficiaries. In the case of irrigation and service delivery, plans include subsequent transfer of ownership and service provision to private sector entities. Public sector intervention is also justified in key post-harvest and off-farm investments that create spillover inclusionary effects but that have been delayed because of a lack of private sector financing.

[50] Also, a recent assessment of the M&E system in support of preparing the evaluation framework of PSTA 3 identified system-related constraints which are included in the World Bank's assessment (see M&E Framework and ASIP for PSTA 3: Intermediate Final Report (May, 2014), prepared by EU-funded consultants).

117. **World Bank added value.** World Bank financing in support of the PSTA 3 program would add comparative value given the World Bank's position to draw upon and help contextualize to Rwandan conditions a wealth of global experience in areas directly related to program investment areas. Achievements and lessons from the successful implementation of ongoing World Bank-supported operations in the sector also provide a strong background upon which to prepare and support the effective implementation of this proposed operation.

118. **A 25-year cash flow model is used to assess the *ex-ante* productivity, effectiveness, and efficiency of public sector investments.**[51] While the costs of all SPs are included in the analysis, the model only quantifies direct benefits for 9 of the 24 SPs, covering 88 percent of the public sector investment. It is assumed that the private sector and PPP investments mapped out in the ASIP costs will occur and be economically viable. The core of the analytical model estimates the impact of SP investments on revenues and costs in seven different enterprise models: three cropping models, one livestock model, and three post-harvest enterprises. In addition, the analysis quantifies increased benefits from greater employment opportunities in agriculture, and an estimate of the economic value of increased carbon sequestration.

119. **A selection of key drivers of agricultural growth is quantified in the model to analyze the impact of changes in public sector investment costs by linking enterprise models and SP costs.** Changes in public sector investments lead to changes in: the number of developed hectares with terracing or irrigation; the number of higher-yielding cows distributed; the number of infrastructures built for post-harvest drying and storage; and the extent of new or improved feeder roads. Further to this, the model captures how SPs are designed to enhance farm-level yields and affect fertilizer and seed use. The linkages between enterprise models and SP investments also capture benefits from reduced soil erosion, labor savings from mechanization, cost savings from feeder roads, avoided yield, and price loss from post-harvest infrastructure, and adoption of new farming practices.

120. **The medium-cost scenario yields an economic net present value (NPV) of US$585 million and a sound economic rate of return (ERR) of 21 percent.** Undiscounted, this is equivalent to an average annual economic net benefit of US$195 million. Using this estimate as a proxy for annual growth in the agriculture sector, it constitutes 8.0 percent of the agricultural share of GDP, nearly matching the 8.5 percent growth target in PSTA 3. Some benefits are not yet captured in this analysis, including incremental benefits from value chain development.

121. **Poverty reduction is achieved through increased farm income and employment generation.** Poverty reduction is achieved through increased farm-level incomes ranging between US$320 and US$2,200 per year on a 0.6 ha farm. Assuming five people per farm household, this constitutes about 0.3 to 2.3 times the national poverty line or US$0.20-1.20 per person per day. Poverty is also reduced by generating agricultural employment in the order of 7.7 million work days per year or 29,400 fulltime person-years.

122. **Elasticities indicate the relative impact of different SPs.** An analysis of elasticities indicates that the economic NPV is most sensitive to changes in investments in land conservation, research and technology transfer, and soil fertility investments. Conversely, estimated elasticities indicate that the impact on employment generation is driven particularly by investments in livestock development and irrigation, while employment decreases with increased mechanization.

[51] Financial prices are converted to economic prices using adjustment factors and amounts are noted in constant 2014 terms; the exchange rate is RwF 650 to 1 US$.

123. **Linkages between enterprise models and SPs highlight that there are positive synergies.** In the case of soil conservation and livestock production, increased income and availability of fodder and straw enable livestock production while available manure helps improve incomes and soil fertility. The net benefit from investments in storage facilities is dependent on successful implementation of SPs that increase crop yields and prices. Program delay and low farmer adoption rates are key risk factors that can threaten the achievement of expected benefits. Risk management strategies should ensure minimum program delay while also increasing farmer adoption rates through extension. Finally, it is important that yield increases are supported through SPs for livestock and hillside developments because these enterprises constitute a large share of total program returns.

124. **Agriculture growth driven by the nine quantified SPs is enabled through linkages to the other SPs.** First, support for farmers' organizations helps improve access to inputs, markets, finance, insurance, and extension services. Based on this, benefits can be captured in cropping and livestock production because these require functioning markets for both farm inputs and outputs. Second, the enterprise models rely on access to markets via value chains for crops, dairy, and meat including for increased production of cash crops and export. This requires access to improved drying, storage, processing, and also transport, which are necessary to meet higher quality standards and to sell perishable products to other than local markets.

125. **Effective institutions, adapted legal and regulatory frameworks, and targeting of disadvantaged groups strengthen program impact.** The impacts of investment in research, technology transfer, and extension rely on effective institutions that can implement research programs and ensure farmer adoption of improved technologies and farming practices. In addition, investments are planned to adapt the legal and regulatory system to transform the agriculture sector toward higher value chains including exports. Finally, because investments that increase productivity may be subject to elite capture, SP investments are planned to ensure that disadvantaged groups benefit through food and nutrition security as well as through employment generation.

126. **Tracking impacts against a baseline with reliable M&E systems helps decision makers and DPs make evidence-based investment decisions.** To ensure that the program investment is sound and stays on target, it is important to track impacts against a baseline. Investments are needed to establish the baseline against which impacts are measured, but also to assess if investment priorities should change over time as new information comes to light. By establishing a statistical system and a targeted M&E system, it becomes possible to implement sound investments in the future based on timely and reliable information.

Part F. Inputs to the Program Action Plan

127. **The technical, fiduciary, and environmental and social systems assessments highlighted five main types of cross-cutting risks and where the resulting key actions and risk mitigation measures form the basis of the PAP**. While the overall PSTA 3 is sound, these additional actions will facilitate smooth implementation and meet and contribute to international good practice. The main areas of cross-cutting risks and mitigation measures to be supported during implementation for the overall PAP are summarized below (see detailed PAP framework in Table 15).

128. **Enhanced enabling policy environment and expanded private sector role and capacities refers to: the relatively infant stage of development and maturity of the private sector in the agriculture sector; the absence of clear and sound policies and supporting mechanisms to stimulate an expanded private sector role in input and output markets; and the relatively weak capacities of**

farmers' cooperatives/organizations. Accordingly, proposed actions to enhance required capacities and performance, as well as risk mitigation measures to be a part of the PAP includes preparing and implementing well-focused and updated strategies of RAB and NAEB to enhance an enabling environment for an expanded private sector through better pinpointing of binding constraints involving policy, institutional, and investment aspects.

129. **Evolving public sector institutional roles and enhanced capacities refers to important changes at central and subnational levels as part of the government's overall decentralization strategy, whereby MINAGRI agencies (RAB and NAEB) are currently completing strategic plans and undergoing restructuring, with an expanded field presence to support Districts' expanded role, to ensure greater efficiencies and effectiveness**. Accordingly, key actions and risk mitigation measures to be a part of the PAP include: i) ensuring these reforms/strategic plans for RAB and NAEB are completed expeditiously (during 2014, they already well advanced) and effectively implemented; and ii) integrating the three SPIUs in MINAGRI's overall structure to foster enhanced capacities and sustainability of strategic activities at various levels, while retaining the strengths of the SPIUs in effective execution.

130. **Operation and maintenance challenges and requirements refers to the challenges of ensuring that the significant expansion of productive rural infrastructure is well maintained and based on efficient and sustainable arrangements (especially soil and land conservation works, irrigation facilities, and rural roads); many farmers' cooperatives and organizations are young, with emerging capacities to ensure the required and timely O&M support, especially given the "public good" nature of this infrastructure, which warrants organized collective action**. Accordingly, key actions and risk mitigation measures to be a part of the PAP include: i) implementing O&M arrangements and mechanisms for each of the infrastructure investments (e.g., IWUOs; cooperatives/farmers' groups; road maintenance brigades) and confirming they are operational and functional, including explicit and timely hand-over arrangements with beneficiaries (e.g., Irrigation Transfer Management Agreements for irrigation schemes); and ii) conducting well-focused capacity development/training activities of the various farmer-level organizational structures to help ensure adequate and timely O&M (IWUOs, farmers' organizations/cooperatives, road maintenance brigades).

131. **Overall, the fiduciary aspects of the relevant implementation agencies are sound, although some modest weaknesses, especially at the District level, need strengthening, considering the increasing proportion of funds being channeled through and accounted for by Districts**. More specifically, the fiduciary assessment highlighted the following aspects that need relatively minor strengthening and appropriate mitigation measures to ensure robust fiduciary accountability at all levels and times: expenditure variance analysis; internal controls; internal audits; external audit; implementation of the public procurement law, regulations, and procedures; and fraud and corruption (F&C) aspects, especially at the District level. Accordingly, the key actions to be a part of the PAP include the following: i) MINAGRI, with support from its SPIUs, and in collaboration with MINALOC, and based on a "representative" sample of Districts, to prepare an operational action plan to strengthen relevant fiduciary aspects, with an emphasis on District-level capacities in the following areas: procurement; internal controls; internal audit; external audit accountability at the District level; more effective and consistent implementation of the procurement law, regulations, and procedures; F&C strengthening at the District level; and ii) implement the agreed fiduciary, environmental, and social systems actions.

132. **Agriculture expenditure and financing framework. There is a need to further strengthen the agriculture planning and budgetary allocation system, coupled with an enhanced MIS to ensure adequate and prioritized levels of funding PSTA 3**. An improved planning and budgetary process has been in place since 2013/14 and TA support (from USAID, EU, and IFAD) to MINAGRI will provide further improvements. MINAGRI and MINECOFIN will work closely to strengthen the planning process. In addition, there

will be intensified government-DP dialogue as part of the annual budgetary cycle in support of the PSTA 3 requirements.

Table 15: Summary of the PAP

Area 1: Enhanced enabling policy environment and expanded private sector role and capacities
- Prepare and implement well-focused and updated policies and strategies of RAB and NAEB, including gender mainstreaming and incorporation of nutrition. TA support from USAID, DFID, IFAD and EU are addressing these issues. - Prepare a position paper on strategic PPPs to pursue in the sector.
Area 2: Evolving public sector institutional roles and enhanced capacities
- Ensure the reforms/strategic plans of RAB and NAEB are completed and implemented, including appropriate integration with the ongoing restructuring. - Complete integration of independent SPIUs into RAB, NAEB structure (and support implementation of action plan for smooth transition, integration, and capacity development). TA is being provided by the EU, USAID, IFAD, FAO and DFID to strengthen the evolving public sector roles and enhanced capacities at central and District levels, as well as an inclusive private sector. - Prepare and implement a capacity development plan for decentralized reforms/restructuring
Area 3: **Operation and maintenance challenges and requirements**
-Implement and strengthen a monitoring scheme to confirm rural infrastructural investments have appropriate O&M arrangements and mechanisms in place and monitor implementation of O&M measures. - Implement O&M monitoring system to monitor O&M of major rural infrastructure (as part of the enhanced MIS for agric. sector). - Conduct well-focused capacity development/training activities of farmer-level organizational structures on O&M mechanisms. The ongoing World Bank-financed projects (LWH and RSSP 3 series) include support for addressing these O&M challenges.
Area 4: Fiduciary, environmental, and social systems
-MINAGRI, in collaboration with key actors, prepare an operational action plan to address and strengthen relevant fiduciary aspects**,** including fraud and corruption, with an emphasis on District-level capacities. - Provide on-the-job training to District accounting staff focusing on the consolidation of nonbudget agencies at the District level. - Provide on-the-job training to OM and NPPA investigators. - Develop and implement a communications strategy to sensitize stakeholders about the Program and complaints mechanism. - Develop and maintain a database of complaints and responses (MINAGRI). - Assess the risk-prone areas of the program at the District level and develop a risk profile to be monitored through the program life ensuring that timely mitigation measures are undertaken. - Reconcile the accounting/financial statements before and after the merger of both RAB and NAEB. - Implement the agreed fiduciary actions, including fraud and corruption systems. - In collaboration with participating ministries and agencies, develop a consolidated Environmental and Social Implementation Manual based on existing government guidelines; and conduct training on the understanding and application of this Manual at the national and District level.
Area 5: Ag. expenditure and financing framework
-MINAGRI will work closely with MINECOFIN to strengthen the agriculture public expenditure planning and budgetary allocation system, coupled with an enhanced MIS, to ensure adequate and prioritized levels of funding to PSTA 3. An improved planning and budgetary process has been in place since 2013/14 and TA support (from USAID, EU, and IFAD) to MINAGRI will provide further improvements. In addition, there will be intensified government-DP dialogue as part of the annual budgetary cycle in support of the PSTA 3 requirements.

Part G. Technical Risk Rating

133. Based on the technical assessment findings, and considering the proposed risk mitigation, improvement, and capacity development measures summarized above (with further details outlined in

Annexes 4 and 9), **the overall risk rating for the technical assessment is "Moderate."** This rating reflects both the cross-cutting risks involving the overall PSTA 3 program and the challenges of efficient and effective implementation of the large number of SPs (24), which involve promoting strategic policy, institutional, and investment reforms/enhancements in the sector; at the same time, these SPs support the achievement of ambitious but attainable strategic objectives and targets for each of the SPs, as well as generate synergies within and between the four programs of PSTA 3, working together to generate higher-level impacts. The detailed PSTA 3 RF provides important details on the nature of the identified constraints and the explicit results chain (from inputs-to-outputs-to-outcomes, all contributing to the higher-level impacts) for achieving the strategic objectives of each SP and the overall PSTA 3. The results chain and design of the RF were intended to address the identified risk factors. Annex 9 provides further details on the nature of the constraints and related risks for each SP, and the basis of the risk rating for each SP. Table 16 summarizes the risk ratings for each of the SPs, which form a core component of the overall risk rating.

Table 16: Summary of Technical Risk Ratings by Subprogram

Program and Subprogram	Risk Rating
1. Agriculture/Animal resource intensification	
1.1. Land conservation	Moderate
1.2. Irrigation	Moderate
1.3. Mechanization	Moderate
1.4. Improve soil fertility	Moderate
1.5. Seed improvement	Moderate
1.6. Livestock development	Moderate
2. Research and technology transfer	
2.1. Research & technology transfer	Low
2.2. Extension services	Low
2.3. Farmers' cooperatives/organizations	Moderate
3. Value chain development/Private sector investment	
3.1. Enabling environment for private sector development	Moderate
3.2. Food crops	Moderate
3.3. Export crops	Moderate to Substantial
3.4. Dairy and meat	Moderate to Substantial
3.5. Fisheries	Substantial
3.6. Apiculture	Substantial
3.7. Agricultural finance	Substantial
3.8. Market infrastructure	Moderate
4. Institutional development and cross-cutting issues	
4.1. Institutional capacity	Moderate
4.2. Decentralization	Moderate
4.3. Legal and regulatory framework	Moderate
4.4. MIS: M&E and Agricultural stats	Moderate
4.5. Gender and Youth	Moderate
4.6. Environmental mainstreaming (including climate change)	Moderate to Substantial (especially ref. climate change challenges)
4.7. Food and Nutrition Security	Low

134. Paragraphs 126-131 highlight the risk mitigation measures that address the four major cross-cutting risk themes. Paragraphs 43-53 summarize the main design features of each of the SPs, including those aspects that address the identified risks. Annex 9 provides further details on the nature and scope of risks.

Part H. Inputs to the Program Implementation Support Plan

135. **The PforR operation in Rwanda will require considerable well-coordinated and sharply focused technical support from the Bank's interdisciplinary team, particularly during the early stages of implementation**. One challenge will be to coordinate and align the actions agreed in the PAP with operational activities on the ground, ensuring that information flows effectively and on a timely basis between policy makers and implementation actors (MINECOFIN, MINAGRI, RAB, NAEB, SPIUs, and Districts). While channels of communication are generally good within Rwanda, there will be a continual flow of information to and between implementing entities and the relevant officials/counterparts during the Program, and linking them to the RF of PSTA 3 and of the Program, and to the DLIs. At the District level, implementation actors will need to confirm with the Bank that their budgetary planning is technically sound and timely to ensure that available funding can be absorbed and expected results delivered on time, and within expected budget envelopes. The team recognizes that the Ag. PforR mode of operation, which transfers performance risk to the implementing actors, provides a challenge, particularly at the local level. The fact that the World Bank Group's Ag. PforR program is highly decentralized, with task team leader and key team members based in the region, will facilitate overall implementation and timely communication with and support to the client (and its various actors), and the diverse stakeholders involved in the implementation phase.

136. **The Bank's implementation support will be focused on making the results-based incentive system work to its full potential.** This will include: i) reviewing implementation progress, including the PAP and any required changes, and solid and timely achievement of Program results and DLIs; ii) providing support on resolving emerging Program implementation issues and bottlenecks and on building institutional capacity of the key actors in line with the PAP (which also addresses the various risks outlined in Annex 4); iii) monitoring the adequacy of systems' performance, especially including the PAP and any required updating, and monitoring compliance with legal agreements; and iv) supporting the GoR in monitoring and managing changes in the various types of risks (as outlined in Annex 4), as well as compliance with the provisions of the legal covenants.

137. **Key to the Bank's effective implementation support will be the coordination and timing with critical points in the planning and verification of results for disbursement requests to the World Bank, based on the agreed DLIs.** The first implementation support mission will take place shortly following effectiveness to provide direct and timely feedback on the quality of implementation plans. It is expected that at that stage, initial progress will have been made towards many of the actions in the PAP and these will also be reviewed during the initial review mission. The first mission is therefore expected to include all team members (i.e., technical, environmental, social, and fiduciary team members). Subsequent implementation support will have a stronger emphasis on verification/M&E skills and technical implementation expertise, varying according to the actual needs as specified in the PAP and priority requests by MINAGRI.

138. Further details on the focus of the Bank's implementation support and the Bank's task team skills mix requirements for implementation support are provided in Annex 10.

Annex 1: Key Accomplishments of PSTA 2 (2008-2012)[52]

1. **During the PSTA 2/Rwanda CAADP 1 five-year implementation period, the agriculture sector was responsible for over 50 percent of the total poverty reduction of 12 percentage points.** This was driven by increased production (productivity gains) and increased sales of production. Interventions that drove productivity gains (yield increases by up to 7 times and an average of 4 times across many crops) included implementation of the Land Use Consolidation policy, protection against soil erosion, increased area under irrigation, greater access to agricultural finance, improved advisory services, expansion of input distribution networks, and increased use of compost, agrochemicals, and improved seeds inputs, increased market accessibility, improved marketing and product quality, and increased post-harvest infrastructure.[53]

2. **Quantitative objectives and accomplishments of PSTA 2/CAADP 1 were measured using 23 specific performance indicators.** Three main groupings of performance indicators**,** comparing established baselines and targets, measured: i) sector macro performance; ii) land intensification, improved inputs and irrigated land; and iii) livestock, food, and export crop performance.

Sector macro performance

3. **The first grouping of performance indicators for PSTA 2/CAADP 1, which measured the sector's macro performance, saw an agriculture sector GDP growth average of 5.6 percent in 2012,** with agricultural investment as a percentage of GDP at 22.5 percent. Off-farm employment as a share of total employment was 26.6 percent, the reduction in the share of the rural population living in poverty was 49 percent, and the share of the population falling below the minimum food requirement was 21 percent. Finally, the share of female-headed households members living in poverty declined to 47 percent, and the annual rate of agriculture exports averaged 22 percent (see Table A1.1).

Table A1.1: Agriculture Sector Macro Performance Indicators for PSTA 2/CAADP 1

Objective	Target	Actual
Increase annual growth of real GDP for all crops and livestock products	6.50%	5.6% avg
Increase in investment as a percentage of GDP	23%	22.5%
Increase in off-farm employment as a share of total employment	30%	26.6%
Reduction of the share of the rural population living in poverty	52%	49.0%
Reduction share of the population falling below minimum food requirement	18%	21%
Share of female-headed household members living in poverty declines	48%	47%
Increase annual rate of growth of agricultural exports	8%	22% avg , 44% in 2012

Source: As given in accompanying text.

4. **Agriculture GDP**. The real GDP for the agriculture sector grew at an average annual rate of 5.6 percent during 2008-2012, contributing to 32.7 percent of GDP and 28 percent of total growth. This relatively high average rate of growth, just below the target 6.5 percent, was the result of expansion of food production due to scaled-up public investments in the Crop Intensification Program (CIP), Land Use Consolidation Program, input subsidies on fertilizers and seeds, and other public activities to promote production of priority crops. Although expansion of the traditional export crops such as coffee and tea

[52] This Annex is taken in its entirety from the World Bank, *Rwanda Promoting Agricultural Growth in Rwanda: Recent Performance, Challenges and Opportunities*, Report No. 86399-RW, June 7, 2014, Agriculture, Rural Development and Irrigation (AFTA2), Sustainable Development Department, Africa Region.

[53] This led to a reduction in post-harvest losses to less than 15 percent of production.

was less than planned, the growth of milk production was strong, in large part because of the One-Cow (Girinka) Program.

5. **Gross capital formation** for the economy as a whole stood at 22.5 percent of GDP in 2012, while the target was set at 23 percent. This was after a steady rise in this ratio from the year 2000, and reflected the government's policy to invest heavily in the economy to induce an increase in private investment. Public investment scaled up to 12.8 percent of GDP, inducing an expansion of private investment to 9.7 percent of GDP. However, this did not leverage an increase in foreign direct investment (FDI).

6. **Off-farm employment**. The actual share of off-farm employment both for wages and self-employment was 26.6 percent in 2011.[54] Although off-farm employment as a share of total employment fell short of the target of 30 percent, this employment increased at a rate of about 100,000 jobs a year over the past five years. Demographic trends, however, necessitate the creation of 200,000 jobs each year to accommodate all new entrants into the workforce. This compares to a total of 396,000 wage jobs in the formal economy in 2012.

7. **Rural poverty**. The reduction of the share of the rural population living in poverty exceeded the target of 52 percent, falling to 49 percent. This was primarily due to three factors: i) increased agricultural production; ii) increased commercialization of agriculture as a response to the policy of promoting maize, wheat, and rice as cash crops; and iii) income-generating activities in the nonfarm sector, a response to declining opportunities in agriculture for those with limited land holdings and low wages available to the poor in the nonfarm sector.[55]

8. **Minimum food requirement**. The share of the population falling below the minimum food requirement was reduced to 21 percent, slightly above the target of 18 percent. This statistic comes from the 2012 Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey that is sensitive to seasonal timing, so it is probable that a year-long survey might have shown a higher percentage of households with acceptable food consumption.[56] The survey is also influenced by year-to-year variations in food production and income, with 2012 being a particularly low year in production due to weather extremes. The policy of promoting maize, wheat, and rice did not encourage production of food crops such as bananas, beans, and cassava for the food insecure.

9. **Share of female-headed household members living in poverty**. According to *Enquête Intégralesur les Conditions de Vie des Ménages* (Integrated Household Living Conditions Survey/EICV 3), the share of female-headed household members living in poverty declined to 47 percent, below the target of 48 percent. This was due to the fact that the consumption standard of the poorest households, in which women-headed households are disproportionately represented, gained more in percentage terms than that of any other group.[57]

10. **Growth rate of agriculture exports**. The annual rate of growth from 2007 to 2012 of the value of agricultural and livestock exports was 22 percent. The most important increases occurred for live bovine animals, wheat flour, and beverages. Although the share of processed products in total agricultural and livestock exports was only 26 percent in 2012, processed exports grew at an annual rate of 53 percent

[54] NISR, EICV 3, Thematic Report: Agriculture, August 2012.
[55] World Bank, *Rwanda Economic Update: Maintaining Momentum, with a special focus on Rwanda's Pathway out of poverty*, May 2013, Edition No. 4.
[56] MINAGRI, NISR, and World Food Program (WFP), "Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey 2012," December 2012, pp. 31-35.
[57] World Bank, *Rwanda Economic Update: Maintaining Momentum, with a special focus on Rwanda's Pathway out of poverty*, May 2013, Edition No. 4.

from 2007 to 2012, contributing to overall export growth. The annual growth of the value of primary product exports was 17 percent, still a very respectable rate.

Land intensification, inputs and irrigated land performance

11. **In the second grouping of performance indicators, between 2008-2012, the area protected against soil erosion rose to 73 percent;** land protected by trenching and terraces increased by 46,246 ha of newly constructed terraces; 23,000 ha of marshlands were developed; hillside irrigated land increased by 2,490 ha; and land area under consolidated use increased from 28,788 to 502,916 ha. Use of inorganic fertilizer increased from 12 percent to 29 percent and fertilizer imports increased from 29,900 MT to 44,000 MT (see Table A1.2).

Table A1.2: Land Intensification, Inputs and Irrigated Land Achievements for PSTA 2/CAADP 1

Objective	Baseline	Target	Actual
Agriculture area protected against soil erosion increased	40%	100%	73%
Land protected by trenches and progressive terraces increases	504,000	860,000 ha	802,292 ha
Hectares of newly constructed terraces	0	32,000 ha	46,246 ha
Area of developed marshland increased	0	20,000 ha	23,000 ha
Irrigated area on hillsides increased	0	13,000 ha	2,490 ha
Land area under consolidated use	28,788	-	502,916 ha
Application of inorganic mineral fertilizer increased	12%	25%	30%
Increase in tonnage of fertilizer imported (MT)	22,900	56,000	44,000

Source: As given in accompanying text.

12. **Area protected against soil erosion**. The percentage of coverage and effectiveness of soil conservation infrastructure increased from 600,000 ha to 1,095,914 ha out of total cultivable area of 1.5 million ha, for a total of 73 percent coverage. While the target was 100 percent, the achievement of almost doubling the coverage of area protected against soil erosion is impressive. This was driven by the CIP and externally financed projects that included a soil conservation focus.

13. **Land protected by trenches and progressive terraces**. Land management, including progressive terracing where this could be applied and was needed, was improved on approximately 300,000 ha. This increased from 504,000 ha to 802,292 ha. Much of this land had already been terraced prior to PSTA 2, but these terraces and trenches were in need of maintenance and some improvement. The government at both the federal and local levels spearheaded this effort.

14. **Hectares of newly constructed terraces.** As a major component of the CIP and Land Use Consolidation Program, the area of land developed with bench/radical terraces attained 46,246 ha in 2012, substantially exceeding the target of 32,000 ha. This form of land protection is more costly than progressive terracing since it involves removing the topsoil, cutting into the hillside, and returning the topsoil and other interventions to restore and improve soil fertility. Since this type of work is done manually, it has the advantage of employing a significant amount of labor. Even though the employment is temporary, it injects substantial cash resources into the rural economy, which was shown to be used to purchase livestock or equipment and to invest in nonagricultural activities. Furthermore, the economic cost of this labor is less than the wages actually paid since the workers hired had few alternative opportunities.

15. **Area of developed marshland increased.** Development of marshlands was a major element in the government's effort to expand rice production and increase food security. The area under irrigation in the marshlands increased to 23,000 ha, well above the target of 20,000 ha. Although the cost of

marshland development for irrigation (US$6,000-$8,000 per/ha) is much lower than the cost of developing irrigation on many of the hillsides (up to US$23,000 per/ha), marshland development costs are rising as the easiest, lowest-cost locations are being developed. However, these costs are to a large extent borne by the government in cooperation with DPs. The marshland rice development program is very popular with farmers, having provided cash income to about 150,000 farm households.

16. **Hillside irrigation** was developed during PSTA 2 on 2,490 ha compared with the target of 13,000 ha. A major reason for this gap was its high cost of up to US$23,000 per ha. This compares with the cost of small-scale irrigation schemes of about US$1,500. Cost recovery requires high-value horticultural or other high-income crops.

17. **Land area under consolidated use.** Although no explicit target was established for increased land area put under consolidated use, it was an important focus of the CIP by improving the efficiency of land use and facilitating extension. Actual results were significant. From 28,788 ha of total area under consolidated use in 2007, it rose to 502,916 ha in 2012. Although farmers had some reservations in the beginning, most became willing converts once the benefits were established of achieving economies of scale in securing inputs and marketing production.

18. **Application of fertilizer**. The percentage of farmers who reported having purchased fertilizers increased from 7 percent in 2001 (12 percent in 2008) to 30 percent in 2011 compared with the target rate of 25 percent. More specifically, the fertilizer application rate in CIP areas reached an annual average of 29 kg/ha in 2012 compared to a national average of 4.2 kg/ha during 1998-2005. Such increases were due partly to the 50 percent subsidy policy on fertilizer applied to maize and wheat, as well as the transport subsidy on fertilizer for rice and potatoes. As a result, average maize yields increased from 0.73 MT/ha in 2007 to 2.76 MT/ha in 2012, while wheat yields increased from 1.30 MT/ha to 2.17 MT/ha during the same period.

19. **Fertilizer imports**. Use of imported mineral fertilizers rose to 44,000 MT in 2012, compared with the national target of 56,000 MT. The shortfall was principally due to challenges of cost and credit recovery along the whole supply chain from distributor to farmer. Providing direct subsidies for fertilizer used in the production of maize and wheat and subsidizing the international transport of fertilizer from Mombasa or Dar es Salaam for rice and Irish potatoes proved to be expensive and there were difficulties in the printing and distributing of subsidy vouchers and monitoring their use. There was also a lack of profitability in the distribution chain, which resulted in high default rates on fertilizer loans among farmers and agro-dealers.

Livestock, food and export crop performance

20. **The third grouping of performance indicators for PSTA 2/CAADP 1 included: a food crop production increase to 24 percent**; households with livestock decrease by 3 percent; increase in number of households participating in the One-Cow Program to 174,900; fully-washed coffee production increase to 29 percent from 10 percent; increase in coffee exports from 18,200 MT to 19,907 MT; green leaf tea exports increase to 19,000 MT from 23,011 MT; pyrethrum exports increase from 2.2 MT to 28.1 MT; horticulture exports increase from 13,700 MT to 27,822 MT; and continued limited capacity to collect and disseminate accurate agriculture statistics (see Table A1.3).

Table A1.3: Accomplishments of Livestock, Food and Export Crops for PSTA 2/CAADP 1

Objective	Baseline	Target	Actual
Basic food crop production rise over the EDPRS period	0	15%	24%
Proportion of rural households with livestock increases	71%	85%	68%
Increase in # of households reached under the one cow programme	0	270,000	174,900 hhlds
Proportion of fully-washed coffee production increase	10%	37%	29%
Increase coffee exported annually (MT)	18,200	40,000	19,907
Green leaf tea exports increased (MT)	19,000	123,000	23,011
Pyrethrum exports increased (MT)	2.2	20.8	28.1
Horticultural exports increased (MT)	13,700	25,600	27,822

Source: As given in accompanying text.

21. **Value of food crop production**. According to the national accounts, the value of food crop production in constant prices rose by 24 percent from 2008 to 2012.[58] This substantially exceeded the target and was due principally to the success of the CIP and Land Use Consolidation policies.

22. **Rural households' livestock increases**. Based on EICV 3 data, the percentage of rural households raising livestock actually declined to 68 percent, substantially below the target of 85 percent and even lower than the percentage in 2005/2006 of 71 percent.[59] This was because of growing population pressure and lack of pasture, forage, and feed in competition with food crops. However, even though the percentage of households holding livestock was lower, more of these animals were marketed, and more inputs were purchased for them than before, marking a shift towards greater intensity of care and livestock productivity. With rising incomes, there has been considerable scope on the demand side for expanding production of small ruminants, swine, and poultry, and their related processing industries.

23. **The One-Cow (Girinka) Program** was highly successful in raising rural household incomes and in increasing milk production and consumption. Since the beginning of the program in 2006, a total of 134,548 cows had been distributed to poor families and 40,352 heifers (for a total of 174,900) had been "passed on to other families by mid-2012." Although this was below the target set of 270,000, it was nonetheless a significant accomplishment. The principal reason for not meeting the target was that the budget needed to distribute an additional 95,000 cows was not available and had been overtaken by other budget priorities such as the CIP. Despite this fact, milk production increased from 50,000 MT in 2000 to 450,000 MT in 2012 and the corresponding "One Cup of Milk per Child" school feeding program contributed to improved nutrition. The success of these programs was due to widespread support from the government, DPs, NGOs, local government, and private citizens.

24. **Fully-washed coffee**. Fully-washed coffee increased from 10 percent to 29 percent. While a positive increase, the target of 37 percent was not achieved. Increasing fully-washed coffee is important because fully-washed Arabica coffee commands a premium on the world market. The major reason for not achieving the 37 percent target was that many existing washing stations have too much capacity to be profitable given the dispersion of coffee production and high transport costs along Rwanda's feeder roads. However, positive steps are being taken to resolve this issue as the coffee-washing sector is being reshaped by the introduction of smaller, more profitable washing stations.

25. **Coffee exports**. Another challenge in the coffee subsector was the low level of production and exports – 19,907 MT in 2012 compared with the target of 40,000 MT. This was primarily because of low prices on the world market, which is subject to substantial fluctuation in price. When prices are low,

[58] NISR, 2012 GDP Annual Estimates, March 2013.
[59] NISR, EICV 3, Thematic Report: Agriculture, August 2012.

coffee farmers do not maintain their trees and are less careful in harvesting. When prices rebound, coffee collection increases. There are also problems with the aging of coffee trees, failure to replant, and poor management.

26. **Green leaf tea exports**. Tea exports of 23,011 MT in 2012 were far below the target of 123,000 MT. The Rwandan tea industry until recently was characterized by poor management. However, that situation is changing as the industry is being reorganized, with tea exports expected to grow more rapidly in the future. Tea factory owners are also aware of the need to have good relationships with the outgrowers, especially regarding the setting of prices. Increasing tea sales and income depend upon improving quality and marketing to move up the value scale. Bulk black tea prices are projected to decline, but the opposite trend is expected for quality teas, for which Rwanda has significant potential. Other favorable factors for the domestic tea industry include the fact that while major world producers are constrained by land and labor shortages, tea consumption in Africa is growing, and Rwanda is well placed to access key markets under European Partnership Agreements (EPAs), the African Growth and Opportunity Act (AGOA), EAC, and other agreements.

27. **Pyrethrum exports**. Pyrethrum exports reached 28.1 MT annually in 2012. Few data are available publicly on the pyrethrum industry. NISR has no information from Customs on exports over the past five years. The industry appears promising, especially if it can be integrated in rotation with production of Irish potatoes, but further analysis is needed once basic data can be secured. The capacity of the extraction plant is 3,000 MT of dried flowers annually, of which only about one-half was used during the last five years. Pyrethrum appears to be a profitable export industry and the public sector has a role to play in helping to persuade farmers and cooperatives to work with the factory in the cultivation of pyrethrum and rotating it with Irish potatoes.

28. **Horticultural exports**. Actual exports of horticultural products in 2012 were 27,822 MT, exceeding the target of 25,600 MT. There is a great deal of interest in horticulture in Rwanda because the climate and soils are ideal and minimal land is needed for production. The government has placed a high priority on promoting horticultural investments and production through the Grow Africa initiative and through three flagship programs co-financed by DPs. Success in horticultural exports was driven by market expansion based on niche appeal and demand for high value added products and the promotion of an integrated supply chain approach which focused on production and processing, transportation, and direct marketing through dedicated contracting arrangements with external buyers, both within the region and internationally.

Other key accomplishments of PSTA 2/ CAADP 1

29. **In addition to the achievements made against the 23 specific targets discussed above, there were other key accomplishments which, for various reasons, were not reported on because they were not easily linked to a specific target(s) or there were no data available to measure actual accomplishments.** For example, under PSTA 2, there were significant achievements related to improved seeds and plant material, milk production, increased fish production and beekeeping, decentralization of sector functions, and an increased "business-friendly environment" as discussed below.

30. **Improved seeds**. The legal framework upon which the basic infrastructure for reinforcing production and quality control and production of plant material and seeds is built significantly increased during PSTA 2 implementation. However, there were insufficient quantities of improved seeds produced nationally for some crops, which forced the government to import seeds, particularly for maize, wheat, and Irish potatoes. The quality of internally produced seed was poor, and there was quality deterioration during seed production and storage, with a prevalence of crop pests and diseases; germination of seeds distributed under the CIP was inadequate, and effective distribution of improved seed was limited.

31. **Milk production**. Although milk production expanded rapidly under PSTA 2, most of this was raw, unpasteurized milk due, in part, to competition in the processed milk market from regional neighbors with lower costs. The approach to milk collection supported by the GoR is sound, with milk collection centers (MCC) managed by producers' cooperatives and providing other livestock services, such as advisory services, artificial insemination, veterinary medicinal products, and animal feeding. However, it is estimated that only 10 percent of the milk is processed, and the country's milk processing plants were operating at only 15-20 percent of their capacity, and some MCC in the East have closed. Although consumption of raw fresh milk by poor households is a good way to improve their nutritional status, it is also posing some sanitary risks (brucellosis, tuberculosis) and the growing market for dairy products in urban areas is putting pressure on the development of the processing industry.

32. **Fisheries sector**. In the fisheries sector, demand outpaced production, with consequent depletion of resources. It is estimated that about 27,000 MT were produced in 2013 (with 80 percent capture fish and only 20 percent aquaculture), but that 70 percent of this production is informally exported to neighboring countries, including DRC. At the same time, 15,000 MT were imported for national consumption. Nevertheless, the sector has great potential and with improved management is capable of growing sustainably and of producing regional exports. Fish are also a nutritious addition to daily diets and the per capita consumption has an important growth potential, with only 2 kg/person/year consumed.

33. **Beekeeping,** while a small activity on the national scale, has been important for the communities involved, representing a significant source of additional income for poor families with marginal land for agriculture. It is estimated that about 70,000 households are engaged in beekeeping, 90 percent in a traditional manner. This was particularly true in forested areas in the Southwest. Processed products (high quality honey, royal jelly, beeswax) have high value addition and demand is growing from urban areas. The GoR is currently finalizing a new National Strategic Plan for this sector.

34. **The implementation of decentralization of functions greatly enhanced the capacity of local governments** to implement PSTA 2 despite varying staffing levels in Districts and financial capabilities. District administrations are in close contact with cooperatives and farmers and have built up knowledge of the Districts' needs and opportunities for agricultural development. District staff also facilitated the implementation of national projects and programs, acted as an interface, and promoted farmer-oriented extension approaches.

35. **Business-friendly environment**. Rwanda's focus on creating an enabling business environment for agribusiness investments during PSTA 2 is starting to pay off. Rwanda has the second most business-friendly environment compared to its Africa competitors (Mauritius is first).[60] It was recently ranked 32nd in the world. It offers less bureaucratic red-tape, easier access to credit, and lower tax rates compared to its neighbors. The government is actively seeking private sector investment in the country, particularly in the agriculture sector. The country's political and macroeconomic stability, compared to other countries in Africa, provides investors with confidence regarding country risk. Furthermore, the government is committed to investment in infrastructure that will facilitate trade originating from Rwanda, including increased air connectivity, improved road networks, a rail link with coastal ports, and expansion of the electricity supply.

[60] *Doing Business 2014, Economy Profile: Rwanda*, 2013, World Bank and IFC.

Lessons Learned from PSTA 2/CAADP 1 and Recommendations for PSTA 3/CAADP 2

36. **In addition to understanding how and what was achieved in PSTA 2/CAADP 1, it is important to identify lessons learned and implications for PSTA 3**. Many factors were responsible for Rwanda's rapid rate of economic growth, including the establishment of a good business-enabling environment and well-directed public investments. It is vitally important that public investment be sustained under PSTA 3 and that it be directed in ways that are most cost-effective in achieving the goals of EDPRS 2 and *Vision 2020*. Moreover, efficiently directed public investment is critical to inducing private investment along with a more focused approach to increase FDI. Key recommendations for PSTA 3 are to: develop a strategy for extreme poor rural farmers; expand the CIP and LUC Program; increase nonfarm employment; enhance value addition of key commodities; increase soil conservation coverage and selectivity in hillside irrigation schemes; expand livestock intensification; increase awareness of horticulture opportunities; establish feeding limits for the One-Cow (Girinka) Program; expand coffee and tea production; and increase the reliability of agricultural statistics.

37. **Develop a strategy for extreme poor**. Under PSTA 2, both food production and food marketing were substantially increased, thereby helping to drive poverty rates down. However, there are still a large number of people in rural areas who continue to live in poverty and there is a need to develop a strategy of crop and livestock intensification and diversification focused on the extreme poor. Relying on secondary benefits in the form of increased demand for the goods and services supplied by small, informal household businesses would be important. At the same time, Rwanda is making good progress in reducing the number of malnourished, but further progress depends on targeting this group more carefully with the food crops they consume.

38. **Expand the CIP and the LUC Program**. The CIP and the LUC Program, along with fertilizer and improved seeds subsidy programs and land development costs, were important in contributing to the expansion of food crop production. The CIP and LUC Program need to be further expanded to geographic areas not currently covered to induce greater participation by extremely poor smallholder farmers and need to include a greater focus on food crops consumed particularly by poor households. The current exit strategy for disengaging from the subsidy scheme for fertilizer and improved seeds should be completed, as farmers have learned about and experienced the benefits of fertilizer and improved seeds over the last five years. Moreover, completing the privatization of import and distribution of fertilizer should be actively pursued by the government and carefully monitored to ensure that the change in policy does not endanger the uptake rates of fertilizer and improved seeds. It is also important to recognize that the reduction in poverty that occurred was not because the extreme poor participated fully in both the CIP and the LUC Program. In fact, they participated less than others in proportion to their numbers. Yet their participation may have helped them become more market oriented. Equally important was their income from the sales of nonfarm goods and services. There were increased risks, in fact, associated with dramatic changes in cropping patterns towards less familiar cash crops that were exchanged for food in uncertain markets and for which there were significant transactions costs.

39. **Grow nonfarm employment**. Although progress has been made in increasing the number of off-farm jobs over the last five years, the rate of increase is not keeping up with the growth of the labor force. Keeping the growing work force fully employed is going to require additional analysis of how these jobs are created via value chain linkages and growth in overall income and demand. Specific attention must be paid to the policies that can be adopted to encourage the most cost-effective expansion of nonfarm employment.

40. **Expand market opportunities in key value chains**. Rwanda has a dynamic and growing export sector, but the share of processed products in total agricultural and livestock exports is relatively small. The government should identify opportunities and promote actions that need to be taken by both

the public and private sectors in key value chains such as coffee, tea, and horticulture to expand market-oriented growth. A joint public-private strategy should be developed and implemented under PSTA 3, in cooperation with Rwanda's neighboring countries, to formalize and expand cross-border trade without introducing unnecessary barriers to trade. This strategy should involve improved transportation and storage infrastructure, maintaining grades and standards for the most important products, and facilitating customs and other clearances.

41. **Improve soil conservation coverage**. During PSTA 2, the large increase in the area of land protected against soil erosion was accomplished at relatively low cost. Protecting farm land with trenches and progressive terraces (slopes of 40-60 percent) is a traditional practice that can be made more effective with a modest amount of organization and technical assistance. Bench/radical terraces are more costly but necessary where slopes are between 16-40 percent slope. The intensive labor necessary to construct radical terraces becomes an important means of injecting cash into the local economy. However, development of marshlands for rice and high value crops is increasing in cost as the low-cost marshlands have either been developed or redeveloped. At some point in the near to medium term, the cost of the expansion of these systems will exceed the benefits.

42. **Selective hillside irrigation schemes**. Hillside irrigation can be an expensive form of infrastructure. Economic and financial analysis for each scheme should justify the investment and cost per beneficiary as compared to other sectoral investments. It is most likely that only high-value crops will justify the high level of investment.

43. **Increase livestock intensification**. Higher levels of use of crop residues, agricultural byproducts, and feed mixes are vital to intensification and expansion of the livestock sector, given the shortage of land available for pasture or forage.

44. **Raise awareness of horticulture subsector opportunities**. Horticulture has the potential to significantly expand as an export industry. Markets and production potential for specific crops need to be identified, their economics studied, and the results made available to potential private investors.

45. **Establish feeding limits for the Girinka Program**. The One-Cow (Girinka) Program has been a success in terms of the number of dairy cows distributed, but it has not benefitted the poor as much as expected because of their lack of access to pasture and feed. An estimate should be made on the total number of cows that can be supported with available crop residues, byproducts, forage, and pasture and a limit of additional heifers to be distributed set accordingly. It will also be important that PSTA 3 contains measures to establish local redistribution systems that ensure that the majority of Girinka milk is consumed by nearby households and in local schools rather than distributed through a high-cost centralized school milk program.

46. **Address nutrition and household vulnerability**. A multisectoral framework of integrated interventions is required to tackle problems of malnutrition and household vulnerability, including supporting households in nutritious garden practices and diversifying food production, improving nutrition-related knowledge and practices, developing a program of biofortified food, expanding the "One Cup of Milk per Child" program, maintaining the National Strategic Food Reserve, and strengthening Rwanda's Food Security Information System.

47. **Expand coffee and tea production**. Coffee and tea are valuable export crops. More investment is needed to increase the number of smaller washing stations, take greater care of plants in the field, and implement other measures to improve coffee quality. Surveys need to be conducted of coffee farmers to establish their cost of production and to devise a cost-effective strategy for increasing production. Participation in the coffee futures market to reduce uncertainty of pricing should be explored.

For tea, the transition to private sector ownership and management should be carefully facilitated with policies and models that provide sufficient incentives to farmers to increase yields and expand production and that are monitored to identify and deal with challenges as they arise**.**

48. **Increase reliability of agricultural statistics**. An important goal of PSTA 3 is to improve the reliability of agricultural statistics in close coordination with NISR. Capacity building is required to collect and disseminate accurate agricultural statistics, which are needed for making effective policy decisions.

Annex 2: Results Framework and M&E

(Targets are for each year/period and are cumulative)

Results Indicators	Core	DLI	Unit	Baseline 2012/13	Targets			Period	Data source	Data collection
					Yr 1 2013/14	Yr 2 2014/15	Yr 3 2015/16			
Program Development Objective: *The PDO is to increase and intensify the productivity of the Rwandan agricultural and livestock sectors and expand the development of value chains.* The proposed operation supports the Government of Rwanda's strategic objectives of the Transformation of Agriculture Sector Program Phase 3 with aims to enhance food security and nutrition contributing to a reduction in poverty and inclusive economic growth. The operation supports four broad program areas: i) agriculture and animal resource intensification; ii) research, technology transfer and professionalization of farmers; iii) value chain development and private sector investment; and iv) institutional development and agricultural cross-cutting issues.										
PDO Indicator 1: Increased agr. land under modernized agricultural technologies[61]	X		%	24	27	31	34	Annual	Seasonal surveys, reports by Districts	MINAGRI
PDO Indicator 2: Increased agriculture exports	X		%	22	23	24	25	Annual	Annual reports	MINAGRI MINICOM
Intermediate Results Area 1: Agriculture and animal resource intensification*: i) Soil erosion reduced and land sustainably managed; ii) Land productivity for priority crops increased; iii) Animal productivity increased and animal products diversified.*										
Indicator 1: Increased soil erosion control, based on agreed technical standards, & sustainably maintained (P: Progressive; R: Radical)	X	X	ha	P: 802,292 R: 46,246 T: 848,538	835,941 54,044 839,985	869,590 61,842 931,432	903,240 69,640 972,880	Annual	Reports by Districts, aggregated by RAB	MINAGRI RAB
Indicator 2: Increased land (hillsides/H &marshlands/M) developed with: (a) irrigation infrastructure, based on MINAGRI technical standards; and (b) with enhanced O&M	X	X	ha	H: 3,075 M: 24,721 T: 27,796 Annual Increases: H: 1,000 M: 1,800	4,075 26,521 30,596	5,075 28,321 33,396	6,075 30,121 36,196	Annual	Reports by Districts, aggregated by RAB	MINAGRI RAB
Indicator 3: Increased average productivity levels of major food and export crops, and livestock commodity	X	X	t/ha kgs ltrs	Cassava 15 t/ha Coffee 2.2 kgs[62] Milk: 4 ltrs /cow/day[63]	16 2.3 4.5	17 2.5 5.0	18 2.7 5.5	Annual (calendar year)	Reports by Districts, aggregated by RAB, and NAEB	MINAGRI RAB, NAEB
Indicator 4: Increased total milk production	X		mt	503,000	532,467	561,934	591,401	Annual	Reports by Districts and RAB	MINAGRI RAB
Intermediate Results Area 2: Research, technology transfer and organization of farmers: *i) Improved technologies which are responsive to Rwanda's agro-ecological potential, men and women farmer needs and resources, and market prospects; ii) Enhanced integrated and market-oriented extension and advisory services which result in higher proportion of farmer adoption of improved technologies, for both men and women; and iii) Strengthened inclusive and business-oriented farmers' cooperatives/organizations with enhanced entrepreneurial skills for effective engagement in input and output markets.*										
Indicator 5: No. of enhanced technology innovations (TI) introduced by public and/or	X	X	TI # A %	5[65] (25%)	3 (25%)	3 (40%)	4 (50%)	Annual	Reports by RAB	RAB

[61] Refers to % of farm families who use: improved seeds, fertilizer, and mechanization.
[62] kgs of cherry per tree/year.
[63] Milk production per cow.
[65] Maize, beans, cassava, rice, wheat, and soybean.

private sectors, and adopted (A) by farmers (adoption rates to be shown by gender).[64]										
Indicator 6: Increased % of cooperatives/farmers' organizations which are graded A and B[66] (includes gender dimension)	X		%	5	15	25	35	Annual	Reports by RCA and Grading reports by MINAGRI	RCA MINAGRI
Intermediate Results Area 3: Private sector-driven Value Chain Development and Expanded Investments*: i) Enhanced business environment for expanded agricultural investments and value addition; and ii) Competitive and private sector driven value chain development and expanded commercialization of production for domestic and export market, enabled by expanded access to finance, efficient and effective agricultural marketing system and improved rural infrastructure, and expanded successful public-private partnerships (PPPs).*										
Indicator 7: Increased value (total production and of exports) of major competitive value chains[67]	X		US$	2.3 b 132m	2.6 b 154 m	2.9 b 176 m	3.2 b 198 m	Annual	Reports by NISR, RDB and NAEB	RDB NAEB
Indicator 8: Increased agri-finance lending for: (a) farmers (F) (including gender targets); & (b) Ag. Enterprise (A) investments (value chain activities)	X	X	Amount (US$m) & % of total lending	F 3.6 A 65	F 4.8 A 68	F 5.9 A 71	F 7 A 75	Annual	Reports by IPAR, AFR, MINECOFIN and MINAGRI	Central Bank AFR MINAGRI
Indicator 9: Increased private sector investments in ag. sector (domestic and foreign)	X		US$	513	613	713	813	Annual	Reports by relevant export agencies & RDB	MINAGRI RDB
Indicator 10: Increased % of agric. production marketed	X		%	28	29	30	31	Annual	Seasonal surveys, reports by Districts,	MINAGRI RAB
Intermediate Results Area 4: Institutional results-focused development and strategic cross-cutting issues*: i) Enhanced capacity of sector and its institutions to deliver efficient and effective agricultural services; ii) strengthened MIS to support more efficient and effective management of the agricultural sector; iii) Improved policy environment for enabling rapid, private-sector driven and sustainable agricultural growth; iv) Increased public ag. expenditures and enhanced expenditure composition and effective management; v) Improved food security and nutrition; vi) Enhanced inclusion of women in agricultural activities and expanded access to agr. services*										
Indicator 11: Enhanced Results-Focused Institutional Capacity Development/CD of MINAGRI (M) &Districts (D): Action Plan (AP) updated/ prepared (UP); AP implementation initiated (II) & AP fully operational (FO)			AP	M NA D NA	M draft AP D AP UP	M AP UP & II D AP UP & II	M AP FO D AP FO	Annual	Reports by MINAGRI and Districts (coordinated via LODA)	MINAGRI (in collaboration with each agency and with MINALOC/ LODA)
Indicator 12: Updated MIS Framework (FR) & Action Plan (AP) for agric. sector: completed (C), approved (A), initiated (I) & fully operational (FO, with key reports, on "core" indicators)		X	FR AP I FO	Initial Draft M&E FR	Draft M&E FR	FR/AP C, A, I	FR/AP FO	Annual	Quarterly & Annual M&E report for sector/key entities[68]	Planning Depts. MINAGRI, RAB, NAEB & SPIUs)
Indicator 13: Approval (A)		X	Policy	S	S A, AP,	F A, AP,	AF A,	Annual	MINAGRI	MINAGRI

[64] Which are consistent with Rwanda's comparative advantage. Also, includes specific innovations to be indicated by RAB, in line with its ag. research priorities.

[66] Grading will include a number of parameters such as inclusion of small and marginal landholders, number of total households benefiting from input and output markets and services, participation and leadership of farmers/gender in managing cooperatives, and revenue generation.

[67] Food crops, export commodities, livestock products, agroprocessed.

[68] Reporting on key indicators from RF, key thematic studies completed.

of Seeds (S), Fertilizer (F) & Ag. Finance (AF) Policy, action plan (AP) prepared & implemented (I)				None F Draft AP AF None	I	I	AP, I			(Planning) RAB, NAEB
Indicator 14: Increase in Women's Empowerment in Agric. Index for Rwanda[69]			Index (%)	91	91.5	92	92.5	Annual	IFPRI	MINAGRI RAB,NAEB & SPIUs)
Indicator 15: Increased % of households with acceptable levels of food consumption			Food Cons. Score (%)	79	80	81	82		MINAGRI (in collaboration with WFP and Districts)	MINAGRI Districts & NISR

[69] Women's Empowerment in Agriculture Index was developed and is currently being compiled by IFPRI, with a focus on the countries supported by Feed the Future Programme (supported by USAID). Rwanda is included in the coverage and tracking of this index. The index includes the increased percentage of women in the total membership and leadership positions of agricultural farmer organizations and cooperatives.

Description and Assessment of Program Results Framework and M&E

1. **During the initial identification mission of the Ag. PforR operation, the Bank team worked closely with and supported MINAGRI's PSTA 3 team to prepare a comprehensive and summary results framework (RF)**, underpinned by an explicit results chain specified at three levels, measured by "SMART" indicators, and their corresponding baselines and targets: impact level for the overall PSTA 3; outcome level for each of the four programs; and outcome and output level for each of the 24 subprograms (SPs) (see PforR file for the copy of the comprehensive PSTA 3 RF). Once the targets for all outputs were costed, there was an excessive financing gap for the "high-cost scenario"; this led to a reduction in the targets for various outputs based on the consistent application of five prioritization criteria to develop a "medium-cost scenario." There were several iterations of PSTA 3's RF, resulting in enhanced capacity and strong ownership by key MINAGRI counterparts. Based on this PSTA 3 RF, the Bank team derived a modified version of the RF for the purposes of the PforR support operation.

2. **The team also supported the formulation of the strategic objective (SO) as outlined in the RF for SP 4.4 (MIS: Agriculture M&E, Statistics and Communication)** to strengthen the efficiency, effectiveness, access to, and utilization of an enhanced management information system (MIS) for the agriculture sector that would contribute to enhanced evidenced-based decision making. This would involve the following component systems (with the RF outlining relevant outcomes and outputs): i) Monitoring and Evaluation system; ii) Agricultural Statistical System, including enhanced national food security and nutrition information system; and iii) Agricultural Communication System. This SO is highly relevant for supporting the effective implementation of PSTA 3, with support from the PforR operation.

3. **Agricultural MIS: M&E, Statistics and Communications. MINAGRI's current MIS plays an important role in endeavoring to provide a sectoral perspective to the implementation of PSTA 3**. However, the MIS is somewhat fragmented, whereby each entity of MINAGRI (Planning Department, RAB, NAEB, and the three SPIUs) have their own M&E, statistical and knowledge management system, and data generation, which is then compiled by the central system. The Bank team reviewed MINAGRI's current M&E system, [70] and identified and consolidated the main constraints, which were: i) there is no unified system in place to link the various institutions/organizations performing M&E in the agriculture sector (MINAGRI -coordinated by the Planning Department, and its main implementation agencies RAB, NAEB, and three SPIUs). Each of the institutions/organizations focuses on input/output indicators as specified in their performance contracts and not relating to PSTA 3; ii) MINAGRI functions to a certain extent as lead agency for M&E operations but does not link them to PSTA 3 as of yet. Neither does it cover the level of strategic objectives, but instead remains at an operational level; iii) the formats used are not harmonized and are oversimplified, so questions arise as to the validity and reliability of the collected data; and iv) M&E at all agricultural institutions suffers from shortages of adequately trained personnel as well as of budgetary means.

4. **At the subnational level, the M&E assessment highlighted an additional set of constraints at District and sectoral levels, which included**: i) a focus on the priorities being determined at a higher level (national and District); ii) some reliability issues in the way that crop production/productivity harvest data are generated and reported; and iii) the diverse reporting formats used at various levels, which pose additional challenges to the reliable aggregation of production data.

[70] Also, a recent assessment of the M&E system in support of preparing the evaluation framework of PSTA 3 identified system-related constraints which are included in the World Bank's assessment (see M&E Framework and ASIP for PSTA 3: Intermediate Final Report (May, 2014), prepared by EU-funded consultants).

5. **In light of the above assessment, the PforR operation includes a framework for updating and consolidating an action plan for strengthening the agricultural MIS/M&E system for MINAGRI**, in a manner that is integrated and supportive of the M&E systems for each of MINAGRI's entities (RAB, NAEB, the three SPIUs) while taking a sectoral approach in line with the RF for PSTA 3. In support of MINAGRI's intention, the Bank supported MINAGRI's recent formation of a MIS working group (in July 2014). It was established (with members from various agencies within MINAGRI) and conducted various working sessions to derive and develop a consensus around a "core" RF for PSTA 3. This larger "core" RF reflects the key indicators highlighted in the above RF for PforR operation and includes some additional indicators for the overall sector and each of the four programs. With support from the EU, MINAGRI has taken steps to prepare a TOR and to mobilize international technical assistance (during 2014) to help operationalize the agricultural MIS, utilizing the expanded core RF.

6. **With the implementation of PSTA 3, which is now underpinned by a comprehensive RF, it is timely that MINAGRI is taking coordinated actions to develop and implement an operational MIS action plan, building on the experience/lessons of implementing MINAGRI's M&E framework of 2011 and the emerging MIS/M&E framework (June 2014). It is expected that this work will include the following aspects**:

i) An aligned and harmonized M&E framework (including the evaluation framework of PSTA 3) with PSTA 3's RF, and the expanded "core" RF;
ii) Operationalized, in a sound and phased manner, data collection systems, processes, and institutional roles at national and subnational levels to focus on generating realistic, reliable, and timely data on the key results and their "SMART" indicators at the impact, outcome, and output levels in line with the RF for PSTA 3;
iii) Organizational and coordination improvements to better integrate the agricultural M&E systems at national and subnational levels, with a focus on the main indicators outlined in the RF and Evaluation Framework of PSTA 3 (e.g., continue the monthly planning and M&E meetings convened by the DG of Planning, supported by follow-up activities);
iv) Adequately qualified and experienced technical MIS staff at the national and subnational levels (e.g., increased M&E staff in MINAGRI's Planning Department to better coordinate and consolidate the diverse M&E systems spread across MINAGRI, RAB, NAEB, SPIUs, and Districts; post an M&E officer at the District level (currently a proposal being promoted by MINALOC as part of the decentralization strategy) who can devote increased attention to coordinating with and integrating M&E activities with the enhanced MINAGRI M&E framework;
v) MIS/M&E activities that devote adequate attention to systematizing relevant experiences and good practices that can be scaled up and out as part of PSTA 3's implementation period, and used as inputs for the design of PSTA 4; and
vi) A MINAGRI-devised and -delivered training program to strengthen the various MIS activities outlined above, involving relevant staff at national and subnational levels.

7. **During implementation of the proposed PforR operation, the Bank team will continue to support MINAGRI's ongoing initiative to prepare and implement an operational MIS plan (including capacity development gaps).** These MIS activities comprise one of the DLIs, and will be coordinated with other DPs (especially the EU, which is playing a key role in providing required technical assistance).

8. **Research, technology transfer and professionalization of farmers.** Research and extension interventions are linked directly to one result (Extension coverage) and indirectly to the DLI on increased average productivity of major food and export crops and livestock. The extension result focuses on increasing the ratio of extension agents to farmer households from the current 1:839 to 1:600 in 2017/18.

The basic assumption is that the increased extension agent to farmer ratio will increase access to information and technologies and subsequently lead to higher technology adoption and productivity gains. This DLI is important in ensuring technology transfer to farmers, is easy to measure, and can be verified with minimal costs. The research and technology transfer SP has developed clear key results focusing on development of technologies for farmers and their adoption rates. However, it is important to caution that adoption of technologies can be influenced by a number of social and economic factors, some of which are beyond the full control of implementing agencies. Furthermore, the research-extension (R-E) linkages that are key to ensuring an effective and efficient technology transfer system are found to be weak and a major risk to the technology transfer objectives.

9. **Promotion of food crops value chains.** Key results have been clearly set regarding the productivity gains expected from each of the main food crops. The SP is also directly linked to one DLI on increased average productivity of major food and export crops. In regard to food crops, the productivity DLI has targeted the growth in yield of cassava. The set yield target for this food crop is achievable based on past growth trends. However, a conservative approach is advocated for in setting the yield targets given the predominance of rainfed production systems for most of the food crops (rice may be the exception), the emerging effects of climate change, and the not-too-solid database for verification of these yields at a national level. Furthermore, global evidence indicate that yields increases are usually low over the long term and growth rates slow considerably as more farmers approach the yield frontiers of any given technological regime. Given the foregoing, the Bank would encourage the Borrower's team to review the set yield targets based on these considerations.

10. **MIS/M&E capacity**. The M&E capacity, including data processing and arrangements for reporting for research and technology transfer and for targets set under food crops are in existence, but needs to be strengthened. While the results set under research and extension are straightforward to measure and report, measuring and reporting the yield results at the national level is more demanding. A reliable and elaborate structure and system to capture and process the data on production, productivity levels, and area under different crops is currently not well developed, and therefore needs to be put in place.

Annex 3: Detailed Description and Assessment of Program Strategic Objectives and Relevance

1. **Overview. In spite of the progress in reducing the numbers of poor households, the challenge of poverty reduction remains high, since 80 percent of the rural population consists of subsistence farm families with an average land size of 0.59 ha (EICV 3).** The Government of Rwanda's (GoR's) Transformation of Agriculture Sector Program Phase 3 (PSTA 3) strategic objectives are to: i) intensify, commercialize and transform the Rwandan agriculture sector to enhance food security and nutrition, reduce poverty and drive economic growth; and ii) accelerate sustainable increases and expanded private sector role in production, processing and value–addition and commercialization of staple crops, export commodities and livestock products.

2. **The PforR operation's development objective** is *to increase and intensify the productivity of the Rwandan agricultural and livestock sectors and expand the development of value chains.* The proposed operation supports the strategic objectives of PSTA 3 with aims to enhance food security and nutrition contributing to a reduction in poverty and inclusive economic growth. The operation supports four broad program areas: i) agriculture and animal resource intensification; ii) research, technology transfer and professionalization of farmers; iii) value chain development and private sector investment; and iv) institutional development and agricultural cross-cutting issues.

3. Increased productivity and production along with increased commercialization of that production and increased off-farm self-employment generated by increasing the number of food and export crop value chains from 2008-2012 were responsible for over 45 percent of poverty reduction (and up to 58 percent if all off-farm self-employment is the direct result of increased self-employment associated with farm commodities) and for facilitating over 1 million Rwandans to lift themselves above the poverty line. Given these facts, the strategic objectives of PSTA 3 are both critical and relevant and are focused on lifting an additional 3 million Rwandans above the poverty line.

4. **The four programs of PSTA 3 and their associated subprograms (SPs) are similar to PSTA 2 in structure and content, with greater emphasis on increasing private sector investment in the sector**. PSTA 2 was highly successful and delivered on over 90 percent of the planned results. In addition, many of the results and targets were exceeded, some by as much as 200 percent.

5. **Much of PSTA 3 is focused on improving efficiencies and economies of scale and mainstreaming the activities that are the key drivers of agriculture development** (land husbandry actions including land conservation – terracing, increasing soil fertility – organic and inorganic fertilization, increasing use of improved seeds, expanding land under irrigation, increasing coverage and quality of extension services and increasing private sector-led mechanization); enhancing market-responsive technology research; significantly expanding and strengthening accessible agricultural finance products; stimulating expanded and inclusive private sector and market-driven value chain development and integration; expanding market-oriented rural infrastructure (i.e., irrigation, rural feeder roads, and post-harvest facilities); and strengthening institutional development and strategic cross-cutting themes.

6. **The World Bank technical team reviewed and evaluated all four programs and their 24 SPs and found not only PSTA 3's high-level strategic objectives but also the strategic objectives for each of the four programs and their SPs to be adequate, of strategic important, necessary, and relevant to achieving the key results and desired impacts of PSTA 3.** They also address the key developmental issues in the sector to increase economic development and reduce poverty. The program has a suitable focus of public expenditure related to policy and other enabling environment investments and focuses on increasing private sector investment in the sector with an appropriate mix of PPP investments planned. Below is a detailed review of the relevance of each of the programs and SPs as assessed by the World Bank technical specialists.

Program 1: Agriculture and animal resource intensification

7. **Summary. The strategic objective for program 1 is transforming the physical environment of land, soil, and water by: i) scaling up successful productivity interventions; ii) expanding quality and yield-augmenting inputs; and iii) developing the animal resource sector, contributing to enhanced food security and nutrition and increased value of production**. Its SPs focus on soil conservation and land husbandry, irrigation and water management, agricultural mechanization, agrochemical use and markets, and seeds and livestock development. Given the land constraints and no agriculture frontier to exploit, the smallholder structure of land ownership, and limited livestock and animal resources per capita, both the program's strategic objectives and the SPs are key in addressing the productivity and food and nutrition security challenges of the country.

8. **Soil conservation and land husbandry are of strategic importance since 90 percent of Rwanda's soils are on hillsides, some with steep slopes.** Most of these soils are old and have been nutrient-depleted for an extended period due to overcultivation. The soil is subject to higher rates of erosion, as Rwanda loses up to 40,000 tons of soil per year to erosion and so far only 73 percent of arable land is covered with some type of erosion-control infrastructure. However, the effectiveness of this infrastructure is only 53 percent.[71] Soil conservation and land husbandry are key factors in increasing agricultural productivity. Thus, reducing erosion and improving the quality of soils is of strategic importance in achieving PSTA 3's strategic objectives for productivity. Different techniques that have been implemented, such as terracing, composting, green manure, organic mulching, and agroforestry, will need to be scaled up nationally and promoted throughout the entire MINAGRI structure. These techniques improve the soil's organic matter content, water holding capacity, infiltration rate, and microorganism activity. MINAGRI has developed a solid methodology for determining the appropriate soil conservation techniques for various soils and slope categories and has defined the national baseline for lands protected against erosion. Lessons from current World Bank-financed operations, LWH and RSSP, indicate that appropriate soil conservation and land husbandry measures can increase productivity up to four times, reclaim marginal lands, and reduce erosion by up to 66 percent.

9. **Irrigation and water management are also vitally important to address pressing climate change issues and reduce dependency on rainfall, which can be erratic and cause crop failure**. So far, only 23,000 ha of land are irrigated; the target is to increase this to 63,000 ha over the PSTA 3 period through irrigation development in marshlands and hillsides.

10. **Agricultural mechanization is of strategic relevance to the achievement of PSTA 3's objectives.** To transform farming into a productive, high-value, market-oriented sector, improved agricultural mechanization is imperative (e.g., alternative farm power, with appropriate technologies for the Rwandan context, such as low-cost motorized engines and draught animals). Until recently, mechanization efforts stalled in Rwanda due to social disruptions and subsequent realignment of priorities. Mechanization has become even more important for the following related reasons: i) the need to open up unused lands to increase area under production, especially under irrigation, and raise productivity of existing lands; ii) promoting youth in agriculture by reducing the drudgery on farms by using mechanization, and consequently reducing rural-urban migration and mitigating urban unemployment, which has become a social problem; iii) addressing seasonal labor constraints, especially in light of the CIP, thereby enabling farmers to benefit from multiple cropping systems with varying land preparation periods; iv) machinery such as pumps, diesel engines, and related equipment can facilitate efficient and equitable access to water, especially for smallholder farmers; and v) appropriate mechanization in agroprocessing and value addition can help increase profitability of farming and improve rural livelihoods by generating income and employment opportunities.

11. **Currently 13 percent of farm operations are mechanized in Rwanda, including land preparation, planting, crop treatment, harvesting, post-harvesting, and agroprocessing**. The use of animal traction or tractors is isolated and does not significantly contribute to agricultural production in Rwanda. This needs to be

[71] Soil erosion baseline, RAB 2012.

enhanced and combined with improved mechanization, fertilizer, and seeds to achieve the ambitious growth rate of 8.5 percent within the next five years as stated in PSTA 3.

12. **Agrochemical use and markets. A key factor for low productivity in the agriculture sector is low and decreasing soil fertility**. Nutrient depletion rates in Rwanda are estimated to be in the order of 77 kg/ha, among the highest in Africa. This translates into a reduction of the country's capacity to feed its people. Hence, pursuing increased and sustained agricultural productivity growth, a key strategic objective of PSTA 3, requires a deliberate effort to ensure large-scale increases of inorganic fertilizers - to 45 kg/ha by 2017 from the current rate of about 35 kg/ha. This is predicated on the fact that Rwanda recorded increased productivity rates in the recent past, corresponding to increases in fertilizer use rates. Fertilizer use increased from 4.2 kg/ha in 2005 to 29 kg/ha in 2012, corresponding to a maize yield increase from 0.64 t/ha to 2.9 t/ha, while wheat yields increased 2.5 times during the same period. This has made a compelling case for the emphasis on fertilizer use in PSTA 3.[72]

13. **Increases in fertilizer use in Rwanda have been driven mainly through an input subsidy program, as part of the CIP.** Since 2008, the GoR has invested in efforts to build an efficient input subsidy program that has contributed increasing fertilizer use among farmers from 3 percent (2007) to 38 percent (2014). Over the last three years, fertilizer use has increased to about 30,000 tons, but potential use is approximately 90,000 tons. Given fiscal constraints and sustainability requirements, a market-led approach would be required to reach the next level of sustainable uptake, with the GoR investing more of its efforts and resources in creating an enabling environment for private investment in the fertilizer sector and investing in public goods. The current situation, with only two major distributors in the fertilizer sector, cannot stimulate competition in the fertilizer market. Currently, the GoR is finalizing a comprehensive fertilizer policy paper that would lay out the roadmap for a more appropriate and sustainable approach to stimulating fertilizer usage.

14. **Seed development. Mechanization and fertilizer must be complemented by improved good quality seeds to increase agricultural productivity**. Seed is an essential, strategic, and relatively inexpensive input to agriculture with a high rate of return on investment that often sets the upper limit for crop production. The use of improved, high-yielding crop varieties can make the difference between a household with an improved livelihood and one trapped in rural poverty and hunger. Inevitably, achievement of PSTA 3's strategic objectives would remain an illusion without development of a vibrant, private sector-driven seed industry. Current improved seed use rates are low, partly contributing to the low productivity of cereals of about 1 t/ha, on average, versus a potential of over 6 t/ha. Consequently, seed sector development is critical to ensuring increased and sustained agricultural productivity in Rwanda.

15. **As in the fertilizer sector, the seed sector is not entirely free of government intervention or disincentives for investment**. For the major crops such as maize, wheat, rice, and Irish potatoes, seeds are supplied to farmers under a government-sponsored seed subsidy program. However, the GoR plans to gradually phase out the subsidy program over the next three to four years. During the subsidy draw-down phase, the government would purchase seed from private companies, the quantity of which would reduce gradually over the years, phasing out completely over three to four years' time. In preparation for phasing out, the government is finalizing a comprehensive seeds policy paper, which includes encouraging the private sector to enter into the seed production business. So far, one seed company has registered and in fact produced seed during the last cropping season. It is believed that the seed companies would inherit the current seed producers, especially the individual farmers, as contract growers.

16. **Livestock Development**. **The two livestock-related SPs (1.6 – Livestock Development and 3.4 – Development of priority value chains: meat and dairy) are of good overall strategic relevance and**

[72] Kelly, V.A., Mpyisi, E., Murekezi, A., Neven, D., Shingiro, E., (2001). FERTILIZER CONSUMPTION IN RWANDA: Past Trends, Future Potential, and Determinants. Paper prepared for the Policy Workshop on Fertilizer Use and Marketing, organized by MINAGRI and USAID, Rwanda, 22-23 February.

complement each other well. Livestock can clearly contribute to achieving objectives of inclusive growth for the country and poverty reduction as stated in EDPRS 2 and *Vision 2020*. The strategic objective of SP1.6 is *to enhance the productivity of animal resources and quality of animal products for improved transformative growth of the livestock subsector, with a focus on smallholders.* Therefore, it is also perfectly in line with the PforR operation's objective. In such a landlocked, mountainous, and high-density population country, limited arable lands and access to natural resources, including pasture and water, remain the major constraints and bottleneck to livestock development and competitiveness. Therefore, the objectives of livestock intensification, productivity increase, and animal production diversification (fishery/beekeeping) appear to be the best strategy for the subsector's development. Expanded livestock development, including livestock, fisheries, and honey, can contribute to two important types of benefits for rural populations: enhanced nutrition levels and increased rural incomes.

Program 2: Research, technology transfer, advisory services and professionalization of farmers

17. **Summary. The strategic objective of program 2 to is to significantly and sustainably increase agricultural production and productivity through ensuring an efficient, effective, and market-responsive research and extension system, driven by: i) modern technologies suitable for Rwanda's agro-ecological environment; ii) more effective extension, education, and training of farmers; iii) greater access to and uptake of these technologies; iv) improved agricultural productivity and stronger farmers' cooperatives; and v) other partnerships to help farmers better engage in input and output markets, and thereby increase rural incomes**. The SPs are: i) research and technology transfer; ii) extension and proximity services for producers; and iii) farmers' cooperatives and organizations.

18. **One of the current challenges is increasing the agriculture research function to meet the need to facilitate and increase both production gains and commercialization**. Research is key to increasing crop and livestock productivity, improving natural resource management, meeting market requirements, and responding to farmers' needs. Despite recent increases, the quality of extension services and their accessibility have been a challenge. To increase production and commercialization of the agriculture sector, farmers' cooperatives will play a key role. However, although improving, cooperative management has sometimes been a challenge, along with higher levels of farmer engagement. The SP for research, extension, and professionalization of farmers via cooperatives was assessed and the strategic objectives, results, outcome, outputs, and activities were found to be sufficient to address the key constraints in this area.

19. **Research, technology transfer, professionalization of farmers, and extension services for producers** are all of key strategic relevance to the achievement of PSTA 3's strategic objectives and targets. No credible productivity and commercialization gains can be made without an effective technology development and transfer system, tailored to Rwandan conditions. Agricultural research is a classic public good because information generation is nonexcludable. Equally, the envisaged expansion of private sector investment will only occur if investors are assured of enough trade volumes and organization of farmers into formalized groups able to mobilize and collect adequate trade volumes. Furthermore, the professionalization of smallholder farmers and their organization into cooperatives and other farmers' groups are necessary to ensure they can enjoy economies of scale in input and output markets, as well as the necessary clout to bargain and benefit from market-driven trade relationships.

20. **The current research and technology transfer functions are currently dominated by the public sector through the Rwanda Agriculture Board (RAB),** which is mandated to undertake agricultural research for crops and livestock, agricultural development (mainly extension and input supply), animal resource development, and provision of rural infrastructure (mainly storage facilities) and mechanization. As part of the GoR's decentralization strategies, the 30 District administrations also play a key role in delivery of extension services at the local level (based on a 3-tier structure and outreach system—District, Sector, and Cell levels). RAB's zonal offices provide technical backstopping and training to the District-level outreach system, which now

includes farmer promoters and para vets. Most of the services provided by RAB have a significant public good element and hence may not immediately attract private providers. However, mixed provisioning of extension and other services is beginning to emerge. Nevertheless, research remains a preserve of the public sector, and initial steps are being taken by RAB to expand the actors.

21. **Farmers' cooperatives and organizations. Community participation and community-led solutions have been highlighted as good practices throughout the PSTA 2 period**. The objective of this SP is to strengthen cooperatives and farmers' organizations, including men and women, for: improved governance, management, and technical knowledge; effective delivery of enhanced services; and more effective and market-based linkages with input and output markets. Rwandan agricultural policies and strategies focus on intensification and increased market orientation of the smallholder agriculture sector, and farmers' cooperatives are seen as an important and principal vehicle to achieve this goal. However, farmers' organizations'/cooperatives' capacities need to be strengthened in management, institutional, and entrepreneurial skills. Inadequate operational strategies exist to enhance cooperatives and farmers' organizations to assume an expanded and effective role. New bottom-up and inclusive approaches are required to bring innovations to both on-farm and off-farm activities. Most technological innovations and extension services are driven from the top, and therefore have limited outreach. The lessons from the experience in the ongoing projects in the sector show that farmers with eroded human capital can benefit greatly from a bottom-up approach coupled with introduction of new appropriate technological processes and instruments that improve productivity and deliver extension and other services in a timely, cost-effective manner. There is also a lack of operational guidelines to ensure effective arrangements and modalities between extension (RAB and District administrations) and Rwanda Cooperative Agency (RCA), taking into account the recent revisions of the Cooperative Law. At the institutional level, extension agents have inadequate capacity to provide the required training/technical assistance to cooperatives and farmers' organizations, especially given the ambitious productivity targets.

22. The number of agricultural cooperatives in the country expanded rapidly during the past few years - from 645 in 2008 to 1,877 in 2013. Agricultural cooperatives include production cooperatives (such as coffee, maize, etc.), service cooperatives (such as land, fertilizer distribution, etc.), and marketing cooperatives (where marketing of farm produce is done collectively) – or a mixture of these. PSTA 3 envisages increasing the number of cooperatives to 2,500 by 2017-18, as well strengthening them to be more effective in serving their members.

23. PSTA 3, with support from the Ag. PforR, is designed to address some of the key constraints to agricultural growth in the country, which entails a need for both larger-scale community-based infrastructure and enhanced and market-driven farmers' organizations and capacity development. The farmers' organizational aspects are therefore critical for achieving the program's expected outcomes for increasing agricultural production and commercial agriculture as outlined in PSTA 3. The broader goal is to ensure a "bottom-up" development process in the sector, such as establishing bottom-up farmers' organizations, enabling participatory planning and decision-making processes, and strengthening community-based credit institutions.

Program 3: Value chain development and private sector investment

24. **Summary. The strategic objective of program 3 is to significantly enhance the agricultural business environment and an expanded private sector role in promoting competitive and inclusive value chain development, including**: i) expanded access to finance; ii) a strengthened agricultural market system through removing market barriers and an expanded rural infrastructure, with emphasis on storage and feeder roads; and iii) expanded agriculture commercialization for domestic, regional, and international markets. The SPs that support this objective are: i) creating an environment to attract private investment, encourage entrepreneurship, and facilitate market access; ii) developing priority value chains for food and export crops, dairy and meat, fisheries, and apiculture; iii) improving agricultural finance; and iv) supporting market-oriented infrastructure for post-harvest handling and storage.

25. **Greater volumes of production will require markets, processing facilities, and value addition to create growth. Domestic production continues to be hampered by a lack of post-harvest facilities and the dearth of agricultural financing available**. Having an enabling environment to attract increased private sector investment to add premium to productivity increases has been lacking. Strengthening value chains and reducing losses through post-harvest facilities are needed to generate more income and employment in activities like product processing, packaging, and marketing. Another fundamental challenge for Rwanda in the regional context and for wider international markets is the high cost of inputs, which affects competiveness.

26. **Program 3 and its SPs were reviewed in detail and found to contain the results and activities needed to achieve the strategic objectives if implemented as planned**.

27. The objective is to create an environment to attract expanded and inclusive private investment to the agriculture sector, encourage entrepreneurship, and facilitate market access to both inputs and outputs. Program 3 responds to the government's development objectives as set out in *Vision 2020*, which envisions a modern and diversified agriculture sector that is private sector-led and provides high-value commodities for export, while enhancing domestic food security. It also recognizes that the continued intensification and commercialization of the Rwandan agriculture sector will be essential to drive inclusive economic growth and reduce poverty. Developing, rapidly expanding, and diversifying competitive agriculture exports remains one of biggest contributors to the theme of rural development and economic transformation of EDPRS 2. Program 3 implements programs aimed at expanding and diversifying agriculture exports in areas where Rwanda has a proven comparative and competitive advantage to accelerate economic growth and increase rural incomes and food security.

28. **Development of priority food crops value chains. Enhancement of food security and nutrition remains a key strategic objective of the GoR and a key subprogram under PSTA 3**. Food crops that include commodities that are regionally and internationally tradable but exclude crops produced for export only account for 85 percent of agricultural GDP. According to the national accounts, the value of food crop production in constant prices rose by 24 percent from 2008 to 2012.[73] This substantially exceeded the target set in PSTA 2 and was due principally to the success of the CIP and LUC Program. Under PSTA 3, eight food crop value chains have been prioritized: bananas, wheat, maize, rice, Irish potatoes, cassava, soya beans, and beans. The size of this subsector makes it clear that even modest growth in these food crops will have a much larger effect on the overall agricultural and economic growth and poverty reduction of the country than rapid growth in smaller export crops. Most of the food crops are grown by a majority of smallholder farmers and are therefore crucial to poverty reduction and food security goals.

29. **Development of priority export value chains. Tea, coffee, horticulture, and pyrethrum are among the key export value chains prioritized for support in PSTA 3 and this Ag. PforR**. Rwanda has a proven comparative advantage in these four value chains as confirmed by recent analyses (2014) and expanding private sector activities. It is worth noting that recent analyses have shown that the export value chains' p.a. growth rates need to be at least 22 percent to contribute to the EDPRS 2 overall agriculture sector growth target of 8.5 percent p.a. Also, the export subsector is critically important for Rwanda in terms of generating valuable foreign exchange, while creating improved income and job opportunities for rural households. This program is a priority for the GoR as evidenced by the fact that targets set for export value chains are found in performance contracts of different institutions involving MINAGRI/NAEB and affiliated agencies. The government has also already initiated various activities focusing on reviewing the legal and regulatory frameworks governing these export value chains, infrastructure deficits and requirements, and subsector expansion and productivity enhancement programs. The government envisions a significantly greater role for the private sector in leading the planned expansion and intensification programs in the priority value chains. Private sector feedback confirms that private investors are ready and interested to take on an expanded role in all four value chains.

[73] NISR, 2012 GDP Annual Estimates, March 2013.

30. **Development of Priority Value Chains: Dairy and Meat**. **The need to improve productivity all along the dairy and meat value chains, including at the input suppliers, processing, and marketing levels, not only at the upstream farm-production level, is well captured in PSTA 3**. The GoR's objective is to double per capita milk consumption from about 36 liters/person/year to 80 liters. This cannot be achieved only by increasing milk production; milk processing (only 10 percent of milk is estimated to be processed currently) and marketing along the value chain as well as important public awareness and communication campaigns also need to be promoted. This is well in line with the strategic objective of the GoR to enhance food security and nutrition; however, doubling per capita consumption might be overambitious over a three-year period. In addition to national consumption, demand for meat and hides and skin exported to neighboring central African countries is important, representing a strategic market to be targeted. However, given the lack of natural resources and cost of animal feeding, the competitiveness of Rwandan meat products remains questionable and national strategy documents, including PSTA 3, lack evidence that it could be.

31. **Development of Priority Value Chains: Fisheries**. **With only 27,000 MT of fish produced (80 percent capture fish) in 2013 and a 2 kg/person/year consumption rate, fisheries remain a small subsector**. It is estimated that about 70 percent of the production is informally exported to neighboring countries, including DRC, but that an additional 15,000 MT are imported to fulfill national consumption needs. Management of resources is currently neither well organized nor sustainable. The Master Plan for Fisheries developed and endorsed in 2011 by the GoR highlights the potentially large growth of this subsector and the strategic relevance of supporting the development of its value chain, from feed production (now 100 percent imported) to aquaculture, fish processing (as 20 percent of the production is lost), and marketing.

32. **Development of Priority Value Chains: Apiculture**. **Similarly, the apiculture subsector remains at an early stage of development.** However, as 90 percent of the almost 70,000 producers involved in beekeeping are "traditional," the strategic relevance of supporting this value chain is high, as it will positively impact smallholder producers and contribute to shared growth. With the urbanization of the country and an emerging middle class, the demand for high value-added processed products, such as high-quality honey, royal jelly, and beeswax, is fast growing, and cannot currently be fulfilled. The GoR is now finalizing a new National Strategic Plan for this sector.

33. **Agricultural finance. Both PSTA 3 and EDPRS 2 prioritize agriculture as a core source of jobs and economic transformation.** Continued and sustained agricultural commercialization and intensification play an important role in the vision for the future. The overall strategic objective outlined for the agricultural finance SP is deemed relevant to the government's development objectives given: i) the government's abovementioned broad objective to align the agricultural growth trajectory with increased productivity and commercialization, and the increased role financial services will have to play to achieve these targets; ii) the unsustainability of government-dominated investments to drive sector growth, and thus the greater need for diversified and market-based financing sources and mechanisms; and iii) the unique character of the agriculture sector, which predominantly consists of large numbers of smallholders, although the presence of strong cooperatives suggests both the need and prospects for diversified and innovative products tailored to their needs.

34. **As the overall objective of expanded and inclusive access to viable agriculture loans and enhanced recovery rates is to increase the volume, variety, and accessibility of agricultural finance products, aiming to increase the number of commercial loans extended by the commercial banking industry is indeed strategically sound**. Moreover, since the sustainability of any improvements in this sector will be affected by the performance of agricultural loans, which will in return be reflected in interest rates, any support in this area should target a percentage decrease in non performing loans (NPLs) as well as an increase in loan volumes. Having a supportive policy framework is particularly relevant in the context of agricultural and livestock insurance, as the most convenient form of insurance (in terms of premium and coverage) indeed requires appropriate government support. Expanded targeted agricultural savings mobilization through strengthened SACCOs and other

appropriate financial institutions is a direct contribution to the objective of diversification and extension of the reach of financial products to smallholder farmers.

35. **Market-oriented Infrastructure for Post-Harvest. Rural feeder roads are considered to be a critical factor to stimulate increased agricultural production and commercialization, which is the core objective of PSTA 3, aiming to contribute to EDPRS 2 objectives of raising growth and creating jobs**. PSTA 3 stresses the need to expand the rural feeder road network to reduce post-harvest losses and the price of delivering agricultural inputs in project areas. Expanded feeder road development will also contribute to social protection by promoting employment generation through public works.

36. **Post-harvest**. **Reduce staple crop post-harvest losses at the producer and first aggregator level**. In support of the CIP, MINAGRI's Post-Harvest Taskforce developed and adopted a National Post-Harvest Strategy designed to assist with: strengthening harvesting, post-harvest handling, trade, storage, and marketing within staple crop value chains; strengthening markets and linkages for farmers; and reducing post-harvest losses. This initially addressed the challenges that accrued following successful implementation of the CIP, which increased crop yields with unanticipated surpluses in key staple grains and cereals and hence incurred heavy post-harvest losses due to the lack of capacity in post-harvest handling and storage. To achieve PSTA 3's objective of increasing agricultural growth by 8.5 percent, it is critical to ensure investment in storage capacities to hold surplus production and reduce post-harvest losses, and consequently maximize net profits for small-scale farmers and reduce food insecurity. Small farmers generally lack the capital and know-how to efficiently harvest, store, and market their surplus production. MINAGRI estimates that farmers experience between 15-22 percent annual post-harvest losses in cereals. These losses have direct adverse impacts on producers and consumers, reducing farmers' incomes and raising consumer prices as a result of diminished supplies. Managing post-harvest losses would essentially be consistent with MINAGRI's five-year action plan, approved in March 2011 by the Agriculture Sector Working Group (ASWG) of Rwanda. To ensure efficiency and sustainability, efforts should be made to ensure private sector investment in the storage structures directly or through PPP arrangements in managing public storage facilities.

Program 4: Institutional development and agricultural cross-cutting issues

37. **Summary. The strategic objectives of program 4 are to: i) build the sector's capacity to deliver in an efficient, effective, and increasingly decentralized manner with enhanced gender-responsive and youth-friendly policies and services; and ii) to provide a conducive policy and legal framework and reliable statistics for rapid and sustainable agricultural growth**. The seven SPs are: i) institutional capacity building; ii) decentralization in agriculture: iii) legal and regulatory framework; iv) MIS: agricultural communication, statistical systems, M&E and knowledge management; v) gender and youth in agriculture; vi) environmental mainstreaming in agriculture; and vii) nutrition and household vulnerability.

38. **Key challenges that program 4 seek to address. In recent years the institutional arrangements of the agriculture sector have performed well, with many successful projects and steady growth**. The remaining institutional challenges need to be addressed through a comprehensive approach to both capacity building and institutional coordination. District administrations have important roles, as they are in close contact with cooperatives and farmers and can build up knowledge of the Districts' needs and opportunities for agricultural development. However, these functions need to be strengthened to be more effective. The quality of agriculture and animal products needs to be improved and adhere to national and international required norms and standards. Therefore, a review of the current related regulatory framework in the agriculture sector is needed to update laws and formulate new ones in accordance with East African Community (EAC) and international regulations.

39. **Rwanda is accelerating its transformation from an agrarian, subsistence economy into a sophisticated, knowledge-based society**. However, the agriculture sector is characterized by insufficient use of improved local and advanced knowledge and technologies. Although Rwanda has made great steps towards achieving gender quality, gender disparities are still prevalent in agriculture. The main challenge for youth is providing employment opportunities and the training necessary to obtain the higher-skilled jobs that will help them break out of poverty. Agriculture and the environment affect each other and must be considered together. To foster a sustainable agriculture sector in the long term, sound environmental management must be mainstreamed in agricultural practices. Food production is increasing and food flows relatively easily within and outside the country. However, EICV 3 identified that in 2012, 82,000 households (4 percent) had poor and 378,000 households (17 percent) had borderline food consumption patterns. These households are vulnerable to seasonal shortages and also have inadequate provision in the case of drought or excess rainfall, both of which reduce harvests.

40. **Program 4 and its eight SPs were reviewed and assessed to be relevant to address the above sector challenges and if adequately implemented, should produce the desired outputs, outcomes, results, and development impacts**.

41. **Institutional capacity building. The institutional capacity building strategic objective (SO), derived from the RF for PSTA 3, is sound and highly relevant**. This SO is well aligned to *Vision 2020*, EDPRS 2, and PSTA 3 to enable and support the agriculture sector: i) to fulfill its intended strategic role; and ii) to position/enhance roles and capacities of MINAGRI and its key entities (RAB, NAEB) and Districts to carry out the proposed SOs of other SPs and to meet their ambitious targets at impact, outcome, and output levels, as well as to ensure enhance governance in the sector, including significantly improved M&E systems and follow-up mechanisms.

42. **Decentralization in Agriculture. Overall, the SO for decentralization in agriculture and its four SPs is highly relevant to support the achievement of the higher-level objectives outlined in EDPRS 2 and PSTA 3.** The four key elements are interconnected, complementary, and contribute to the achievement of the SOs. They also help operationalize the actions needed to support the implementation of the government's Decentralization Implementation Plan/DIP (2011-2015) with respect to the agriculture sector. Especially during the past year, there have been a number of important initiatives to further operationalize MINAGRI's decentralization strategies at the operational level. Many of these activities are ongoing and are generally making good progress.[74]

43. **Legal and Regulatory Framework**. **The legal and regulatory framework, including compliance with international phytosanitary standards (SPS), is a key cross-cutting program of PSTA 3**. It is relevant for enabling the expansion of high-value commodities for export as well as maintaining environmental sustainability and private sector involvement. Given the scope of PSTA 3 and the type of productivity and geographic focus that needs to be achieved, the government's priority is to strengthen its regulatory systems and ensure enhanced quality of agrochemicals and seeds marketed in Rwanda that may have a positive environmental impact.

44. **Formalize the national irrigation policy**. **An Irrigation Master Plan (IMP) was launched in 2010, established the baseline for the required irrigation developments, and identified the potential for**

[74] Several useful documents outline the decentralization strategy with respect to the agriculture sector, including the main components, primary challenges, "gaps," and ongoing actions. These documents include: Review of Decentralization in Rwanda's Agriculture Sector to Inform the Sector Strategy 2013-2018 (prepared by Landell Mills/ Veteffect for the European Union), 2012; Progress Report of Technical Assistance to MINAGRI in Decentralisation, prepared by Aimable Rusingizankekwe, March 2014 (this report provides the most up-to-date assessment of progress and further operational recommendations); Supporting Fiscal Decentralisation in the Agricultural Sector Developing Guidelines and a Training Manual for Utilization of Earmarked Grants to Districts, prepared by ETC East Africa Ltd, 2008; Sector Policy, Planning and Budgeting Guidelines for the Agriculture Sector, prepared by MINAGRI (2008).

developing irrigation infrastructure nationally. The national irrigation policy will allow operationalizing the IMP.

45. **Develop regulations for organic agriculture, pesticide and limestone use. Since 2001, organic agriculture has been promoted in Rwanda for crops such as apples, banana, pineapple, strawberries, coffee, tea, avocado, passion fruit, tree tomatoes, and chili**. The gross value of production of organic agriculture is relatively small. However, given the growing demand for organic products in the U.S., the U.K., local markets, Europe, and South Africa, the potential for rapid growth exists. In Rwanda, organic market initiatives fit well with government's efforts to promote agro-business through commodity chain development, transformation, and competitiveness of agricultural products to facilitate access to markets under PSTA 3's agenda. However, government policies are not *per se* pro-organic, but they acknowledge that organic agriculture can play an important role side-by-side with conventional agriculture, and some of the practices promoted support organic agriculture as demonstrated in MINAGRI's involvement in organic farming awareness-raising, capacity building of farmers' organizations and certifiers, support to the certification process, and seeds/seedlings distribution, among others.

46. **Just like other purchased inputs (seeds and fertilizers), pesticides are used by a small proportion of farm households**. Pesticides are used mainly on coffee, tea, bananas, potatoes, and horticultural crops at much lower rates than other inputs. The low use of pesticides can be traced to demand-side as well as supply-side factors. Weak demand for pesticides results in part from farmers' poor knowledge of pest and disease control methods, which in turn is compounded by the lack of research on chemical pest control practices. It also results from the cost of purchased inputs and the consequent financial risk for farmers, most of whom have very low levels of income. The limited availability of pesticides on the market stems from the difficulty of procuring pesticides, most of which are imported.

47. **Under PSTA 3, there are plans to increase the use of improved seed, fertilizer, and pesticides, a strategy that inevitably calls for input market development**. This strategy typically begins with establishment of an enabling policy, regulatory, and investment environment to mobilize private capital into the sector. The importance of these improvements stems from their effects not only on reducing risks, uncertainties, and transaction costs prevailing in the input market, but also on providing adequate incentives for increased investment by the private sector. Rwanda has made significant strides in improving its business investment environment as seen from the *Doing Business* indicators. However, additional work needs to be done to strengthen the regulatory framework to fully actualize PSTA 3's objectives.

48. **Develop regulations around the value chain guarantee fund. The GoR recognizes the need to overcome small farmers' challenges in obtaining access to credit**. Investment in the sector has been shown to be an effective instrument to alleviate poverty and enhance food security. The objectives of diversified and private sector-led agriculture result in the need to invest in strong value chains, especially for export commodities. Thus, the Value Chain Fund focuses on long-term, growth-oriented investments in growing and dynamic small- and medium-sized enterprises (SMEs). The required regulatory framework has already been put in place to create this Fund.

49. **Develop the legal basis on an agricultural catalytic fund**. **Improving entrepreneurship is one of the objectives of the agricultural finance SP**. The GoR recognizes the need to do so with targeted interventions as well as broad measures supporting a business-enabling environment as a whole. This will indeed involve ways to improve private equity and access to seed capital for new ventures. As such, providing a transparent and rule-based legal framework for the management and oversight of such a fund will be one of the critical building blocks in achieving results and allocative efficiencies while ensuring accountability of the Fund.

50. **Agricultural Communication, Statistical Systems, M&E, and Management Information Systems. MINAGRI's MIS comprises three interrelated components:** Monitoring and Evaluation; Agricultural Statistical Systems; and Agricultural Communication. While each of these components has distinct roles and technical and institutional characteristics, together they comprise an integrated MIS expected to generate essential, reliable, and timely information that should contribute to more efficient and effective management of the sector, which involves many actors at various levels. Until recently, MINAGRI has viewed and managed these components in a fragmented manner. In 2011, MINAGRI carried out a major exercise to prepare a comprehensive action plan to enhance the M&E system for the sector, reflecting a move toward a more integrated MIS approach to supporting implementation of PSTA 2.[75]

51. **With the launch of PSTA 3 in 2013/14, MINAGRI management has taken various steps to further strengthen and operationalize these three components as integrated management tools for supporting the efficient and effective implementation of PSTA 3 programs and SPs, in support of achieving the expected results and targets at impact, outcome, and output levels**. Accordingly, MINAGRI, with DP support, took various steps in 2014to better pinpoint and address the constraints to each of these components and the overall system, with a focus on enhancing the M&E system. First, the RF for PSTA 3 highlights the expected results, underlying constraints, and expected outputs of an enhanced MIS for the agriculture sector. Second, preparation of the ASIP included formulation of a M&E framework for PSTA 3. The challenge is for MINAGRI to take the next steps in operationalizing these enhanced frameworks in a coherent and integrated manner, and at various levels (central MINAGRI and subnational levels).

52. **The strategic objective for the Agricultural MIS, as outlined in the RF (SP 4.4) for PSTA 3, is to strengthen the efficiency, effectiveness, access to, and utilization of an enhanced MIS for the agriculture sector that would contribute to enhanced evidenced-based decision making**. This would involve the following component systems (with the RF outlining relevant outcomes and outputs): i) Monitoring and Evaluation system; ii) Agricultural Statistical System, including enhanced national food security and nutrition information system; and iii) Agricultural Communication System. This SO is highly relevant for supporting effective implementation of PSTA 3, with support from the PforR operation.

53. **The RF exercise included the identification of key constraints to achieving this SO**. In summary:

i) **Policy/strategic aspects**

a) While there is a national statistical strategy, there is no explicit agricultural statistics strategy; and

b) There is neither a national M&E strategy nor an agricultural M&E strategy.

ii) **Institutional Aspects**

a) M&E and Agricultural Statistical System: there are limited professional staff to handle a large and growing work program at national and subnational levels (e.g., there is one M&E specialist for the whole MINAGRI sector-wide M&E and reporting system, while there are separate M&E specialists assigned to RAB, NAEB, and for each of the three SPIUs; there is one agricultural statistician for the whole MINAGRI and its agencies/SPIUs, who also serves as the focal person for FAO's Countrystat System; at the District, there is no M&E officer, and these tasks need to be handled by one planner and one statistician, both covering all sectors);

b) The ongoing restructuring process within MINAGRI need to be completed and fully operationalized to enhance the roles and efficiencies of general agricultural information coordination and individual staff in relation to MINAGRI's institutional requirements (in process);

c) The multiplicity of different DP reporting requirements at the local level pose a challenge to consolidating common reports to facilitate decision making at various levels;

[75] For example, the following report was the result of an exercise to prepare an integrated action plan for MINAGRI's M&E system, in support of implementing PSTA 2: "Monitoring and Evaluation Framework for the Agricultural and Animal Resources Sector," prepared by MINAGRI, June, 2011.

d) There are inadequate periodic trainings to ensure professional and technical staff keep abreast of changing information technologies in relation to agricultural extension, delivery service, and emerging demand;
e) There is a need to complete a sector M&E/MIS development process; and
f) There is an inadequate environment for IT applications' interconnectivity and harmonization (talking and linking to each other).

iii) **Investment/expenditures**

a) The budget is inadequate to fulfill the full mandate and the required and growing number of tasks, including staff requirements;
b) There are some constraints in adequate operational funds to conduct periodic and necessary field surveys; and
c) There are constraints to purchasing the required IT tools (S/w), materials and equipment (e.g., extension materials, essential equipment to enable efficient and timely processing of data).

54. **Second, the recent exercise to formulate an enhanced M&E system to support the implementation of PSTA 3 (via the ASIP) summarized the following system-related constraints these complement the above-identified constraints arising from the RF exercise carried out by MINAGRI):**[76] i) there is no unified system in place to link the various institutions/organizations performing M&E in the agriculture sector. Each institution/organization focuses on input/output indicators as specified in its performance contracts and not relating to PSTA 3; ii) MINAGRI functions to a certain extent as lead agency for M&E operations but does not link them to PSTA 3 as yet. Neither does it cover the level of strategic objectives, but instead remains at an operational level; iii) the formats used are not harmonized and are oversimplified, so questions arise as to the validity and reliability of the collected data; and iv) M&E at all agricultural institutions suffers from shortages of adequately trained personnel as well as of budgetary means.

55. **At the subnational level, the above M&E assessment exercise (2014) highlighted an additional set of constraints at District and sectoral levels, which include**: i) a focus on the priorities being determined at a higher level (national and District); ii) some reliability issues in the way that crop production/productivity harvest data are generated and reported; and iii) the diverse reporting formats used at various levels, which pose additional challenges to reliable aggregation of production data.

56. **Gender and youth in agriculture**. **Rwanda's poverty profile indicates that women are more affected by poverty than their male counterparts: 47 percent of female-headed households are poor compared to 44.9 percent of all households, out of which 24.1 percent are extreme poor**. The depth of poverty indicators (i.e., the proportion by which poor households fall below the poverty line) shows that despite improvements, many households in rural areas are far below the poverty line, while other households continue to be vulnerable to shocks, particularly in the agriculture sector. The prevalence of poverty is associated with low productivity in subsistence agriculture. Poverty is highest (77 percent) among households (often landless) that obtain more than half their income from working on other people's farms. The next poorest group is those with diverse livelihoods who obtain more than 30 percent or more of their income from farm wage work (76 percent). Smallholders hold an average of four to five plots that make up a mean land size average of approximately 0.59 ha, with a median value of 0.33 ha. The land distribution is skewed: 36 percent of households own 6 percent of farm land, with an average of 0.1 ha per household. Women are more likely to fall into this category. In addition, women provide the bulk of labor in the crop sector, but function mainly at subsistence level with insufficient skills, access to markets, and control over land and other agricultural facilities. A key challenge for EDPRS 2 is therefore to ensure that sustained growth and poverty reduction occur nationwide and among all groups. Therefore enabling graduation from extreme poverty, particularly in the agriculture sector, is stated as one of the priority areas of PSTA 3.

[76] Preparation of a Revised M&E Framework and ASIP for PSTA 3: Intermediate Final Report (May, 2014), prepared by EU-funded consultants.

57. **Gender equity and equality have been highlighted as a foundational and cross-cutting issue under EDPRS 2**. Rwanda builds on a solid foundation, having the highest percent of women in Parliament in the world (63 percent) and a relatively high percent of women's participation in all decision-making local government bodies (32 percent). The GoR has made a strong commitment to gender equity and equality, and is determined to see it well-integrated in policies and programs at all levels. The GoR is committed to placing the family at the center of development, and as a prerequisite to achieve equitable and sustainable development for women and men. Gender equality and family promotion are firmly entrenched in both PRSP and EDPRS 1. EDPRS 2 also ensures that the achievements realized in the past years are sustained and that new approaches and innovations towards family and gender are promoted. EDPRS 2 mainstreams gender and family in the planning, budgeting and in all development programs at national and local levels. PSTA 3 sector strategies and District plans focus on interventions that reduce poverty levels among men and women, and reduce gender-based violence, malnutrition, and other related conflicts, at both family and community level.

58. **In the rural/agriculture sector, progress has been made towards achieving gender equality and ratifying regional and international legal instruments to protect women's rights**. Rwanda has a legal framework supporting gender equity and equality in the Constitution of 2003. Nevertheless, gender disparities are still prevalent in the rural/agriculture sector. On an average, rural women have longer working hours than men. Women's burdens are worsened by the fact that they are involved in doing activities that are labor intensive and time consuming, with low remuneration. Key gender issues in the agriculture sector are: i) lack of gender-related knowledge and skills among extension workers and few female extension staff, considering the large percentage of women farmers; ii) low literacy levels, particularly among women, limits training opportunities; iii) limited gender-sensitive technologies; iv) organizing training and capacity-building activities as per women's convenience; v) lack of access to finance, marketing, and value addition opportunities due to lower levels of education among women; and vi) gender disparities among senior staff in the agriculture sector. As a result, women remain in subsistence agriculture; they receive low prices for their products due to lack of market and finance. All these factors result in a vicious cycle of poverty. Thirty percent of the country's households are female-headed and most of them are very poor. Therefore, the strategy of mainstreaming gender in policies, programs, projects, and activities forms a foundation for equal rights and opportunities for women and men in the agriculture sector and rural development. MINAGRI has developed a Gender Strategy[77] that describes the issues in detail and sets out a sound agenda to address them.

59. **Youth**. **There are 4.1 million youth (defined as the 14-35 years old) in Rwanda, which constitutes about 39 percent of the population**. The largest age group within the overall youth group is the 14- to 19-year-olds who comprise 14 percent of the total population. The main challenge for youth is providing employment opportunities and the training necessary to obtain the higher-skilled jobs that will help them break out of poverty. Many youth do not find traditional agriculture attractive and therefore seek rural off-farm employment or urban jobs. EDPRS 2's thematic area on youth and productivity highlights a number of youth-targeted programs. PSTA 3 further mainstreams youth involvement in agriculture. Three key program areas for youth are relevant to achieving the growth and poverty reduction objectives of PSTA 3, namely: i) develop a TVET curriculum for agricultural specializations; ii) target youth in entrepreneurship programs; and iii) develop an agricultural leadership program for youth to include intensive seminars and hands-on experience in modern agriculture and visits to selected sites in the region.

60. **Environmental mainstreaming in agriculture**. **Soil conservation mainstreaming through appropriate soil conservation measures is of great importance and should be done through the promotion of integrated soil fertility management programs combining the use of chemical and organic fertilizers to improve productivity but also to preserve soil's physical and chemical characteristics**. The different techniques that have been implemented, such as composting, green manure, and organic mulching, will need to be

[77] Agricultural Gender Strategy, Ministry of Agriculture and Animal Resources, November 2010.

scaled up nationally. These techniques improve soil's organic matter content, water-holding capacity, infiltration rate, and microorganism activity.

61. **Environmentally sound water management in irrigation schemes is very crucial to the sustainability of these schemes, and will be accomplished through the adoption of appropriate irrigation schedules determining the correct irrigation amount and answering the typical questions of what, when, how, and how much to irrigate**. This will lead to improved water use efficiency and avoid deep percolation and leaching of specific nutrients that significantly harm soil over time.

62. **Environmental considerations in rural roads**. **The widening of roads may impact natural vegetation and soil stability, which may lead to erosion unless proper surfacing and side drainage facilities are provided with erosion protection measures, such as stone pitching steep slopes and providing check dams**. Some of the roads to be widened are degraded, and cross hilly terrain susceptible to landslide and marshlands, which may have fauna and flora of ecological importance. The rehabilitation and upgrading works can involve significant earthwork and construction of slide protection and drainage structures, as well as embankments crossing marshlands. Potential adverse impacts include: loss of agricultural land and vegetation due to excavation of land in road expansion and borrow areas; slope instability due to soil and water erosion and operation of machinery; disruption of natural drainage/flow and flooding; pollution of water bodies due to improper disposal of solid waste and spoil; and increased noise and air pollution in the vicinity of construction sites. The focus on mitigating potential negative environmental impacts is both imperative and relevant to achieving the sustainable growth and poverty reduction objectives of PSTA 3.

63. **Planning for climate change**. **Climate change, if not mitigated, remains a major risk to Rwanda's agriculture sector, considering that most (90 percent) of its crop and livestock production is rainfed**. The investments being made to increase area under irrigation greatly assist the sector to cope with some of the effects of climate change. The increased adoption of hillside conservation measures and other watershed management structures by smallholder farmers will also help in climate change mitigation. According to PSTA 3, planning for climate change adaptation will be done in accordance to the 2011 National Strategy for Climate Change and Low Carbon Development, with MINAGRI taking the lead. Currently the focus is on risk assessment and vulnerability mapping through modeling and creating a robust database. Several research programs on enhancing climate change adaptation and mitigation are also ongoing. Going forward, the greatest challenge will be to raise various stakeholders' awareness on climate change issues, particularly the farming community. Integration of climate change issues in planning, research, and extension programs also remains a challenge. Thus, while efforts are being made to integrate appropriate climate change adaptation and mitigation measures, more needs to be done in the future to reduce and better manage climate change risk, including the inclusion of appropriate indicator(s) in the RF to monitor the mainstreaming of climate change in the PSTA 3 program.

64. **Nutrition and household vulnerability. Food security and nutrition are key priorities for Rwanda. A National Nutrition Policy was formally adopted in 2007**. It became apparent that while poverty was falling, changes in acute and chronic malnutrition were more intransigent. About five years ago, the government stepped up its commitment to tackle nutritional challenges, resulting in: a Presidential Initiative that inspired a nationwide emergency action to find and manage all cases of acute malnutrition in children (2009); multisectoral participation and consensus around Rwanda's First National Nutrition Summit (2009); the Second National Nutrition Summit (2011); completion of health facility and community-level tools to more effectively promote and counsel on Maternal, Infant and Young Child Nutrition (MIYCN); development of the National Multisector Strategy to Eliminate Malnutrition (NmSEM) (2010); a national Joint Action Plan to Eliminate Malnutrition (JAPEM 2012); and District Plans to Eliminate Malnutrition (DPEM) in every District (2011).

65. **EICV identified that in 2012 about 460,000 households (21 percent) had poor or borderline food consumption patterns (82,000 households (4 percent) had poor consumption patterns; 378,000 households (17 percent) had borderline).** These households are vulnerable to seasonal shortages and also have inadequate

provision in the case of drought or excess rainfall. Food insecurity follows a distribution similar to that of poverty across Districts. Food insecurity is coupled not only with inadequate consumption but also with low diet diversity, resulting in chronic malnutrition (stunting) and micronutrient deficiencies. About 43 percent of children under five are stunted; this is highest among children aged 12 months old (at 70 percent).

66. **The 2007 Nutrition Policy and its subsequent 2013 revision recognized the need for multisectoral ownership, coordination, and sector-specific activities linked to budgets and financial management, as well as decentralization, equity, and gender sensitivity**. MINAGRI's 2013 Nutrition Action Plan is incorporated into the 2013 National Nutrition Policy as strategic action 3, and the Policy is jointly owned by the Ministry of Health, MINAGRI, and MINALOC. As noted by Minister of Health, "Chronic malnutrition is prevalent. We need to make sure that families know what to feed their children, how to produce it and how to cook it properly." The Minister added that community health workers need to be trained and given nutrition tools because they play an important role in fighting the scourge.[78]

67. **In EDPRS 2, food security and malnutrition are foundational issues. The identified solution is coordinated, strengthened, and scaled-up community-based nutrition programs and information campaigns across the country**. As per EDPRS 2, reducing Rwanda's chronic malnutrition rates for children less than two years old (currently 47 percent) is a prerequisite for Rwanda's continued economic and inclusive development. Nutrition and Food Security is one of the priority areas under Rural Development Strategy (Priority Area 2). Income generation and household food security are intertwined, as households need to be able to generate enough money to buy nutritious and quality food. The commitment to nutrition in the country has grown and is now reflected in all policy updates from the EDPRS 2 and PSTA 3.

68. **The National Food and Nutrition Strategic Plan 2013-2018 (NFNSP) is a five-year implementation plan reflecting and addressing all nutrition-related problems as outlined in the recent National Food and Nutrition Policy 2013-2018 (NFNP).** As a multisectoral plan, the NFNSP, although co-owned by three ministries,[79] is being implemented with the participation of other line ministries.[80] It comprises seven strategic directions,[81] of which strategic direction 3 (Improving Household Food Security) fully embodies MINAGRI's Nutrition Action Plan (MNAP[82]). The Plan has been costed at US$44.2 million.

69. **MINAGRI's Nutrition Action Plan 2013-2018 was recently developed as part of the National Food and Nutrition Strategic Plan 2013-2018 (NFNSP).** It focuses on the agricultural perspective to addressing food security and nutrition-related issues. MINAGRI's MNAP includes six specific objectives underpinned by a set of 29 key interventions[83] to be implemented between 2013-14 and 2017-18 inclusive. The six objectives of MNAP are: i) Households increasingly diversify the food production; ii) Improve nutrition-related agricultural knowledge/practices of households; iii) Income-generating capacities of food and nutrition insecure households supported; iv) Availability, Affordability and Quality of nutritious food is increased; v) Increased access to and use of appropriate food for the most vulnerable households; and vi) Governance of food security and nutrition enhanced.

[78] Rwandan Times, January 2nd 2012.
[79] The Ministry of Local Government (MINALOC) as a coordinating entity, the Ministry of Health (MINISANTE) and the Ministry of Agriculture and Animal Resources (MINAGRI).
[80] Other line ministries actively participating in the NFNSP implementation include: the Ministry of Education (MINEDUC), the Ministry of Gender and Family (MIGEPROFE), the Ministry of Education (MINEDUC), the Ministry of Disaster Management and Refugees (MIDIMAR) and the Ministry of Youth (MINIYOUTH).
[81] The seven NFNSP's strategic directions include: i) Food and Nutrition advocacy to sustain commitment and generate resources for implementation, ii) Prevention of chronic malnutrition, iii) Improving household's food security, iv) Prevention and management of all forms of malnutrition, v) Improving food and nutrition in schools, vi) Assuring food and nutrition in emergencies and vii) Support programs and services.
[82] MNAP = MINAGRI Nutrition Action Plan.
[83] National Nutrition Action Plan 2013-2018. A contribution the National Multisectoral Strategy (NSEM) and to the Joint Annual Nutrition Action Plans (JAPEMs) to Eliminate Malnutrition. MINAGRI, July 2013.

70. **Key actions recommended in PSTA 3 to address food insecurity and malnutrition build on the above nutrition strategies, and are to**: i) support households in nutritious garden practices and diversifying food production. The kitchen garden program initiated in 2012 will be scaled up, and farmers will be encouraged to use land around their homes to grow diverse fruits and vegetables and to adopt intercropping practices; ii) improve nutrition-related knowledge and practices for food insecure households – kitchen gardens, intercropping and better nutrition (including cooking demonstrations) will be promoted through extension workers, Farmer Field Schools, Self-help Groups, District agronomists, and agricultural village promoters. MINAGRI is supporting a multisectoral Behavioral Change Communication initiative to improve and institutionalize nutritional knowledge; iii) develop a program of biofortified food, especially focusing on beans fortified in iron, vitamin A-rich maize, orange sweet potato, fortified cassava, and rice; iv) continue to maintain an adequate national strategic food reserve to address potential shocks to food supply that the market or other GoR programs cannot or have not adequately addressed, thus helping to improve food security. This strategic food reserve should consist of selected staples such as maize and beans; and v) strengthen Rwanda's food security information system to bring together quantitative information from different sources, which would be processed into indicators that will enable timely decision making, and to consolidate data to MINIGRI and its agencies for effective monitoring.

71. **The implementation of the strategy does not consist of multisectoral coordination groups at every level**. Rather, each line ministry knows its responsibilities and accountabilities in terms of changing nutritional status. In a sense, instead of "think globally, act locally," this approach involves "think multisectorally, but act sectorally." The policy does not envisage ministries acting outside their core comparative advantage.

Annex 4: Detailed Description of Program Technical Soundness

1. **Summary. The technical design of PSTA 3 and the PforR operation is overall sound and contributes to the objective of efficiently and effectively producing the key results of the Program, and achieving the strategic development objectives and desired impacts in terms of sectoral transformation from overall subsistence to commercial and market-oriented farming, economic growth, and poverty reduction**. The Program design is based on best practices in terms of technical standards and typology of activities and has in fact set the standard globally for an effect model for integrated sustainable land management in the context of small landholding farmers. Both sustainability and incentives for farmers and other key stakeholders to engage in, embrace, and sustain productivity increases and continual income increases while contributing to the achievement of the Program's objectives are built into the design.

2. **A key feature contributing to the soundness of the technical design is that it is built around the key drivers of agriculture transformation, economic growth, and poverty reduction.** These key drivers include land husbandry activities, technology, research and extension, agricultural finance, private sector value chain development, market-oriented infrastructure, and institutional development to build the sector's capacity to: i) deliver in an efficient, effective, and increasingly decentralized manner enhanced by gender-responsive and youth-friendly policies and services; and ii) provide a conducive policy and legal framework and reliable statistics for rapid and sustainable agricultural growth.

3. **All four programs and their respective SPs were reviewed and evaluated by the World Bank's technical specialist on their technical soundness and their efficiency and effectiveness to contribute to the overall achievement of the Program's key results.** The programs and SPs were all found to be technically sound, but the review identified areas for potential strengthening and improvement. In general, MINAGRI counterparts have welcomed the review's constructive suggestions, and therefore, the PforR will support their implementation as they are incorporated by the various implementing agencies.

Program 1: Agriculture and animal resource intensification

4. **Summary. The design of program 1 took into account effective solutions and responses to some of the major constraints in the sector related to: i) sustaining the productivity gains in the medium-to-long term and expanding them to more food and export crops and livestock, which have made a significant contribution to strong agricultural growth and raised rural incomes in the last five years; and ii) increasing food and nutrition security for the rural population**. The key outcomes from program 1 are anticipated to be: i) soil erosion reduced and land sustainably managed; land productivity for priority crops increased; and iii) animal productivity increased and animal products diversified. The SPs consist of soil conservation and land husbandry, irrigation and water management, agricultural mechanization, agrochemical use and markets, and seeds and livestock development.

5. **Soil Conservation and Land Husbandry**. **Given that most of Rwandan soils (90 percent) are on hillsides and that most of the soils are old and depleted in nutrients either by erosion or overcultivation, the achievement of PSTA 3 will be highly dependent on the effective use of soil.** The programs under PSTA 3 aim at provision of infrastructure for erosion control and rejuvenation of soil health. The GoR has developed strong leadership in soil conservation work. The proposed investment in better understanding Rwandan soils will be crucial to help formulation of differentiated recommendations for input use (lime and fertilizers). New technologies that minimize soil turning and help conserve the soil moisture, like minimum tillage, and mulching will also be key in achieving the goals of this SP. Tremendous achievements have been documented in significantly enhancing soil conservation technologies, especially under World Bank-financed projects. These technologies will need to be scaled up in a larger area of Rwanda. There is need for a comprehensive and harmonized guidance on establishment and maintenance of erosion control infrastructure, and appropriate and area-specific guidance on soil fertility management. There is plenty of technical capacity within RAB and SPIUs

to develop and manage erosion control and implement soil conservation programs, but this needs close integration with research teams to remain up-to-date.

6. **Irrigation and Water Management. Most of Rwandan agriculture is rainfed and climatic and seasonal variations negatively affect agricultural production. For this reason, PSTA 3 has set ambitious targets of developing an additional 40,000 ha of irrigation to reach a target of an additional 63,000 ha of irrigated land nationally**. This will comprise both marshland and hillside irrigation. So far the maximum amount of irrigation infrastructure has been developed by the GoR and has a significant amount of public good element. Since 2008, the GoR has made irrigation development a key national priority, to achieve sustainable production levels and to mitigate climatic shocks. Institutions and policies have been put in place gradually to work on this key priority. As public funding will not provide irrigation for all the required irrigable land, appropriate incentives for private sector investment in this subsector are being put in place as the private sector will play a key role in achieving this ambitious target, especially considering that most irrigable land is privately held. Technical capacity to develop and manage large-scale irrigation infrastructure is lacking and a lot of TA is required for the ongoing projects. The education program on irrigation and water management is very recent in Rwanda and a critical mass of irrigation professionals has yet to be built. The existing capacity relies heavily on the TA available within SPIUs. Water Users Associations (WUAs) will be established (where not existing) and strengthened through training of both male and female members.

7. **Agricultural mechanization. The total area suitable for mechanization is estimated at 1 million ha, which represents around 60 percent of the total cultivatable area. The expectation under PSTA 3 is that about 25 percent of Rwanda's 2 million farmers will have their farm operations mechanized by 2017**. This means that 500,000 Rwandan farmers would either own and/or hire mechanization services. The government, through MINAGRI, has been heavily involved in the mechanization drive since the Mechanization and Irrigation Task Force was established in 2009. Plans are underway to hand over mechanization services to private entities such as cooperatives or rural communities, private companies, and young professionals while stressing the need to focus on agricultural zones where mechanization can be easily implemented and managed. Initial experience suggests that the mechanization strategy is sound technically, but has to be expanded to include simple mechanized tools to cater to smallholder farmers, who cannot access large-scale mechanization without financial support from the government and/or DPs.

8. **Agrochemical use and markets. MINAGRI's focus on increasing the adoption of improved inputs is predicated on the belief that current fertilizer consumption is well below levels that could be profitable**. Using the value-cost (v/c)[84] ratio as a measure of profitability, a combination of DAP and urea has been observed to be more profitable than using the NPK fertilizers (17-17-17) that have traditionally been recommended in the past. In general, fertilizer could be used profitably in a wider range of zones and communes in the production of maize, sorghum, Irish potatoes, sweet potatoes, and climbing beans as well as for irrigated rice, horticultural crops such as cabbage, and inoculated soybeans. Although there is substantial potential for profitably increasing fertilizer use in Rwanda, it is important to identify crop/zone combinations where fertilizer is not profitable and avoid them.

9. **Seed development.** Scientific and technical development of agricultural and animal resources in Rwanda to improve the livelihoods of low-income farmers prior to July 2011 was mandated to the Rwanda Agricultural Research Institute. The institute carried out research and promoted technologies in crop production, livestock, forestry, agroforestry, post-harvest management, land conservation, and water management. Since 2011, these research areas have continued under the Rwanda Agricultural Board (RAB) and are grouped under three main program areas: crops, livestock, and natural resources management. Some progress has been made at the national

[84] Value cost ratio (v/c) is defined as the value of additional production obtained from using fertilizer divided by the cost of the fertilizer treatment. A v/c ratio >2 is generally considered an adequate incentive for fertilizer adoption; it means that the financial returns to using fertilizer are two times greater than the cost.

level to support seed sector development. In 2004, stakeholders formed the Seed Traders Association of Rwanda (STAR) upon the recommendation of the East African Seed Committee (EASCOM). Following the development of a seed policy in 2007 to define the roles of various stakeholders in the seed value chain, a seed master plan involving main stakeholders of the seed chain was developed and adopted in 2008.

10. To produce, conserve, and treat seeds to be kept safely for a long time, a Rwanda Seeds Enterprise (RSE) was established in 2010. Beyond these national endeavors, RAB's Seed Project program has formed strategic alliances with various continental and regional bodies to add value to their activities. RAB links up with NEPAD and COMESA frameworks. Within EAC, RAB collaborates with ECAPAPA (Eastern and Central Africa Programmes for Agricultural Policy Analysis) and ASARECA (Association for Strengthening Agricultural Research in Eastern and Central Africa) for harmonizing Rwanda seed policies. It is also involved in the EAC seeds standards harmonization effort being led by RBS. Rwanda is also a member of African Regional Intellectual Property Organization (ARIPO). In other words, Rwanda has laid the foundation for establishing a technically sound seed sector linked to regional and subregional initiatives. These roles and arrangements are being reflected in a new seeds policy currently under discussion.

11. **Livestock Development.** For the livestock sector, PSTA 3 and its overall results chain are technically sound and most of the proposed indicators would measure well the progress towards achieving PSTA 3's strategic objectives and the PforR operational results. The growth of some subsectors of animal production (such as dairy) has been impressive in the past 15 years, demonstrating a sound strategy and overall good implementation. It is worth noting that the lack of lands and pasture as well as availability and accessibility of feed are identified as key bottlenecks to livestock intensification and productivity increase in the country.

Program 2: Research, technology transfer and professionalization of farmers

12. **Summary. The key outcomes of program 2 are:** i) improved technologies which are responsive to Rwanda's agro-ecological potential, men and women farmers' needs and resources, and market prospects; ii) enhanced integrated and market-oriented extension and advisory services which result in higher proportion of farmer adoption of improved technologies, for both men and women; and iii) strengthened inclusive and business-oriented farmers' cooperatives/organizations with enhanced entrepreneurial skills for effective engagement in input and output markets. The SPs are: i) research and technology transfer; ii) extension and proximity services for producers; and iii) farmers' cooperatives and organizations.

13. **The program and SPs were analyzed and reviewed and found to be sound technically based on good research, extension, and strengthening of farmers' cooperatives' practices.** The outcomes and associated outputs and key activities were also assessed and found to form the relevant results chain, which contributes to the key productivity and commercialization objectives of the Program. Additionally, areas for increased effectiveness in design and implementation were identified.

14. **Research. Prior to July 2011, the Rwanda Agricultural Research Institute (French acronym ISAR) was mandated with conducting scientific and technical development of agricultural and animal resources in Rwanda to improve the livelihoods of low-income farmers**. The institute carried out research and promoted technologies in crop production, livestock, forestry, agroforestry, post-harvest management, land conservation, and water management. These research areas have continued under RAB, with the research grouped under three main program areas: crops, livestock, and natural resources management. The research is being conducted through multidisciplinary teams and has moved away from traditional research-extension linear processes to Integrated Agricultural Research for Development (IAR4D), based on an "innovation platforms approach." In this system, the stakeholders (farmers, scientists, traders, local authorities, NGOs and the private sector) are becoming increasingly involved in the research process, from priority setting and technology development to technology transfer. However, the value chain approach, which is central in PSTA 3, has yet to be fully integrated in some research activities. Efforts have also been made to strike a balance between the three program areas, although the

crop program remains the largest in resource allocation. Increasingly, the research program is also embracing cross-cutting issues such as climate change adaptation and mitigation. The research program is therefore found to be technically sound and in line with the objectives of the PSTA 3 program. Nevertheless, the research programs cost-effectiveness and efficiency would be further improved by enhanced collaboration with other regional research programs, especially in the other East African countries. This collaboration will: allow more resources to be devoted to adaptive research; enhance specialization; and reduce initial basic research costs.

15. **Extension and proximity services for producers are key interventions implemented under the CIP. The CIP is based on three pillars: i) land use consolidation; ii) improved seed and fertilizer use; and iii) proximity of extension service to farmers.** RAB and Districts have adopted a Farmer Field Schools (FFS) approach, which emphasizes farmer-to-farmer extension. In the changing context for rural smallholders where no blanket recommendations exist in agriculture and collective action is required to access markets, farmers need to organize, be innovative, and be able to adjust to changing situations. In this context, FFS have an important role to fill in the development of locally-based innovations, to create knowledge for a framework of action, and to boost local management and leadership skills, aspects not normally catered to in regular training and extension based on technology transfer concepts. The FFS process has been shown to build self-confidence (particularly for women), to encourage group control of the process, and to build group and management skills. Farmer-led FFS have also been a common strategy both for scaling-up FFS interventions and for cost reduction in both Asia and Africa. Efforts have been made to compare FFS costs versus other methods of extension but the comparisons fall short due to the difficulties in comparing outcomes of the investments, particularly in relation to aspects of empowerment, which are very difficult to value. Thus, despite the challenges that accompany FFS in general, the Rwandan model is found to work well and is technically sound, especially given the past recorded productivity gains, strong government support both at national and local levels, and its effective dovetailing with other government community initiatives. However, given the shift in emphasis to a value chain approach and the need to commercialize agriculture, there is need to focus more on capacity building for both farmers' groups, service providers, extension staff, and other key stakeholders on business development services.

16. **Farmers' cooperatives and organizations. This SP builds on the successful development of farmers' cooperatives under PSTA 2, and ongoing flagship projects in the sector such as LWH and RSSP 3**. Five key objectives highlighted in PSTA 3 are to: i) develop management and entrepreneurial capacities in farmers' cooperatives and organizations; ii) support farmers' organizations' participation in activities of higher value, both at the farm level and in post-harvest handling and agroprocessing; iii) develop farmers' organizations as vehicles to improve farmers' access to inputs in a demand-driven way; iv) develop rural women's organizations and groups within cooperatives; and v) promote the growth of social capital to provide farmers' organizations with an enduring foundation for the longer run.

17. **To achieve the above objectives, six lines of actions are being carried out**: i) encourage farmers to form new cooperatives in new markets to increase the number to 2,500 cooperatives; ii) train cooperative members in management, organization, and entrepreneurial skills to increase the proportion of cooperatives trained from 30 percent in 2013 to 60 percent by 2018; iii) facilitate and train cooperative members in post-harvest handling and agroprocessing techniques and facilitate the entry of cooperatives into these markets; iv) increase the proportion of cooperatives that procure farm inputs for their members from 15 percent in 2013 to 45 percent in 2018, through facilitation and training; v) increase the volume of agricultural credit accessed by cooperative members from RwF 373 million in 2013 to RwF 560 million in 2018; and vi) increase the number of cooperative members accessing agricultural insurance from 20,238 in 2013 to 200,000 in 2018. In all of these activities, efforts will be made to ensure adequate attention is given to involving/supporting women members.

18. **PSTA 3 has not fully captured experience on farmer empowerment and institutions on the ground, and as a result, this is not fully reflected in the ASIP**. There is need for harmonization of various approaches (within SPs 2.2 and 2.3 – extension and farmers' organization) as well as ensuring participatory and bottom-up institutional structure of the cooperatives. While the farmer-to-farmer approach is well recognized by PSTA 3,

there are currently variations within several programs in MINAGRI, RAB, and the SPIUs. Lessons and insights highlighted in the Implementation Completion Report (ICR) of RSSP 2 (2012) should guide the harmonization of the approach and quality of these entities. Also, section 2.3.1 of PSTA 3 talks about the key pillars for rapid sector growth, which include soft skills and farmer capacity; to support this pillar, it talks about the focus area of "professionalization of farmers, reorientation incentives in agricultural extension, privatization and extension to cover business advisory services and marketing assistance." The professionalization of farmers is critical for increasing production and commercialization.

19. **MINAGRI has already addressed the key issues of harmonization of various approaches and the bottom-up institutional model of cooperatives as part of the Ag. PforR preparation, and a policy on the institutional aspects of farmers' organizations and farmer-to-farmer extension systems has been approved in principle by the Cabinet**. The new model starts with the farmer at the community level and is supported through the village to the national level by technical committees. It consists of a two-pronged approach: Self-help Groups (SHG) to cooperative model and farmer-to-farmer extension. MINAGRI is in the process of developing an operational plan on how to integrate FFS and other existing systems. This institutional framework is critical to ensuring that farmers' organizations and cooperatives are inclusive, participatory, gender- and youth-sensitive, and sustainable and include the bottom 50 percent of households. This inclusive institutional framework for farmers' organizations/cooperatives is important not only for poverty reduction, but also for commercialization of production and private sector development. The details of the policy note are being worked out, and will be finalized as part of Ag. PforR preparation by appraisal. It builds on the lessons and experiences of the flagship LWH and RSSP 3 projects and other good practices in the sector.

20. **The new approach calls for systematic mobilization and institution building and a decentralized approach to empower Districts and to devolve decision-making management and implementation of agricultural activities to the village level**. It recommends SHGs (15-20 farmers) as the foundation for institutional development. Each SHG selects a group leader whose main role is to guide and supervise the group members in uptake of good agronomic practices. One farmer promoter is selected per village and trained in practical skills (related to crops) as well as in soft skills of planning and communication, to enhance his/her ability to act as an extension agent for other farmers in the village.

21. **The key challenges now are to operationalize the new approach and mobilize necessary technical assistance required to build capacity at the farmer and staffing level to implement the new policy**. Some of the questions to be addressed during next few months are: i) What happens to the 1,877 cooperatives already established and functioning? Would these cooperatives be restructured as per the new policy?; ii) Do the District and national teams that have been formed as core teams for technical support have necessary knowledge and expertise to provide technical assistance and monitor the performance of the cooperatives?; iii) What package of TA would be required to achieve outcomes and results as envisioned by the program? This requires reviewing what has already been done by the LWH and RSSP projects, identifying gaps, and finalizing a capacity-building plan; v) What role would the Trainer of Trainers (TOT) have?; and vi) Regarding the farmer-to-farmer extension model operating for the last three seasons, what lessons have been learned and how can this model be further improved to ensure that it is self-sustaining? (i.e., the role of farmer-to-farmer extension should be institutionalized so that the District and national teams can focus on monitoring their performance, identifying gaps, and providing technical assistance).

Program 3: Value chain development and private sector investment

22. **Summary. The key outcomes of program 3 are: i) enhanced business environment for expanded agricultural investments and value addition; and ii) competitive and private sector-driven value chain development and expanded commercialization of production for domestic and export markets, enabled by expanded access to finance, more efficient and effective agricultural marketing systems, and improved rural infrastructure**. The SPs are: i) creating an environment to attract private investment, encourage

entrepreneurship and facilitate market access; ii) development of priority value chains: food and export crops, dairy and meat, fisheries, apiculture (5 SPs); iii) agricultural finance; and iv) market-oriented infrastructure for post-harvest handling and storage.

23. **The program and SPs were analyzed, reviewed, and found to be technically sound based on the results chain for each SP strategic objective including the outcomes, outputs, and proposed activities to accomplish the outputs.** Areas for increased effectiveness in design and implementation were identified.

24. **Creating an environment to attract private investment, encourage entrepreneurship, and facilitate market access.** The specific objectives of increasing overall production, productivity, and value addition in target value chains as well as creating an enabling environment conducive to increased private sector participation are well aligned with the set target for increasing the value of exports in priority value chains by 28 percent p.a. by 2018. However, more in-depth understanding needs to be developed in terms of mid-term market demand dynamics expected for each value chain as well as a clearer prioritization among the various levers available to the government (i.e., expansion, intensification, value addition) to achieve the set export growth target in a sustainable way. How much of this target will come from intensification and how much is expected from expansion in terms of contribution to achieving the targets? Early engagement with the private sector suggests intensification should be considered as a first priority over expansion given Rwanda's land constrained environment, particularly for expansion of well-established, more traditional export value chains (tea and coffee). Intensification efforts could very well be supplemented by expansion based on a clear value proposition for farmers in target areas.

25. **Development of priority food crop value chains**. Promotion of the eight priority food crops (bananas, wheat, maize, rice, Irish potatoes, cassava, soya beans, and beans) is of critical importance to food security and nutrition, growth, and poverty reduction. The emphasis of the value chain approach is found to be best, especially since most farmers have started to produce surpluses for the market after satisfying their consumption needs. However, it is important to note that taking a value chain approach involves addressing the major constraints and opportunities faced by businesses at multiple levels of a given value chain. This can include a wide range of activities, such as facilitating access to cheaper or better inputs, strengthening the delivery of business and financial services, increasing access to higher-value markets, or simplifying export licensing. Furthermore, a value chain approach requires capacity building for farmers and other service providers such as extension agents to ensure there is an orientation towards "farming as a business" rather than for subsistence. Some of these ingredients of a value chain approach are found to be weak or lacking currently. Going forward there is need to undertake comprehensive value chain analyses of the eight priority food crops to identify the gaps and develop an action plan on how to fill these gaps. Apart from the domestic market, regional markets also need to be studied to better understand their needs and constraints.

26. **Development of priority export value chains.** More clarity is needed on areas in which FDI is required and in what volume to achieve export value chain targets. For example, in the horticulture export value chain, serious inflows of FDI will be required as a necessary condition for meeting the ambitious export growth targets set for this relatively small but emerging export subsector. Success in this area will hinge on addressing infrastructure and logistics challenges (e.g., cold chain) and successfully identifying promising PPP and greenfield investment opportunities. For the tea, coffee, and horticulture subsectors the expectation is that the market can absorb the increased export volumes planned. In the pyrethrum subsector, the market dynamics need to be better researched and understood to allow for a proper validation of the feasibility of the targets set. For all these export subsectors, the target areas for planned expansion of production need to be reviewed from a poverty reduction and social risk standpoint as they involve farmers switching from predominantly food crops to cash crops. Intensive training support will be required as these farmers move into producing new crops for which they lack experience.

27. When considering the objective of increased commercialization of export value chains and the need for considerable private sector investment to achieve subsector targets by 2018, there is a need for stronger involvement of the private sector, both in-country and other potential investors in the planning and implementation stage to clarify how these objectives can best be achieved and the best division of labor between the government and private sector. Building on the private sector consultation (held on March 27, 2014), further validating PSTA 3's RF with a select group of private sector operators in each sector is a recommended first step.

28. **Development of Priority Value Chains: Dairy, Meat, Fisheries and Apiculture.** The overall approach for the development of these four value chains is technically sound, with focus on feed-producing and -processing infrastructures (with strong private sector involvement), but also development or enhancement of the legal and policy framework and SPS standards. However, it is not clear how indicators related to increased revenue for value added of the value chains' products will be monitored and the implementation arrangements for the different activities need to be better described.

29. Moreover, parts of the Strategic Plan and its RF require further work to make them consistent with the overall objectives of PSTA 3, implementable, and easier to monitor. These include: i) better describing the section on "improved control of animal diseases," including using a pre-operational tool such as the World Organization for Animal Health (OIE) Performance of Veterinary Services (PVS) pathway; ii) improving the baseline data and source/methodology of the indicators; and iii) avoiding discrepancy and contradictions between this SP and SP1.6 (Livestock Development) and their respective activities.

30. **Agricultural Finance.** The action items to achieve expanded and inclusive access to viable agriculture loans and enhanced recovery rates include: i) developing a national agricultural finance policy; ii) developing a warehouse receipts (WRS) act and regulations; iii) M&E of existing agricultural financial instruments; iv) constructing warehouses; v) MINAGRI facilitating a value chain finance relationship through contract farming; vi) MINAGRI, in collaboration with agriculture financial stakeholders, establishing and convening agricultural finance forums; vii) MINAGRI, in collaboration with other stakeholders, providing specialized training for bank officers in providing credit to agriculture, including support in preparation of business plans; and viii) MINAGRI, in collaboration with other stakeholders, raising public awareness of available financing instruments. These actions are comprehensive and well-targeted, however they may fall short of achieving the indicated outcome due to the following reasons: a) many of the action items require development of policies and national plans that will inform more detailed actions later on, but by themselves will not help reach the indicated targets; b) it is not clear whether WRS is the main mechanism that would increase loans by the banks to the agriculture sector (which is the only specific action proposed in addition to stakeholder development and capacity building). With the existing data and information in the financial sector, it is not yet possible to assume that the warehouse receipts act and regulations, by itself, will more than double the loans extended to agriculture; c) support to warehouse infrastructure assumes the lack of storage capacity to be the main reason for the absence of a functioning WRS. There is also an assumption that government funding is required to improve this capacity. Both assumptions are currently unfounded, as no demand and feasibility analyses exist for WRS in Rwanda; and d) facilitating value chain finance relationship through contract farming is a vague action item. Further specificity is required on these four areas to strengthen the results chain to achieve the desired results and targets.

31. Although somewhat vague/high-level, increasing access to sustainable agriculture and livestock insurance, the main assumption (that agricultural insurance requires an enabling framework and premium subsidy) is correct. In addition, action items that will likely help implement the policy framework include: i) developing an index-based crop yield insurance tracking system; ii) developing an M&E framework for agriculture and livestock insurance progress and impact; and iii) increasing public awareness of agriculture and livestock insurance.

32. The outcome of expanded, targeted, agricultural savings mobilization through strengthened SACCOs and other appropriate financial institutions directly ties into the experience of a well-studied and -performed savings-linked input financing program. As such, targeting its expansion with the provided targets is technically reasonable. However, the action items in the results chain (as listed below) should make more explicit references to the required actions and next steps and the reasons for the identification of the target based on the available experience with this program. Action items in the results chain include: i) monitoring and impact assessment of financial education in rural areas; ii) financial education campaigns; and iii) training of financial institutions to develop innovative savings products that meet the specific needs of the rural population.

33. **Market-oriented infrastructure for post-harvest. Promote efficient and equitable transport systems.** MINAGRI, the lead institution for feeder rural roads investments, has prepared a common framework of engagement. The lead technical institution for roads development, the Ministry of Infrastructure (MININFRA), has prepared a Transport Sector Master Plan that provides strategic direction for development of feeder rural roads throughout the country. A comprehensive feeder roads development strategy and program that provides the framework for prioritization of investments, maintenance of feeder roads, and definition of the institutional arrangements is currently under preparation. The National Transport Sector Policy (December 2008) identifies the important role transport plays in stimulating economic growth by increasing internal production and facilitating access to domestic and international markets, while ensuring favorable conditions for provision and distribution of imported products within the country. Emphasis is placed on the development of transport infrastructure and services, in terms of construction, rehabilitation, and maintenance of transportation networks, aimed at growth and economic development to achieve the objectives of *Vision 2020*. The transport policy identifies the need to reduce constraints to transport to promote sustainable economic growth and decrease poverty.

34. Rwanda has a road network of about 19,055 km, of which about 15,055 km is classified, and consists of: 1,211 km and 58 km paved national and District roads, respectively; 1,538 km unpaved national roads; and 12,248 km unpaved District roads. The unclassified roads network is estimated at about 4,000 km, which are predominantly very low engineering standard earth roads, and principally constitute the feeder rural road network. However, these roads are in dismal state, and represent a major constraint to the mobility of the rural population and agricultural inputs and marketable surplus outputs. Farmers' transport to markets relies predominantly on human transport and Intermediate Means of Transport (IMT). Thus, with limited resources, investment in rural roads should be prioritized by the roads' ability to connect areas of economic growth. As a result of insufficient maintenance and inadequate drainage, only about 15 percent[85] of the classified District roads are in good and fair condition, while about 50 percent of the national network in general is in good and fair condition. However, about 95 percent[86] of the paved road network in Rwanda is in good and fair condition as a result of the intensive road rehabilitation works carried out over the last decade. The strategy and targets of the medium-cost scenario for PSTA 3 to construct 11,000 km of feeder rural roads and maintain an additional 1,500 km are both technically sound and strategically imperative for securing efficient access of more inputs and production to markets.

35. **Reduce staple crop post-harvest losses** at the producer and first aggregator level. Post-harvest activities mostly occur before consumption. These include primary handling (drying, threshing, shelling, winnowing, sorting), aggregation and transportation, storage and speculation, marketing, and processing. In general, cereals and legumes are not particularly perishable products, but losses can occur along the post-harvest value chain. Reducing post-harvest losses (quantitative or qualitative losses resulting in a measurable decrease in monetary value) can increase the volume and value of staple crops within the market and available for consumption. To reduce post-harvest losses and at the same time improve intertemporal food consumption, the GoR initiated strategic grain reserve activities in 2010. MINAGRI purchased approximately 7,000 metric tons (MT) of maize and 3,000 MT of beans from Season A production. In 2011, the Post-Harvest Taskforce purchased about 60,000 MT of maize and beans as a strategic food reserve with a potential to reach 200,000 MT. The Post-Harvest

[85] Assessment of the Transport Sector Achievements under EDPRS, RTDA report, 2011.
[86] Road condition survey results of a consulting firm engaged by European Union in 2010.

Taskforce within MINAGRI has oversight and responsibility for the reserve activities. These efforts provide a firm foundation and are technically sound for the management of post-harvest loses.

Program 4: Institutional development and agricultural cross-cutting issues

36. **Summary. The key outcomes of program 4 are: i) enhanced capacity of the sector to deliver efficient and effective agricultural services; and ii) an enhanced policy environment for enabling rapid and sustainable agricultural growth.** The SPs are: i) institutional capacity building; ii) decentralization in agriculture; legal and regulatory framework; iii) agricultural communication statistical systems, M&E and knowledge management; iv) gender and youth in agriculture; v) environmental mainstreaming in agriculture; and vi) nutrition and household vulnerability .

37. **The program and SPs were reviewed and assessed and found to be sound technically and of sufficient design to be able to deliver on the key results and outcomes.** Additionally, potential areas that could benefit from strengthening were identified.

38. **Institutional Capacity Building.** Based on the PforR assessment mission findings and various recent capacity development diagnostic assessments and their corresponding recommendations,[87] the assessment of this capacity development SP concludes the following main points: i) there are adequate recent assessments of the capacity priority needs and required strengthening actions of MINAGRI and its main agencies (RAB, NAEB) to carry out the proposed PSTA 3 Ag. PforR support operation. While there have been some assessments of the District capacities to formulate and implement agricultural programs, these have been limited in scope and depth. Nonetheless, there are several recent assessments supported by the EU, for both overall District capacities and agricultural-specific[88] capacities and required priority actions (2013 and 2014), also as part of support for enhanced decentralization efficiencies and effectiveness; ii) in addition, there is a forthcoming exercise (later in 2014) for a MINAGRI/District Working Group to carry out an exercise that would consolidate and update the priority capacity needs and strengthening actions, with special reference to ensuring the effective implementation of key actions that will help achieve the proposed outcomes and outputs and targets of PSTA 3 as articulated in the RF; iii) the RF for this SP, including its underlying results chain, is technically sound. Generally, it reflects and builds upon the above-mentioned evidenced-based diagnostic assessments and action plans in specifying appropriate interventions that will generate priority outputs and contribute to strategic outcomes outlined for the decentralization SP; it also supports the outcomes of other SPs that involve enhanced services to farmers. At the same time, the results chain can be further strengthened by incorporating the results of the proposed forthcoming updated capacity needs and action plan exercise cited above; iv) both RAB and NAEB are updating their strategic plans with the aim of strengthening their presence and role at the subnational level, while recognizing the expanded role of and need for strengthening planning and implementation and M&E capacities at the District level; and v) MINAGRI and its agencies generally have: a weak M&E system in terms of each entity lacking a well-designed and functional M&E system, with corresponding "SMART" indicators, with their updated baseline and target figures; and an absence of an overall integrated and functional M&E system for the agriculture sector, with limited evidenced-based analysis to help inform decision making. The ASIP includes support for an enhanced integrated M&E system.

39. **Decentralization in Agriculture.** PSTA 3's proposed SP on Decentralized Agricultural Services, and its articulation in the RF is technically sound. The four components are appropriately linked to each other and

[87] Agriculture Sector Capacity Building Plan: 2013- 2018 (MINAGRI, RAB, NAEB), prepared by the Govt. of Rwanda Public Service Commission (2013); Capacity Needs Assessment for MINAGRI, prepared by Coffey International Development, July 2013.

[88] See above footnote for detailed references. In addition, there is a useful assessment exercise which includes relevant recommendations for enhancing the program cycle (and can provide useful inputs for the proposed capacity development assessment exercise (see below): Institutional Architecture for Food Security Policy Change: A Case of Rwanda (prepared by Development Alternatives Incorporated, for USAID), 2014.

together will contribute to the envisioned decentralization SOs. A clear decentralization strategy and road map (as reflected in the Decentralization Implementation Plan (DIP)) is propelling progressive increases in fiscal decentralization to the 30 Districts. Ongoing reforms of MINAGRI and its agencies/units (RAB, NAEB, and the three SPIUs) will further integrate its centralized structure and staff increasingly into the subnational structure (especially at the District level) and its *modus operandi* in the provision of expanded, enhanced-quality agricultural services. These will be accompanied by specific capacity development (CD) programs and interventions, although there is a need to further strengthen these activities at the District and sector levels. There will be expanded participation and transparency at the District levels, although these aspects are at an early stage. The recent planned improved harmonization and strengthening of M&E systems at the national/MINAGRI and District levels, including the introduction of multi-stakeholder/client surveys and other tools at the District level, will contribute to much needed improvements in the governance and accountability aspects of implementing agricultural programs at the District level, including enhanced utilization of earmarked funds (which has been one of the identified weaknesses). These improvements, in turn, will contribute to enhanced performance and results.

40. **Legal and Regulatory Framework.** Formalize the national irrigation policy. An Irrigation Master Plan (IMP) was launched in 2010, established the baseline of the required irrigation developments, and identified the potential for developing irrigation infrastructure nationally. The national irrigation policy will allow operationalizing the IMP. Both the IMP and the national irrigation policy are technically sound and provide both the framework and foundation for implanting key investments in this subsector.

41. **Develop regulations for organic agriculture, pesticides and limestone use.** Laws and regulations have direct consequence for inputs marketing, including registration procedures, packaging and labeling requirements, quality control measures (e.g., pre-shipment inspection and final retail inspection and enforcement) but these are critically inadequate currently. The **Rwanda Seed Law** n°14/2003 was promulgated on May 23, 2003, and six Ministerial Orders (or regulations) related to seeds adopted (the most recent one in 2011), while a national seed policy was promulgated in October 2007. The law is under review consistent with the EAC harmonization protocols and contains Plant Breeders Rights (PBR). Most recently Rwanda actively participated in the harmonization of EAC seeds standards, which are now under public review before they are signed by the EAC Council of Ministers for adoption by the individual member states. Rwanda has yet to ratify the EAC Sanitary and Phytosanitary (SPS) protocols. Once ratified, a Presidential Order would be needed for implementation. A developed crops protection law has been in Parliament for approval for about seven years now.

42. Rwanda developed a **fertilizer policy** in 2007, but it is largely about the increased use of chemical fertilizers without any recommendations and actions targeting the better use of organic fertilizers. Such recommendations are important to improve extension systems to create farmers' awareness on the importance of organic fertilizer, demonstrate better methods of producing and applying organic manure, reinforce investment in soil erosion control measures particularly radical terraces that are efficient, and reinforce integration of livestock production with crop production so that animal manure can be used for crop production and crop byproducts can act as feed for animals. Currently, MINAGRI is finalizing a more comprehensive fertilizer policy that aims to address these gaps.

43. **Organic farming** is not completely new in Rwanda, as most Rwandan farmers use little or no chemicals in farming and could be classified as organic farmers. Officially, however, only those who consciously use organic inputs and certify their products are designated as such. Many farmers are being trained either as individuals or farmers' associations by NGOs (e.g., Gako Training Center) in organic farming practices including certification. Rwanda did not have any standards for organic products until the adoption of the East African Organic Product Standards in 2007. That notwithstanding, Rwandan organic products meant for export are certified to the EU regulation and in a few cases also to the US. There is need to regulate the system but given the limited size of organic agriculture and the low level of awareness among Rwandans, it may be important to first investigate whether the potential benefits of introducing the regulations outweigh the combined cost of resources needed to develop and implement them before moving ahead.

44. Develop regulations around the **value chain guarantee fund**. The technical assessment showed that a new fund may not resolve the current challenges of developing value chains. Indeed it would be more efficient to restructure the Business Development Fund (BDF) and include a focus on value chain development. The BDF is an independent company created in collaboration of the GoR and the Development Bank of Rwanda (BRD) to help SMEs access finance. It has four categories: i) an Agriculture Guarantee Fund that will cover any productive projects developed in agricultural value chains; ii) an SME Guarantee Fund aimed at guaranteeing loans made by participating financial institutions within the framework of promoting SMEs in Rwanda (any productive investment other than in the agriculture sector); iii) a Women's Guarantee Fund aimed at promoting women; and iv) a Retrenched Civil Servants Guarantee Fund that intervenes when borrowers do not have sufficient collateral to cover the whole risk of Participating Financial Institutions (PFI). The Agriculture Guarantee Fund of the BDF has the mandate to support the development of value chains. But due to inadequate funding, low private sector participation in activities that should be their responsibility, and lack of coordination between stakeholders, the Fund has not been able to achieve its objective. Institutional capacity appears weak in terms of coordination, staffing, planning, and capacity to prepare technical specifications documents. The recommendation is to evaluate the current challenges and obstacles of the current Agriculture Fund and restructure it to carry out the functions and objectives of value chain financing.

45. **Develop the legal basis for an agricultural catalytic fund.** While developing the legal basis for an agricultural catalytic fund is an important next step towards diversifying the sources and methods of financing for new ventures and increased entrepreneurship, any effort in this space should be accompanied and to some extent preceded by a clear demand assessment to clarify the fund's objectives and inform its legal and regulatory requirements.

46. **Agricultural communication statistical systems, M&E and knowledge management.** Based on PSTA 3's RF, the strategic objective of the MIS (and component M&E, Stat. Systems and Agric. Communication) is to strengthen the efficiency, effectiveness, access to, and utilization of an enhanced MIS for the agriculture sector that would contribute to enhanced evidenced-based decision making. This would involve the following component systems (with the RF outlining relevant outcomes and outputs): i) Monitoring and Evaluation system; ii) Agricultural Statistical System, including enhanced national food security and nutrition information system; and iii) Agricultural Communication System.

47. Based on information provided in the RF, the overall SO and supporting details (of outcomes, outputs, indicators, baselines, and targets) are sound, although they need to be further operationalized at national and subnational levels. The proposed evaluation framework for PSTA 3 prepared as part of the ASIP document (June, 2014) needs to be further harmonized and aligned with the RF, as well as further simplified and operationalized (a large number of indicators require disaggregated data that are currently not available; therefore, the gap between the "ideal" and the "feasible" needs to be bridged, something that perhaps can be done in a phased manner as the statistical systems are strengthened).

48. The RF outlines five sound outcomes for the MIS (with corresponding indicators, baselines, and targets, and specific outputs/supporting activities): i) improved M&E System for Agriculture Sector, leading to better and more timely decisions at management level; ii) harmonized and accessible Agricultural Statistical System to support evidenced-based decision making (ref. to planning, budgeting, implementation, M&E); iii) enhanced operational food nutrition and security information system to support better decision making; iv) enhanced agricultural communications: agricultural information is collected, managed, enriched, and placed at the disposal of all actors of the agricultural development of the country; and v) strengthened MIS for Agriculture Sector, resulting in better and more timely decision making by key actors.

49. **Gender and youth in agriculture**. The overall goal of the gender strategy is to contribute to poverty reduction and sustainable development through institutionalization of gender-responsive programming, implementation, monitoring, and reporting systems and improved gender equality in the agriculture sector. For MINAGRI, the strategic objective is to improve gender equality in the agriculture sector and redress existing disparities. The Ministry's strategy aims at mainstreaming gender within MINAGRI's institutional and operational framework. The following are key actions recommended by PSTA 3, and elaborated in the gender strategy to achieve gender equity: i) institutionalize gender equality in the agriculture sector (all entities should have at least 30 percent representation by women); ii) develop capacities for gender-sensitive programming; iii) enhance gender-responsiveness in agricultural service delivery; iv) promote equal participation in decision-making processes; and v) continue to develop, strengthen, and operationalize partnerships with gender-focused institutions.

50. The Gender Strategy and Action Plan is comprehensive and includes interventions in each of the above five priority areas. PSTA 3 has included two gender objectives: i) to institutionalize gender-responsive programming and implementation; and ii) to improve gender equality in the agriculture sector, to contribute to increased income from agriculture for male and female farmers. While the gender strategy and action plan are quite detailed in recommending key implementation actions, some of the observations and/or focus areas that need attention and should become part of ASIP are: i) gender and inclusion are very closely interlinked. One of the important outcomes of EDPRS 2 is a 10 percent reduction (from 24 percent) of extreme poor and these are mostly women-headed households, those with stunted children, and those with very small landholdings. Income generation and household food security are intertwined, as households need to be able to generate enough money to buy nutritious and quality food. This would necessitate more income-generating opportunities for women to help them out of extreme poverty; ii) gender needs to be mainstreamed across various SPs (e.g., related to water and irrigation management, access to finance, technology and research, farmers' cooperatives, extension, feeder roads, etc.); iii) gender mainstreaming in agriculture remains a challenge due to the lack of female extension agents and Local Service Providers (LSPs) to mainstream and monitor gender aspects. While training modules are available, TOTs have limited capacity to provide services at the "last mile." It would be useful to revisit the interventions to ensure that the capacity issue at each level is addressed and reflected in the ASIP and budget, and monitored and evaluated; iv) mapping and targeting methodology needs to be revisited/refined to ensure that all SPs address the needs of targeted households (in collaboration with the National Women Council); v) a strong M&E system with a robust baseline and tracking system needs to be institutionalized. Currently, this is lacking and the numbers do not reflect gender; this area needs more attention going forward; vi) gender-sensitive targets are needed in SP areas (e.g., how many women benefit from various programs?); vii) SPs' activities on gender included in the RF and ASIP do not seem adequate to achieve the above objectives and outcomes; and viii) focus should be placed on promoting off-farm jobs for women, sensitizing women to the anticipated transformation of agriculture, formal cross-border trade, cooperatives and off-farm.

51. There is little discussion of the local-level farmer/community institutions that would play a critical role in addressing gender issues. These should be the champions and promoters of gender equality at the community level.

52. **Environmental Mainstreaming in Agriculture.** Soil conservation mainstreaming. Mainstreaming environmental management in soil conservation and irrigation practices being undertaken in PSTA 3 are key for sustainability of the various investments and for the environment. They are necessary to maintain and restore ecosystems so they are as close as possible to their natural state. The GoR has put in place sound and strong environmental governance structures and systems which are also rooted throughout the PSTA 3 program.

53. Environmental considerations in rural roads. The rural roads to be improved in PSTA 3 follow the existing alignment and remain within the existing right-of-way, hence limiting adverse environmental and social impacts. The existing feeder roads are often about four meters wide. However, the new road act, which requires upgrading some feeder roads to six meter width, may involve widening the road formation by two to three meters.

This may necessitate expropriating some farm lands and relocating households, which will be carried out according to national environmental and social policies. The policies state that to avoid adverse negative environmental and social impact, when a road proposed for improvement has to be widened, no road contract tender should be launched before a road-specific Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) are prepared and an Environmental and Social Management Plan (ESMP) with mitigation measures is incorporated in the bidding documents.

54. The roads to be improved traverse hilly terrain and marshlands, which could be environmentally and socially sensitive. Roads in the hilly terrain require construction of culverts, often small in size, following the existing natural water course. Side drains may require stone pitching and check dams to control erosion. The soil along the roads is mostly soft, and could be excavated by labor, which helps in limiting damage to the environment, as labor construction involves gentle cutting and minimal spillovers. The marshlands are often in-between hills and are increasingly used for small-scale, community-owned, irrigation-based farming. The farms are usually at the foot of the hills adjacent to the marshland. The roads crossing marshlands may have to be raised and the side slopes may have to be flatter, involving widening; this will not require relocating people, but does require degrading more marshland area. The existing roads often cross on the shorter side of the marshland, which will limit the negative impact. The impact on fauna and flora is expected to be limited as the roads follow existing routes, and road sides are cultivated or already cleared.

55. Adverse impacts on natural vegetation which normally are associated with the operation of quarries, borrow areas, and the construction of detours and access roads will be limited as the quarry and borrow material requirement for feeder roads is minimal and as much as possible existing borrow/quarry sites will be used. The maintenance works are expected to use existing borrow sites for sourcing materials and will not require opening up new borrow pits. The impact on soil erosion will be negligible, as will the impact on the stability of slopes or the sedimentation/siltation of rivers. Instead, the rehabilitation of the road will decrease erosion along the road alignment by stabilizing slopes and providing proper drainage. The maintenance works to be carried out in the future, after completion of the rehabilitation, are not expected to induce negative impacts, but will instead help to control slope stability and soil erosion. Maintenance works will help control roadside siltation caused by the anticipated continued agricultural activities in the project area. As observed in many roads constructed in the hilly terrain, landslides/rockslides from the hilltops will remain a potential problem, given the geo-technical nature of these areas. Emphasis should be on timely post-works maintenance activities. The implementation of the ESMPs prepared for the rehabilitation shall continue.

56. It is expected that the rehabilitation of the roads will result in net positive environmental and social impacts through enhanced access for rural populations, as well as increased agricultural productivity and increased access to economic opportunities. On the environmental side, improved road asset management will reduce the need for frequent road reconstruction. In hilly areas where soil erosion is a problem, improved feeder rural roads will also enhance the sustainability of critical transport infrastructure.

57. The Rwanda Environment Management Authority (REMA) provides guidelines and monitoring implementation of national environmental safeguard measures. Rwanda Transport Development Authority (RTDA) has environmental and social specialists that look after safeguard issues for the main road contracts, but it has not yet established an Environmental and Social Management Unit. The Environmental Officers of the Districts under the Environment and Water Resource Management Units are responsible for environmental and social safeguard aspects of development projects, but due to capacity limitations, their engagement is restricted to minor community-level development actions.

58. REMA provides overall guidance on the preparation of Environmental and Social Impact Assessments (ESIAs) and approves ESIAs and follow-up implementation of safeguard measures for development projects, including roads. REMA has issued guidelines for the preparation of ESIAs for road projects. The guidelines have

been reviewed and found to be technically sound. Based on REMA's guidelines, MINAGRI prepares the ESMF and works with the Districts to prepare the RPFs.

59. **Planning for climate change**. The 2011 National Strategy for Climate Change and Low Carbon Development is technically sound and will be used to guide overall planning for climate change. There is no particular indictor in the RF to help monitor the mainstreaming of climate change issues. MINAGRI should consider including one to track climate change adaptation and mitigation efforts within the sector.

60. **Nutrition and Household Vulnerability.** MINAGRI recognizes its role in and accountability for ensuring availability of and access to affordable, nutritious foods to ensure food and nutrition security for all Rwandan citizens. One key target of PSTA 3 is to ensure that at least 90 percent of Rwandan households have acceptable food consumption. MINAGRI recognizes two approaches to improving access to and availability of nutritious foods. The first is increasing overall agricultural productivity, recognizing increasing income will result in more money spent on higher-nutrient, quality foods including meat, dairy, fruit, and vegetables. The Crop Intensification Program (CIP), started in September 2007, focuses on six core staple crops: maize, wheat, rice, Irish potatoes, beans, and cassava. Under this program, farmers organized in SHGs synchronize the cultivation of crops. Farm inputs such as improved seeds and fertilizers were imported and distributed to farmers through PPPs, and extension services on the use of inputs and improved cultivation practices rendered to farmers. The second approach is to increase the diversity of available foods and "upgrade" the nutrient quality of foods. The former was done through the promotion of home gardens; the latter by using biofortified staple crops wherever possible. Biofortified crops are bred with better nutrient profiles by exploiting the natural variation between varieties of the same crop. The GoR has committed to disseminating and promoting all biofortified staples that are or could be available in Rwanda. MINAGRI encouraged and disseminated the first available biofortified staple crop, high-iron beans, within the CIP. It also promotes cultivation of biofortified vitamin A-rich sweet potato. MINAGRI has requested the biofortified vitamin A cassava currently available in the Democratic Republic of the Congo, and is completing trials of vitamin A maize for release in 2015.

61. Recognizing the importance of animal source foods for nutrition, especially for the poorest, the government introduced the One-Cow (Girinka) Program. The program was set up with the central aim of reducing child malnutrition rates and increasing household incomes of poor farmers by giving households access to milk. Started in 2006, the program gives a heifer to a poor household, with a goal of reaching 350,000 of the poorest households in the most food-insecure Districts. Small livestock, such as goats, were also distributed. As a result, 47 percent of households now have a cow, and 57 percent have a goat, increasing the availability and consumption of milk by small children. These beneficiaries, in turn, agree to pass on one of their offspring livestock to another eligible family.

62. While agriculture clearly has positive impacts on nutritional outcomes by increasing the availability and affordability of a diversified diet, it can also have negative impacts on nutrition through the consequences of increased agricultural productivity. MINAGRI recognizes and is addressing the potentially negative nutritional impacts of the CIP, particularly for maize. Post-harvest handling and storage of maize is particularly important given poor drying and storage, resulting in high levels of aflatoxins. These toxins are virtually indestructible, consumption by humans is cumulative, and the toxins can seriously impair human health. Numerous studies have shown children with high aflatoxin levels also have higher levels of stunting. Consumption of grain with high levels of aflatoxins can result in aflatoxicosis, leading to death, as happens in Kenya every few years.

63. The Post-Harvest Handling and Storage Taskforce has focused on training farmers' cooperatives on post-harvest storage and drying, and has distributed equipment, constructed drying grounds and warehouses, and installed metal silos, as well as distributing hermetic bags. Post- harvest losses of maize and rice declined from 32 percent to 9 percent, and 25 percent to 15 percent, respectively, for season 2013 A. While this is not equivalent to

reducing aflatoxin, the attention paid to post-harvest drying and storage has undoubtedly significantly reduced the incidence of aflatoxin in maize.

64. EDPRS 2 and PSTA 3 have clearly articulated a vision and focus areas to address the food security and nutrition challenges. The Action Plan is well prepared and costed for recommended action lines. Some preliminary key observations are: i) given the high rates of stunting and malnutrition and the linkage to poverty, increasing household income sources for poor and vulnerable households is one key factor; ii) increasing access to nutrition education for poor households is important. The new centers operated by cooperatives are one potential venue where this could take place, especially where closer and more accessible to poor farmers. Consideration could be given to delivering basic antenatal and nutrition services to women at these centers; iii) the school feeding program is highlighted but it is not clear whether it is only the "One Cup of Milk per Child" program or other foods. MINAGRI should look into linking the school feeding programs to agriculture by linking farmer production to schools (homegrown school feeding program). This could extend beyond the crops in the CIP, especially those that are biofortified, to excess production from household gardens; iv) one area to be strengthened is bringing nutrition into the upstream of agriculture research and plant breeding. The nutrient content of crops varies across varieties, and ensuring that plant breeding and adoption focuses on the varieties with better nutrition profiles is key. This is particularly important given climate change, where evidence suggests that the production of crops grown in high CO_2 concentrations have poorer nutrition profiles than the seeds planted; v) MINAGRI could consider its guidelines for trials, certification, and release of new varieties to ensure that varieties with poorer nutrient profiles than those that are currently grown are not released; and vi) another area that could be further strengthened is bringing nutrition to the forefront of crop selection and value chains and in the dialogue with the private sector. This includes identification of foods that can be industrially fortified in the food chain.

Annex 5: Detailed Description of Program Institutional Arrangements

1. The technical team reviewed the implementation arrangements for all 24 SPs of PSTA 3 and assessed the adequacy of the systems, capacity, and commitment of implementing entities staff to implement the Program and the proposed PAP, including the ability to manage fraud and corruption (F&C) risks. The team found that the institutional arrangements are adequate and identified areas where strengthening could potentially help further improve efficiency and effectiveness of the implementation of PSTA 3. Below is a detailed assessment of the institutional arrangements for the implementation of each of the SPs.

Program 1: Agriculture and animal resource intensification

2. **Soil Conservation and Land Husbandry** activities are now being implemented by different agencies (RAB, REMA), local administration (Districts) and SPIUs (LWH/RSSP, KWAMP). While there is an excellent amount of good work being done, there is an apparent lack of coordination, harmonization, and standardization of the different works and approaches for soil conservation and land husbandry. RAB has set an established methodology for monitoring the coverage of soil erosion control infrastructure and will be reporting on the situation every two years, but does not coordinate the implementation of different works being carried out in different implementing agencies.

3. **Irrigation and Water Management** are carried out by various agencies with different mandates such as GoR-funded programs (GFI, QWM) implemented by the Irrigation and Mechanization Task Force (IMTF) and donor-funded projects (RSSP3, LWH, PAIRB, KWAMP). When projects close, the infrastructure is handed over to beneficiaries under the guidance of relevant Districts, but no single national authority oversees irrigation schemes. The establishment of such a body is urgent, especially as the IMTF's term ended on June 30, 2014. The law establishing Water Users Associations (WUAs) was approved and gives beneficiaries of irrigation infrastructure an obligation to maintain them.

4. **Agricultural Mechanization.** To popularize mechanization and achieve a target of 25 percent mechanized farm operations by 2017, the GoR, through the IMTF, has driven the mechanization program since 2008. An internally financed project, the IMTF was mandated to: i) promote mechanization options for rural farmers; ii) develop local skills and strengthen capacity in agricultural mechanization; and iii) promote mechanization in post-harvest activities. On June 30, 2014 the Task Force was phased out, and its activities absorbed within RAB. According to data from Rwanda Revenue Authority (RRA) an MINIFRA, the current fleet of agricultural machinery in Rwanda is estimated at 240 tractors, 270 power tillers, 35 rice planters, 7 combine harvesters mainly for rice and maize, and around 2,000 attachment tools for tractors and power tillers. Related activities implemented include: the creation of 17 Village Mechanization Services Centers (VMSCs) for hiring and selling services; feasibility studies for an assembly plant for tractors and power tillers; mounting of several demonstrations in collaboration with the private sector/market preparation; and various training activities, including training 300 farmers and 50 tractor operators and technicians on operation and maintenance of machinery. After the initial wave of investments, the government plans to gradually withdraw and hand over the procurement and distribution of mechanization equipment to the private sector. The government would scale down to 60 percent within the next three years and then be phased out completely thereafter, but would continue to ensure a conducive environment for private sector investment through enabling policies and to provide soft services such as extension, thematic studies, and capacity building of relevant stakeholders. In a drive to attract private investors into the mechanization sector, MINAGRI secured the services of three private investors: Way-Invest Ltd; Yanmar-Japan (through Akagera Motors); and Mahindra-Indian (through ETC Agro). In addition, around eight manufacturing companies, mainly of post-harvesting equipment, have been established.

5. **Agrochemical Use and Markets.** Rwanda depends on imports for all its agrochemical fertilizer requirements because the country has no local production. Fertilizer is generally procured in small consignments of 2,000-2,500 tons from fertilizer traders in Uganda, Kenya, Mauritius, South Africa, Dubai, Jordan, and China.

Between 1998 and 2005, fertilizer was imported entirely by the private sector. As of December 2006, three types of fertilizer importers were operating in Rwanda: i) importers supplying primarily to tea and coffee parastatals against confirmed orders; ii) importers buying in small lots from neighboring countries to satisfy local demand; and iii) the GoR importing large quantities for distribution to all categories of customers. Fertilizer imports evolved from 1,344 tons in 1995 to 9,039 tons in 2006, and were inadequate to meet the government's targets for the country. In 2009, MINAGRI started importing and distributing fertilizer in bulk (in 100, 50, and 25 kg bags) to food crop farmers through 20 distributors and 1,062 agro-dealers under a fertilizer subsidy program, while NAEB imports fertilizer for coffee farmers. Distributors are provided with supply credit to procure the fertilizers for the government subsidy program. By 2013, import levels reached 35,000 tons, about 95 percent of which is by the government through private importers under an input subsidy program. As part of the plan to pull out of the subsidy program, MINAGRI withdrew the supply credit in 2013 to allow for private sector participation in fertilizer import and distribution. To fill the gap, three private companies have registered with the government to import fertilizers. MINAGRI is gradually reducing its fertilizer subsidy with the target of being completely out of it by 2018. It is also exploring ways to make the subsidy more efficient and opening it up to all crops. The government is committed to liberalizing the fertilizer subsector and having the entire fertilizer value chain (from importing to supplying to farmers) operated by the private sector, based on farmers' demand.

6. **Seed Development.** Seed production in Rwanda has been dominated by producer cooperatives (60 percent) and individual farmers (40 percent). Under an input subsidy scheme, the GoR, through RAB, purchases the seeds of maize, wheat, rice, and Irish potato and through private agro-dealers delivers them to farmers free of charge to plant 0.5 ha. RAB floats tenders for the distribution of seed to beneficiaries after procurement. Only farmers benefiting from the fertilizer subsidy scheme benefit from the subsidized seed program. Rwanda has created a seed sector coordination unit (seed special program) in RAB. RAB's seed special program focuses on: i) pre-basic and basic seed production; ii) seed quality control and certification; iii) private seed management; and iv) seed processing, marketing, and sales, although much emphasis is placed on i) and ii). Currently, pre-basic and basic seed multiplication is carried out in RAB's stations located in various Districts under the Agriculture Zone Division responsibility. Each station is managed by a head of station under the Director of Agriculture Extension and Research at the zone level. Certified seed production is presently carried out by 478 registered seed growers and six farmers' cooperatives located in RAB Stations of Sigira, Masogwe, Ruhunde, Mulindi, and Rugende. RAB's seed program also provides seed quality control and certification. Seed inspectors carry out seed inspection on all seed fields registered after planting through the crop declaration. Each Province has a technical assistant in seed production and quality officer reporting to the National Seed Coordinator. Although RAB's seed program has a mandate to produce and market seed, in the spirit of private sector development, the government has decided to lessen its control of the seed sector, promote private investment, and phase out the seed subsidy, welcome news to the private sector. All of these reforms are reflected in a fertilizer policy paper expected to be approved in 2014.

7. Livestock Development. The human resources are inadequate in number (for instance, there is one public veterinarian for all 416 sectors and one per District) and skills required. The World Organization for Animal Health (OIE) Performance of Veterinary Service (PVS) evaluation report seems to confirm the same for the animal health sector. Past experiences and implementation of livestock-related projects (e.g., the AfDB-funded Livestock Infrastructure Support Project/ LISP) have shown that the GoR, through MINAGRI and RAB, knows how to implement and monitor results-oriented investments in the livestock subsector. However, adopting a programmatic, outcomes-oriented approach remains more challenging.

Program 2: Research, technology transfer and professionalization of farmers

8. **Research, technology transfer and extension for producers**. RAB has the mandate to undertake research on all crops and livestock. To execute this mandate, RAB has a Directorate of Research, headed by a deputy director general (DDG). The DDG is supported by senior scientists at the national level and four zonal directors who lead the research and extension programs on crops, livestock, and natural resources. The extension

function is implemented by the directorate of extension, and also headed by a DDG. The DDG extension is supported by a number of coordinators and specialists at the national level. At the local level, extension services are implemented as part of the CIP with implementation facilitated through local government (LG) structures working together with RAB. The implementers include a district agronomist and contracted service providers to support cooperatives/producers engaged in CIP activities. RAB provides national support and oversight, while the LG is charged with implementation at the District and lower levels. In 2014, RAB has undertaken an institutional review, and changes have been proposed based on the need to improve efficiency, accountability, and sustainability of the delivery system and to devote more earmarked funds to the local level. Through the institutional changes, more RAB staff will be deployed to the zones and Districts to support implementation and decentralization policies and directives. The research programs are also to be consolidated to 16 at the zonal level. These changes are expected to be implemented from July 2014.

9. To reach more farmers, RAB together with LGs is planning to train and expand the number of farmer promoters to 15,000 across the country. Already the LG has started the training of the promoters and RAB is expected to earmark funds for the operations. When this capacity of farmer promoters is fully operational, MINAGRI will have sufficient capacity to reach out to the estimated 2 million farm households in the country and achieve the set results for the subprogram. The ownership of FFS by both RAB and LGs is a clear indication of system sustainability. However, it is not clear whether the farmer promoters will also be used to cover livestock activities. The Bank is of the view that for cost-efficiency reasons, the crop and livestock extension services should be delivered using the same system, as most farmers have mixed farms.

10. **Farmers' Cooperatives and Organizations.** At the village level, lead farmers and farmer promoters will be responsible for farmer mobilization and capacity building. MINAGRI has defined criteria for selection of farmer promoters, and has provided a platform for exchange and sharing of knowledge (which is based on the health worker model). It has also been connected recently to the cooperatives in the sector. The FFS facilitators trained through the FFS approach are mapped at the Cell level (one per Cell) to train the farmer promoters. Agriculture committees are established at all levels to act as command post and the roles and responsibilities include coordination, monitoring, reporting, mobilization and advisory. Permanent operation centers/secretariats, composed of two to three members drawn from MINAGRI and MINALOC, are established at the District and national levels for day-to-day monitoring of activities. A national Agriculture Steering Committee oversees implementation of activities and provides policy guidelines. A well-thought-through package of technical assistance is required to ensure that the lead farmers/farmer promoters and Cell- and District-level staff receive a full package of training and backstopping to ensure their effective performance in the different roles of farmer mobilization, SHG formation, skill enhancement, monitoring, and tracking. MINAGRI already has experience (SPIU LWH/RSSP) and results on this field-level training and technical assistance. This existing capacity needs to be mainstreamed and included in MINAGRI's capacity-building strategy.

Program 3: Value chain development and private sector investment

11. **Creating an environment to attract private investment, encourage entrepreneurship, and facilitate market access**. NAEB is the key institution mandated for delivering the strategic objectives of program 3 of PSTA 3. NAEB was set up in 2011 by consolidating three government agencies responsible for cash crops and agriculture exports. In particular, all services from the Rwanda Coffee Development Authority (OCIR CAFE), the Rwanda Tea Development Authority (OCIR THE), and the Rwanda Horticulture Development Authority (RHODA) were merged into this new agency. The institution's two main departments "Production Support & Value Chain Development" and "Export Operation & Market Development" deal with the production and marketing sides, respectively, of priority export crops. NAEB has wide-ranging responsibilities including a regulatory function, research and agricultural extension, licensing of operators, setting of quality standards, issuing certificates of origin, training of farmers and cooperatives, international marketing, and the provision of market intelligence. The new strategy envisions NAEB increasingly focusing on its core function as regulator and creating a conducive environment for encouraging the private sector to take on a bigger role in research, extension

and marketing of export crops. NAEB is in the process of finalizing a medium-term export strategy firmly aligned with the five-year EDPRS 2, PSTA 3, and the National Export Strategy. It has a particular focus on cross-cutting sectoral issues and prioritized strategic interventions by key multistakeholder actors. The RF for this program component should be updated to fully reflect NAEB's final strategic plan 2013-2018 action matrix (expected to be finalized by August 2014).

12. **Development of priority food crop value chains.** RAB has the institutional mandate to promote food crop productivity interventions. To do this, RAB has identified several drivers of productivity which include: promoting use of improved seeds, agrochemical fertilizers, and compost/manure; controlling pests and diseases; timely planting; maximizing the use of consolidated land; and promoting banana production. The GoR, through MINAGRI, RAB, and other agencies, has a subsidy program that targets maize, wheat, beans, rice, Irish potatoes, and soya. Smallholder farmers growing these crops received subsidized fertilizers, seeds, and other planting materials. The level of subsidy varies with type of crop and input. For instance, maize and wheat farmers get 100 percent subsidized seeds, while farmers in land use consolidation (LUC) sites receive fertilizer subsidies of 50 percent. There are well-established procedures for identification and distribution of the subsidies, which are mainly based on LG's institutional set-up. While in the past the government agencies were responsible for procurement and distribution of fertilizer and other subsidies, there is a gradual move to directly bring on board private sector players. In March 2014, MINAGRI signed a Memorandum of Understanding with three companies (Top Services Enterprises Ltd, Alfred Nkubili and Sons (ENAS), and One Acre Fund-TUBURA) for the import and distribution of mineral fertilizers. The three companies have been allocated Districts in which they will concentrate their operations.[89] MINAGRI has also intensified training of agro-dealers throughout the country to ensure farmers have access to their services. Plans are underway to reduce the subsidy level for most inputs, with an objective of phasing out direct subsidies by 2017/18. These government strategies for promotion of food crops and the measures being taken to bring on board private sector players are considered adequate and robust to ensure the results set under PSTA 3 are met. However, the risk of the subsidy program being captured or misused, although minimal at the moment, needs to be evaluated further, and the necessary institutional strengthening measures implemented.

13. MINAGRI is responsible for sector capacity-building activities, and a strategy has been developed to address the capacity gaps. For its part, RAB completed a capacity-building assessment of its functions and mandates in 2013 and developed a strategic plan. Through this assessment every program area has identified the human resource capacity gaps at all levels (support, technical, and professional). Infrastructure gaps have also been identified. However, given the proposed decentralization changes, there is need to revise the strategic plan to incorporate these changes. The overall capacity of RAB is assessed to be adequate to deliver the results areas under RAB's strategic plan. However, there is need to finalize the review of the strategic plan and incorporate any identified capacity gaps as part of the PAP of the Ag. PforR.

14. **Development of priority export crop value chains.** The capacity of NAEB could be described as generally sufficient, adding the complementarities with LG structures to follow up and support delivery of all planned interventions. Coordination issues might arise where MINICOM and MINAGRI intersect in processing activities and trade facilitation, but a coordination mechanism (Industrial Development and Export Council/IDEC) was put in place to tackle the issue. There is strong commitment at all relevant agencies to implement the program, including export targets as a key part of the results performance agreements of the agencies involved. Considerable experience and sector expertise exists within the key counterparts (MINAGRI and NAEB) around

[89] Top Services Ltd. will be distributing fertilizers to the Districts of Musanze, Burera, Nyabihu, Ngororero, Rubavu, Gakenke, Gicumbi, Muhanga, Kamonyi, and Rulindo. ENAS will be distributing fertilizers for the Eastern Province of Rwanda and Kigali, namely the Nyagatare, Gatsibo, Kayonza, Kirehe, Ngoma, Rwamagana, Bugesera, Gasabo, Kicukiro, and Nyarugenge Districts. One Acre Fund-TUBURA has been given the responsibility of providing fertilizers for the Districts of Karongi, Rutsiro, Nyamasheke, Rusizi, Nyamagabe, Nyaruguru, Huye, Nyanza, Ruhango, and Gisagara.

planning for and supporting expansion of the coffee and tea subsectors. Less experience seems available in the horticulture and pyrethrum subsectors. Planning for the tea expansion program is well underway, including establishment of multiple nurseries to support the 18,000 ha expansion. However, to achieve the ambitious targets and ensure the development of market-driven value chains, a "new deal" is needed in terms of extension of partnership with the relevant private sector and other key stakeholders, right from the beginning.

15. For investment promotion-related activities, NAEB will have to work closely with RDB, the focal institution for investment promotion and facilitation in Rwanda. For reviewing and updating the regulatory framework for export value chains, it will have to work closely with MINAGRI as the main policy-setting institution. Given NAEB's ambitious implementation plans for each subsector and its relatively limited capacity to execute, it is advisable to strengthen NAEB's core team with some experts to assist with planning and execution of implementation in each value chain.

16. **Development of priority dairy, meat, fisheries, and apiculture value chains.** In "small" subsectors and value chains (but with high potential), such as fisheries and beekeeping, the capacity to implement such a program is questionable, due to the lack of human resources (for instance, for beekeeping, there are only two specialists in MINAGRI and four in RAB at the central level, and the sector relies on generalist veterinarians at the local level). Similar assessments are made in very specific areas that would contribute to the overall objectives, such as milk quality and food safety. Therefore, it is recommended that as part of SPs 1.6, 3.4, 3.5, and 3.6, a specific needs assessment and capacity-building and training plan be developed and implemented. In addition SP 2.3 (Farmers' cooperatives and organizations*)* and the entire program 4 will be key to achieving the overall objectives of the livestock intensification and productivity increase. Subsequent institutional arrangements must ensure that animal production and health staff from MINAGRI and RAB fully participate in the respective subworking groups for program design, preparation, and implementation.

17. **Agricultural finance.** Currently, only one staff member in MINAGRI is in charge of the agricultural finance agenda. While the individual is extremely competent and proactive, given the requirements of the next steps to achieve the Program targets, this capacity is inadequate. Moreover, while the Access to Finance Rwanda (AFR) is a unique platform through which pilots and assessments to enhance agricultural finance can be implemented, it is not yet well-positioned to support MINAGRI to achieve its strategic objectives in this area. For agricultural insurance, a PPP model backed by law and regulated at the national level is one of the most proven arrangements. Under this scheme, a public agriculture insurance entity provides premium support to private insurance companies that underwrite agriculture risk, set premium rates, and do their own actuarial analysis. The objective of this scheme is to share the premium burden with the farmer, but also to spur underwriting discipline and competition from agriculture insurers.

18. **Market-oriented Infrastructure for Post-Harvest.** Promote efficient and equitable transport systems. The engagement of multiple institutions (i.e., a decentralized road administration at the District level with limited experience in managing development feeder roads investments) and not being able to rely on good support from national-level institutions leads to an implementation challenge, requiring significant resource allocation to build capacity. MINAGRI, MINIFRA, and MINALOC have capacity-building activities[90] within each sector program, which should be sufficient to strengthen the Districts and national entities responsible for feeder roads oversight. There is a need to strengthen the planning, collaboration, and prioritization of road investments among the various stakeholder government ministries such as MINAGRI, MINIFRA, and MINALOC.

[90] Support to the Districts and national coordination entities capacity building, includes: i) technical assistance to the Districts infrastructure, finance, procurement, environmental management, and planning units through adoption of systems and manuals and provision of training to District staff; and ii) strengthening the capacity of national coordination entities, through provision of training on feeder roads development planning, monitoring and maintenance for MINAGRI and RTDA staff.

19. **Reduce staple crop post-harvest losses at the producer and first aggregator level**. To reduce post-harvest losses, MINAGRI's Post-harvest Taskforce is implementing the Post-harvest Strategy, which involves a number of measures to address losses, such as: developing training materials; delivering training; and providing drying and shelling facilities and equipment to cooperatives and individual farmers, as well as adopting quality standards. The Taskforce has a Post-harvest Extension Department whose role is to undertake post-harvest extension work. The strategy is implemented through Provincial Coordinators, who supervise District post-harvest extension officers. NGOs liaise with MINAGRI to implement post-harvest handling and storage activities (developing training materials, training, and installing storage and drying facilities). Other initiatives to reduce post-harvest losses at the producer and first aggregation level include: distribution of hermetically sealed grain storage cocoons; construction of storage silos with donor assistance (ACDI/VOCA, UNDP, WFP, IFAD, etc.); and rehabilitation of pre-1994 strategic storage facilities, previously under the ownership and management of OPROVIA-GRENARWA. The strategic grain reserves (SGR) managed by the Post-Harvest Taskforce also helps to reduce post-harvest losses. Opportunity exists to tender the leasing of these stores and the management of SGR within the stores to the private sector. As additional storage is made available in more rural areas, the amount of SGR held in these silos could be reduced; the leaseholder could then use the additional storage for other economic activities. It is, however, critical that MINAGRI with support from MINICOM builds ISAR's Post-Harvest Team's capacity to identify and prioritize economically relevant post-harvest technologies and to disseminate and promote their uptake. The current staffing of ISAR with food scientists should be reconstituted to include agricultural engineers and economists to evaluate potential technologies and build commercialization strategies for post-harvest activities.

Program 4: Institutional development and agricultural cross-cutting issues

20. **Institutional Capacity Building**. **MINAGRI and its two agencies (RAB and NAEB), its three SPIUs, and the Districts have a designated focal person to coordinate CD needs and initiatives, especially since various DPs provide several types of CD assistance**. For example, MINAGRI has a designated coordinator for the Strategic Capacity Building Initiative (SCBI). Given the large number of Districts (30), the institutional arrangements for coordinating these CD initiatives vary. It is envisioned that one of the outputs of the above CD assessment exercise is to recommend enhanced institutional arrangements for coordinating and enhancing the M&E of CD initiatives, with a stronger results focus. Updating ASIP's M&E framework is intended to provide MINAGRI with a more functional tool for evidenced-based decision making. These initiatives would help strengthen the institutionalization of CD as a key instrument for strengthening the planning, budgeting, implementation, and governance structure and program management cycle, and therefore, a stronger tool for managing risks. A recent CD assessment (supported by USAID, 2014, reference cited above) concluded that with respect to the food security system, MINAGRI needs to improve the alignment, consistency, and inclusive institutional arrangements and mechanisms for promoting effective dialogue, evaluation platforms, and mechanisms for the public sector, private sector, civil society, and research institutions. This type of strengthening would help sustain evidenced-based policy design and implementation processes, which would enhance the implementation of PSTA 3 and achievements of its targets.

21. **Decentralization in Agriculture. The GoR has a clear decentralization strategy and supporting institutional arrangements and roles at the subnational level.** However, there is less clarity at the level of MINAGRI, its entities (RAB and NAEB), and SPIUs in terms of ensuring that their organizational and functional structure and systems are well integrated and supportive of the envisioned expanded decentralization of agricultural services. Currently, RAB and NAEB are finalizing their strategic plans to be strongly aligned with PSTA 3's RF, and the recently prepared ASIP. This includes working out appropriate organizational, functional, and staffing structure reforms to enhance decentralized agricultural services. During the Ag. PforR assessment mission, three key elements that will need continued strengthening at the District level were identified, consistent with recent progress reports: the planning, budgetary, and M&E aspects of decentralization, which involve all sectors including agriculture. It will be important for MINAGRI to coordinate closely with MINALOC and its CD initiatives at the District level, whose activities address these three key elements.

22. **MIS: Agricultural M&E, Statistics and Communication. Currently, the agriculture sector MIS operates at the national and subnational levels, involving a relatively large number of diverse actors with specified and complementary roles in data collection and reporting, utilizing various reporting processes and mechanisms and exhibiting varying levels of capacity to deliver on their expected roles and outputs.** In general, there is an attempt to utilize the M&E framework developed in 2011, although various constraints impede its full and effective application. At the national level, the MIS system, especially the M&E system, is supported by four main vehicles for collection of impact, outcome, and output data: i) the periodic household poverty survey (EICV, with the last household data collected in 2011), conducted by the National Information Statistical Office/NISO; ii) annual crop assessment surveys, conducted by MINAGRI staff; iii) project and program data, collected by MINAGRI's project entities (via the SPIUs); and iv) routine data, collected primarily by District- and sector-level agronomists and veterinarians.

23. **In addition, MINAGRI has a number of other data collection, reporting, and monitoring systems and mechanisms that contribute to various reporting and communication requirements (especially to monitor the annual performance contracts, with various entities).** These include: i) periodic national agricultural surveys; ii) the comprehensive food security and vulnerability analysis (CFSVA) and six-monthly Food Security and Nutrition Monitoring System; iii) Joint Sector Reviews, which occur twice a year to assess the common performance accountability framework (CPAF), with respect to key indicators from the EDPRS Results and Policy Matrix; these reviews involve participation by DPs; iv) National Leadership Retreat, which draws on the Prime Ministerial Quarterly Report (ref. the "dashboard" of key indicators) and provides inputs for the annual national leadership retreat, assessing the performance of sector ministries (and their annual performance contracts); v) the Agriculture Sector Working Group, which meets monthly and comprises key sector stakeholders (the government, DPs, private sector, NGOs) as the main forum for regular sector coordination; vi) the Agriculture Sector Budget Support Group ("SWAp subgroup"), comprising key DPs for aid coordination matters, with a focus on budget support in the agriculture sector; vii) Budget Support Harmonization Group, which focuses on discussing and coordinating budget support for Rwanda; and viii) MINAGRI M&E Working Group, which was recently broadened to include overall sector planning and M&E activities, bringing together the planning and M&E officers from the various agencies of MINAGRI; its aim is to enhance, align, and harmonize annual work plan and budgetary activities and M&E activities for MINAGRI and its various entities.

24. **The key actors at the national level include MINAGRI (coordinated by the Planning Department), and its main implementation agencies (RAB, NAEB, and three SPIUs).** Each of these implementation agencies have their own M&E system, which are in the early stages of being integrated into an overall sectoral MIS. The recent M&E framework assessment exercise highlighted some of the challenges in the extent of fragmentation of M&E activities carried out by the above actors, which tend to focus on monitoring the expected outputs outlined in their performance contracts. Further operationalization of the sector-wide MIS needs to intensify its efforts to achieve a more integrated M&E system that can meet the performance contract requirements, as well as PSTA 3's requirements in tracking the impact and outcome level targets.

25. **At the subnational level, there has been less attention to devising and managing coordinated processes and mechanisms to ensure a well-integrated and coordinated sectoral MIS system**. The focus at the subnational level is for District- and sector-level officials (especially the agronomist, coordinated with the District-level Planning Director) to carry out regular monitoring and reporting of primarily key outputs, especially those included in the performance contracts of the Districts. The abovementioned assessment highlighted some of the challenges of generating reliable production/productivity data of crops and some of the CD and reporting requirements to ensure more reliable and effective M&E systems that can be better integrated with the national-level agriculture sector MIS system outlined above.

26. **From the reviews and activities, and given the requirements of meeting the ambitious but achievable PSTA 3 targets, MINAGRI (and its agencies) endeavors to further enhance and coordinate its**

evolving agricultural MIS. PSTA 3's M&E requirements pose additional challenges to strengthen the overall MIS system and its components to ensure it becomes an effective management tool to track progress, support better decision making, and enable the achievement of the PSTA targets at output, outcome, and impact levels.

27. **Gender and youth in agriculture**. **A number of agencies at the District level (e.g., Ministries of Gender and Family Planning, National Council of Women and MINAGRI) are working together to address gender and youth issues**. The focus is on building the capacity of agricultural staff (such as agronomists, livestock specialists, and LSPs) to deliver gender-responsive service. The Ministry of Gender and Family Planning is the focal point and coordinates gender-related work with other ministries. MINAGRI has prepared various training modules for extension service agents and LSPs in gender-responsive service delivery. It is recommended to strengthen gender-sensitive aspects in other capacity-building activities as well as increase the quality of training provided to extension agents and LSPs.

28. **Environmental Mainstreaming in Agriculture. Environmental considerations in rural roads. REMA provides both guidelines and monitoring implementation of national environmental safeguard measures, including rural feeder roads oversight**. RTDA's environmental and social specialists monitor safeguard issues related to rural feeder roads works. Districts also have Environmental Officers within their Environment and Water Resource Management Units responsible for the environmental and social safeguard aspects of rural feeder roads.

29. **Planning for climate change**. **Planning for climate change adaptation is done in accordance with the 2011 National Strategy for Climate Change and Low Carbon Development, with MINAGRI taking the sector responsibility.** Currently the focus is on risk assessment and vulnerability mapping through modeling and creating a database. Several research programs for enhancing climate change adaptation and mitigation are ongoing. Apart from these activities, limited institutional capacity exists in the sector to promote and coordinate climate change issues. The greatest challenge is raising various stakeholders' awareness on climate change issues, particularly the farming community. MINAGRI needs to enhance its capacity to promote and coordinate climate change issues with other GoR ministries (e.g., Environment, MINALOC) and agencies such as RAB and NAEB.

30. **Nutrition and household vulnerability**. **While the GoR policy can be seen as top-down, implementation is at the District and local levels – MINALOC is one of the core owners of the National Nutrition Policy**. This is also reflected in the building of strategies based on District and sector strategies, such as in the development of EDPRS 2. Coordination is done by seven ministries at the District level – there is a nutrition sector working group with representation from MoH, Education, MINALOC, Gender, Disaster, and MINAGRI, with overall coordination under MoH. Both MoH and MINAGRI rely on community-level implementation mechanisms. Health workers are the main agents of change at the village level – there are two or three health workers per village. These workers are not only responsible for basic health provision in the village (including training in preparation of oral rehydration salts complemented by distribution of zinc tablets to treat diarrhea and distribution of contraceptives), they also carry out growth monitoring. Each month every household with a child under five years is visited, the child is weighed and measured, and parents are counselled on healthy eating practices.

31. **In MINAGRI, implementation is done through the formation of SHGs consisting of 12-20 farmers each. MINAGRI staff are trained and sensitized on gender. SHGs' membership must include at least 30 percent women, including members and officeholders, with many exceeding this requirement.** SHGs form the crux of MINAGRI's implementation strategy. Each SHG has five lead farmers trained in various aspects to help the group. One farmer is trained in conflict management and social welfare whom MINAGRI links to the community health workers. In some cases, community health workers are also part of SHG, and are the lead farmer. Through this system, all members of the farmer group are trained on healthy eating and food preparation, especially for young children, using the production from their farms and home gardens. This is consistent with

community health workers goals to reduce malnutrition in their communities. This could be extended to more formal delivery of services by community health workers in cooperative centers.

32. **These SHGs decide together on which crops will be grown on their consolidated land. As the groups build their social capital, a number of SHGs are amalgamated at the zone level.** This builds another level, with an elected management body at the zone level, mirroring that at the SHG level, with an equal focus on incorporation of women. As the zones develop their social capital, they are federated into farmers' cooperatives. At this point, the GoR investment in drying and storage, warehousing, and equipment is catalyzed. The cooperative receives the services of a manger for 12 months to help the cooperative build capacity to manage itself, to improve the quality of its production, and to begin to sell to the private sector and develop negotiation and contracting skills. Cooperatives also start to include other services at their facilities, inviting more engagement on nutrition through the community health workers, as well as access to financial services. This structure has been successful. The increased yields have substantially increased farmer incomes. It is notable that one of the first things that many farmers acknowledge buying is health insurance, which is available in Rwanda, with fees based on the level of income. Health insurance ratchets up the impact of the nutrition education and improved diets by increasing the likelihood that sick children will be taken for health care.

Annex 6: Detailed Program Expenditure Framework

Total Public Expenditure on Agriculture

1. **Public expenditure on agriculture through MINAGRI has shown a rapidly increasing trend in recent years. Table A6.1 gives recent expenditure and the current MTEF budget for MINAGRI, separated into its recurrent and development components.** MINAGRI's expenditure and budget has increased significantly in recent years, with substantial increases in 2010/11 and in the current MTEF period starting in 2013/14. It is welcome that the government has started to devote a greater share of its resources to agriculture. It should be noted that the figures shown below do not reflect the total amount of public funds to the agriculture sector, given the expenditures by other central ministries and by the 30 Districts. Around three-quarters of expenditure is development expenditure due to the large internal and donor-financed projects funded from the development budget. The recurrent budget largely covers operational costs, including salaries and wages.

Table A6.1: MINAGRI Development and Recurrent Expenditure and Budget (US$ millions)

	Expenditure				Budget and MTEF		
	2009/10	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
Recurrent	10.2	10.8	13.9	14.4	25.1	31.6	33.6
Development	24	54.9	50.7	55.1	104.4	124.2	127.3
Total	**34.2**	**65.7**	**64.6**	**69.5**	**129.5**	**155.8**	**160.9**

Proportion of Government Expenditure Allocated to the Agriculture Sector

Table A6.2: Proportion of Government Expenditure on Agriculture Through MINAGRI (US$ thousands)

	Expenditure				Budget and MTEF		
	2009/10	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
MINAGRI	45,095	65,540	64,525	69,455	129,630	155,730	160,950
Government	1,166,090	1,427,235	1,592,100	2,066,3950	2,284,910	2,594,050	2,819,960
MINAGRI	3.90%	4.60%	4.10%	3.40%	5.70%	6.00%	5.70%

2. **The proportion of government expenditure allocated to agriculture through MINAGRI is rising and estimated to be about 6.0 percent in 2014/15. As stated above, MINAGRI does not provide all public funding in the agriculture sector.** MINIRENA has significant soil conservation programs under its mandate to protect the environment and is also responsible for the forestry subsector, with MINAGRI only responsible for agro-forestry. MINALOC is responsible for Districts, the main vehicle for local service delivery, including agricultural support services. When this funding for agriculture through other ministries is included, Rwanda passes the CAADP target of 10 percent government spending on agriculture (currently estimated to be about 13 percent, although this figure needs to be reconfirmed with disaggregated data).

Expenditure by Agency

3. **MINAGRI's two implementing agencies, RAB and NAEB, are funded from MINAGRI's budget and in addition it implements projects though its three SPIUs. Most MINAGRI funds are retained centrally, reflecting the large internal and donor-funded SPIUs managed by MINAGRI.** All agencies have seen a trend of increasing expenditure and budgets as the government has devoted increasing resources to agriculture (Table A6.3).

Table A6.3: MINAGRI Expenditure and Budget by Agency
(US$ millions)

Fiscal Year	2010/11			2011/12			2012/13		
	Budget	**Execution**	**Rate**	**Budget**	**Execution**	**Rate**	**Budget**	**Execution**	**Rate**
MINAGRI	36.5	53.1	145%	39.8	50.6	127%	46	52.9	115%
RAB	11.9	11.5	96%	11.7	11.5	98%	13.7	13.6	99%
NAEB	1.02	1.007	99%	2.5	2.5	99%	2.9	2.9	100%
Total	**49.5**	**65.7**	**133%**	**54**	**64.6**	**120%**	**62.6**	**69.4**	**111%**

Expenditure by Program

4. **Table A6.4 gives MINAGRI expenditure and budget by program, including the new program of administrative and support services from 2013/14 onwards**.

Table A6.4: MINAGRI Expenditure and Budget by Program
(US$ millions)

	Expenditure				Budget		
	2009/10	**2010/11**	**2011/12**	**2012/13**	**2013/14**	**2014/15**	**2015/16**
Administrative and support services					5.9	7.8	9.4
1. Agriculture/Animal resource	36	54.1	44.7	50	96	115.4	117
2. Research and technology transfer	3.5	5.2	4.3	4.5	5.1	5.1	5.2
3. Value chain dev./Private sector	3.5	3.2	11.3	11.1	21.6	25.9	26.5
4. Institutional dev. / Cross-cutting	2.1	3.2	4.4	4.4	1.1	1.9	2.8
Total	**45.1**	**65.7**	**64.7**	**70.1**	**129.7**	**155.9**	**160.9**

5. **Slightly under three-quarters of program expenditure and budgets are through the agriculture and animal resource intensification program.** This program covers large internal and donor-funded projects in land conservation, irrigation, provision of farm inputs, and agricultural mechanization. The second largest program addresses value chain development and private sector investment. With the increasing focus of the government on the private sector, this program has received significant additional funding in recent years. The research and institutional development programs are funded at far lower levels.

Budget Execution

6. **It is important to consider budget execution rates, especially in the current context of rapidly increasing budgets in agriculture. MINAGRI budget execution rates are consistently high, with rates close to 100 percent for RAB and NAEB (Table A6.5)**. Execution rates are significantly higher for MINAGRI's central budget, reflecting high expenditure by the large internal and donor-funded projects managed from the

center. Good performance on these projects means that they consistently spend more than their initial budgets for the year, resulting in MINECOFIN providing additional funds during the budget revision in the later part of the fiscal year.

Table A6.5: MINAGRI Budget Execution
(US$ millions)

Fiscal Year	2010/11			2011/12			2012/13		
	Budget	**Execution**	**Rate**	**Budget**	**Execution**	**Rate**	**Budget**	**Execution**	**Rate**
MINAGRI	36.5	53.1	145%	39.8	50.6	127%	46	52.9	115%
RAB	11.9	11.5	96%	11.7	11.5	98%	13.7	13.6	99%
NAEB	1.02	1.007	99%	2.5	2.5	99%	2.9	2.9	100%
Total	**49.5**	**65.7**	**133%**	**54**	**64.6**	**120%**	**62.6**	**69.4**	**111%**

7. **Decentralization Implications for Public Expenditures. The Decentralization Implementation Strategy envisions an expanded proportion of funds from MINAGRI (and its two boards and three SPIUs) to be channeled through subnational entities (especially at the District level).** In recent years, this proportion has increased rapidly, reaching about 60 percent in 2013/2014. Most of these funds have been in the form of earmarked allocations for specific agricultural activities to be implemented at the subnational level. These activities include funding a relatively large number of the 24 SPs, including the production-oriented expenditures (e.g., soils, irrigation, mechanization, inputs, technology generation and transfer, capacity development). In line with the spirit of decentralization, there is a significant policy push to increase the proportion of earmarked funds into "open funds," whereby Districts have the flexibility to set specific priorities and allocate these sector funds to address relevant sector issues. Currently, the "open funds" constitute a small percent of total allocated funds from MINAGRI to the Districts. In the short term, there will be continued emphasis on using and expanding earmarked funds for specific programs through District implementation.

ASIP Program Structure and Cost Estimates

8. **The recently prepared ASIP had two scenarios for the five-year public investment program to support the implementation of PSTA 3 and its four programs**: Program 1: Agriculture and animal resource intensification; Program 2: Research, technology transfer and professionalization of farmers; Program 3: Value chain development and private sector investment; Program 4: Institutional development and agricultural cross-cutting issues. The ASIP costing exercise adopted the prioritization criteria developed as part of the RF for PSTA 3, namely: the degree to which SPs/activities contribute to: i) *Vision 2020* and EDPRS 2 strategic objectives and targets (including agriculture sector growth of 8.5 percent p.a. and reduced poverty levels; ii) increased crop, livestock productivity, and food security; iii) inclusive agricultural private sector investment; iv) enhanced market-oriented commercialization and value addition; and v) agriculture export growth.

9. **The initial cost estimate had a large and noncredible financing gap (about US$1 billion), referred to as the "high-cost scenario."** A "medium-cost scenario" was thus constructed with the purpose of bringing ASIP implementation costs within an affordable range, based on likely financing sources and amounts. The main differences in the assumptions between the two scenarios are as follows:

- PSTA 3 targets were revised significantly downwards to reach more financially achievable levels, especially for the five highest-cost SPs;
- PSTA 3's prioritization criteria were more rigorously applied to a prioritized RF;
- Some unit costs were revised downwards based on savings that could result from -+cost sharing of public projects with farmers. Land conservation terraces and irrigation schemes were identified as areas where greater cost sharing with farmers could be achieved;
- A strong enabling framework for private sector growth and development with a business-friendly regulatory environment and more aggressive investment promotion following the strategic theme set out

above was expected to lead to greater private sector investment, especially in export crops and processed products;

- A review of the RF identified public sector projects that could be implemented by PPP arrangements. Further PPP opportunities were identified for coffee, tea, horticulture, irrigation, milk collection centers and dairy processing, meat processing, and hides and skins;
- Fertilizer, lime, and seed subsidies were fully phased out by 2017/18, with the private sector leading the farm inputs market;
- Agricultural research was scaled up to provide more innovative technologies for farmers, which is critical for achieving yield targets; and
- Extension was improved and expanded to provide support and training for farmers.

The medium-cost scenario is therefore one of lower costs, intended to bring costs within an affordable range.

Medium-cost Scenario Public Costs

10. Table A6.6 sets out the medium-cost scenario public sector implementation costs for ASIP by program and SP.

Table A6.6: Costs of ASIP's "Medium-cost Scenario"
(US$ 000s)

Program/Subprogram	2013/14	2014/15	2015/16	2016/17	2017/18	Total
1. Agriculture/Animal resource intensification	**133,326**	**141,426**	**131,122**	**121,434**	**112,649**	**639,957**
1.1. Land conservation	20,519	21,852	22,424	22,874	23,311	110,980
1.2. Irrigation	56,280	59,958	61,630	62,707	63,904	304,478
1.3. Mechanization	10,016	10,330	8,573	7,715	6,867	43,500
1.4. Improve soil fertility	18,186	24,026	16,103	8,423	1,367	68,105
1.5. Seed improvement	13,874	10,536	7,336	4,357	1,549	37,652
1.6. Livestock development	14,451	14,724	15,056	15,359	15,652	75,242
2. Research and technology transfer	**12,157**	**15,647**	**18,060**	**19,701**	**20,481**	**86,046**
2.1. Research & technology transfer	7,154	7,263	7,453	7,603	7,748	37,222
2.2. Extension services	3,837	7,129	9,247	10,638	11,234	42,084
2.3. Farmers' cooperatives	1,166	1,254	1,359	1,460	1,500	6,740
3. Value chain Devt./Private sector	**65,075**	**70,046**	**74,915**	**84,099**	**88,360**	**382,495**
3.1. Private sector development	600	914	625	638	650	3,426
3.2. Food crops	14,500	14,722	15,107	15,410	15,705	75,444
3.3. Export crops	16,650	16,905	17,347	17,695	18,033	86,631
3.4. Dairy and meat	1,200	1,218	1,250	1,275	1,300	6,244
3.5. Fisheries	250	254	260	266	271	1,301
3.6. Apiculture	120	122	125	128	130	624
3.7. Agricultural finance	1,195	1,213	1,245	1,270	1,294	6,217
3.8. Market infrastructure	30,560	34,698	38,955	47,418	50,978	202,608
4. Institutional dev. / Cross-cutting issues	**18,831**	**20,186**	**21,079**	**21,980**	**22,941**	**105,017**
4.1. Institutional capacity	1,615	1,742	1,683	1,717	1,750	8,506
4.2. Decentralization	1,065	1,437	1,683	1,982	2,291	8,459
4.3. Legal and regulatory framework	100	305	365	319	325	1,413
4.4. MIS/Agricultural statistics and M&E	1,400	1,421	1,459	1,488	1,516	7,284
4.5. Gender and youth	320	325	333	340	347	1,665
4.6. Environmental mainstreaming	115	117	120	123	125	600
4.7. Food and nutrition security	14,215	14,839	15,436	16,011	16,588	77,089
Total Costs	**229,389**	**247,305**	**245,175**	**247,215**	**244,432**	**1,213,516**

11. **ASIP public sector implementation costs under the medium-cost scenario rise gradually from US$229 million in 2013/14 to US$244 million in 2017/18, a total of US$1,213 million (rounded to US$1.2 billion) over the five-year ASIP period.** Costs by program have a very different distribution under the medium-cost scenario. Program 1 remains the largest program, accounting for just over half of all costs by 2017/18. The revision of PSTA's 3 targets in land conservation and irrigation down to more financially achievable levels as well as the phasing out of subsidies on fertilizer, lime, and seeds bring Program 1 costs under the medium-cost scenario to more affordable levels. Program 3 remains the next largest, with just under 30 percent of

implementation costs by 2017/18, but also with significantly reduced costs under the medium-cost scenario from more financially achievable targets for the construction of rural roads. Reduction of Program 1 and 3 implementation costs under the medium-cost scenario creates the space to slightly increase the allocation to Program 4 and to significantly increase the allocation to Program 2. Agricultural Research and Extension rises to 10.3 percent of ASIP implementation costs by its final year in 2017/18.

Table A6.7: ASIP's "Medium-cost Scenario" Public Sector Costs by Type (US$ thousands)

	2013/14	2014/15	2015/16	2016/17	2017/18	Total
Capital costs	114,601	120,187	124,600	133,805	138,019	631,213
Recurrent costs	114,788	127,118	120,575	113,410	106,412	582,303
Total Costs	**229,389**	**247,305**	**245,175**	**247,215**	**244,432**	**1,213,516**

12. **The proportion of ASIP's medium-cost scenario public sector costs taken by capital investment rises gradually from 60 percent in 2013/14 to 68 percent in 2017/18.** The proportion of costs taken by capital is, however, significantly lower than under the high-cost scenario due to the reduction in PSTA 3 targets in land conservation and irrigation as well as the reduction of the role of the state in agricultural mechanization.

13. Table A6.8 provides the proposed financing plan, based on available information, DPs' ongoing projects and "firm" programming intentions for PSTA 3, and government contributions. Table A6.9 provides a summary of the available funding vis-à-vis requirements, and shows a negligible deficit. However, it will be important for the government and DPs to synchronize the timing of the funding to ensure it matches PSTA 3's cash-flow requirements.

Table A6.8: PSTA 3 Financing Table by Donor and Projects

	2013/14	2014/15	2015/16	2016/17	2017/18	Total	% of Total Funds
A) Budget Support/PforR	**40.6**	**77.7**	**83.7**	**106.0**	**71.0**	**379.0**	**31.6**
European Union	25.0	25.0	36.0	37.0	37.0	160	13.3
DFID	15.6	19.7	14.7	14.0	13.0	77.0	6.5
IFAD				21.0	21.0	42.0	3.5
IDA PforR		33.0	33.0	34.0		100.0	8.3
B) Project Support	**76.9**	**161.7**	**135.3**	**83.8**	**63.3**	**521.0**	**43.4**
World Bank Projects	33.6	80.5	52.1	18.0	9.8	194.0	16.2
Swiss	2.0	2.0	2.0			6.0	0.5
Netherlands	3.6	3.6	1.4	1.4		10.0	0.8
USAID (incl. $40 PforR)	14.5	36.5	33.5	28.5	25	138.0	11.5
JICA		4.0	9.0	11	8	32.0	2.7
AfDB	3.5	9.5	7.0			20.0	1.7
DFID	0	1.6	5.0	3.2	3.2	13.0	1.0
IFAD Projects	17.7	20.0	19.3	13.7	7.3	78.0	6.5
FAO	2.0	4.0	6.0	8.0	10.0	30.0	2.5
C) Total DP Funds	**117.5**	**239.4**	**219.0**	**189.8**	**134.3**	**900.0**	**75**
D) Government	**60.0**	**60.0**	**60.0**	**60.0**	**60.0**	**300.0**	**25**

Funds							
TOTAL PSTA 3 Available Funds (C+D)	**177.5**	**299.4**	**279**	**249.8**	**194.3**	**1,200.0**	**100**
PSTA 3 Req. Funds	229.4	247.3	245.2	247.2	244.4	1,213.5	
Deficit/Surplus	-51.9	52.1	33.8	2.6	-50.1	-13.5	

Table A6.9: Comparison of ASIP's "Medium-cost Scenario" Public Sector Costs with MINAGRI's Budget (US$ Thousands)

	2013/14	2014/15	2015/16	2016/17	2017/18	Total
PSTA 3 Public Sector Costs	**229**	**247**	**245**	**247**	**244**	**1,213**
PSTA 3 Available Funds	177.5	299.4	279	249.8	194.3	1,200
Deficit/Surplus	51.9	52.1	33.8	2.6	50.1	13.5 [a/]

Note: [a/] For purposes of simplicity, total costs are rounded to US$1.2 billion; therefore a negligible deficit (1 percent) results.

14. **In summary, the ASIP program structure and expenditure levels build on the structure and expenditure trends during the PSTA 2 period, while reflecting enhancements in the Program structure and increased expenditures to reflect PSTA 3 costs and available funding.** This pattern also reflects the recent increases in budgetary allocations to MINAGRI, which are expected to be sustained in the medium term. It will be important for the annual planning and budgetary cycle to ensure the required level and timing of allocations from both the government and DPs match PSTA 3's requirements. Accordingly, it is anticipated that there will be a need to update the costs and financing plan in accordance with actual implementation.

Annex 7: Detailed Program Economic Assessment

I. Summary

1. Annex 7 presents the economic assessment of the Agricultural Program for Results (PforR) support operation for the Government of Rwanda's (GoR) Strategic Plan for the Third Phase of the Transformation of Agriculture (PSTA 3). The rational for public sector financing as well as the World Bank value added are presented followed by a quantitative and qualitative assessment of the Agriculture Sector Investment Plan (ASIP). Results are also presented to inform the relative prioritization of the different subprograms (SPs) in the ASIP medium-cost scenario, which total US$1,195 million over five years in constant 2014 prices (equivalent to US$1,214 million with inflation and projected changes in the RwF/USD exchange rate).

2. **Public sector rationale.** The rationale for public sector investments includes that cash-poor farmers are unable to internalize large unit development costs combined with long-term and downstream benefits. In the case of irrigation and service delivery, plans include subsequent transfer of ownership and service provision to private sector entities. Public sector intervention is also justified in key post-harvest investments that create spillover effects but that have been delayed because of a lack of private sector financing.

3. **World Bank added value.** World Bank financing in support of PSTA 3 would add comparative value given the World Bank's position to draw upon a wealth of global experience in areas directly related to Program investments areas. Achievements from the successful implementation of ongoing World Bank-supported operations in the sector also provide a strong background upon which to prepare this proposed operation.

4. **A 25-year cash flow model is used to assess the *ex-ante* productivity, effectiveness, and efficiency of public sector investments.**[91] While the costs of all SPs are included in the analysis, the model only quantifies direct benefits for 9 of the 24 SPs – covering 77 percent of the public sector investment. It is assumed that the private sector and public-private partnership (PPP) investments mapped out in the ASIP costs will occur and be economically viable. The core of the analytical model estimates the impact of SP investments on revenues and costs in seven different enterprise models: three cropping models, one livestock model, and three post-harvest enterprises. In addition, the analysis quantifies increased benefits from greater employment opportunities in agriculture and an estimate of the economic value of increased carbon sequestration.

5. **A selection of key drivers of agricultural growth are quantified in the model to analyze the impact of changes in public sector investment costs by linking enterprise models and SP costs.** Changes in public sector investments lead to changes in: the number of developed hectares with terracing or irrigation; the number of higher-yielding cows distributed; the number of infrastructures built for post-harvest drying and storage; and the extent of new or improved feeder roads. Further to this, the model captures how SPs are designed to enhance farm-level yields and affect fertilizer and seed use. The linkages between enterprise models and SP investments also capture benefits from reduced soil erosion, labor savings from mechanization, cost savings from feeder roads, avoided yield and price loss from post-harvest infrastructure, and adoption of new farming practices.

6. **The medium-cost scenario yields an economic net present value (NPV) of US$585 million and a sound economic rate of return (ERR) of 21 percent.** Undiscounted, this is equivalent to an average annual economic net benefit of US$196 million. Using this estimate as a proxy for annual growth in the agriculture sector, it constitutes 8.0 percent of the agricultural share of GDP only 0.5 percent short of, matching the 8.5 percent growth target in PSTA 3. Some benefits are not yet captured in this analysis, including incremental benefits from value chain development.

[91] Financial prices are converted to economic prices using adjustment factors and amounts are noted in constant 2014 terms; the exchange rate is RwF 650 to 1 USD.

7. **Poverty reduction is achieved through increased employment generation and farm income,** ranging between US$320 and US$2,200 per year on a 0.6 ha farm. Assuming five people per farm household, this constitutes about 0.3 to 2.3 times the national poverty line or US$0.20-1.20 per person per day. Poverty is also reduced by generating agricultural employment in the order of 7.7 million work days per year or 29,400 fulltime person-years.

8. **Elasticities indicate the relative impact of different SPs.** An analysis of elasticities indicates that the economic NPV is most sensitive to changes in investments in land conservation, research and technology transfer, and soil fertility investments. Conversely, estimated elasticities indicate that the impact on employment generation is driven particularly by investments in livestock development and irrigation, while employment decreases with increased mechanization.

9. **Linkages between enterprise models and SPs highlight that there are positive synergies.** In the case of soil conservation and livestock production, increased income and availability of fodder and straw enable livestock production while more available manure helps improve incomes and soil fertility. The net benefit from investments in storage facilities is dependent on successful implementation of SPs that increase crop yields and prices. Program delay and low farmer adoption rates are key risk factors that can threaten the achievement of expected benefits. Risk management strategies should ensure minimum program delay while also increasing farmer adoption rates through extension. Finally, it is important that yield increases are supported through SPs for livestock and hillside developments because these enterprises constitute a large share of total program returns.

10. **Agriculture growth driven by the nine quantified SPs is enabled through linkages to the other SPs.** First, support for farmers' organizations helps improve access to inputs, markets, finance, insurance, and extension services. Based on this, benefits can be captured in cropping and livestock production because these require functioning markets for both farm inputs and outputs. Second, the enterprise models rely on access to markets via value chains for crops, dairy, and meat including for increased production of cash crops and export. This requires access to improved drying, storage, processing, and also transport, which are necessary to meet higher quality standards and to sell perishable products to other than local markets.

11. **Effective institutions, adapted legal and regulatory frameworks, and targeting of disadvantaged groups strengthen program impact.** The impacts of investment in research, technology transfer, and extension rely on effective institutions that can implement research programs and ensure farmer adoption of improved technologies and farming practices. In addition, investments are planned to adapt the legal and regulatory system to transform the agriculture sector toward higher value chains including exports. Finally, because investments that increase productivity may be subject to elite capture, SP investments are planned to ensure that disadvantaged groups benefit through greater food and nutrition security as well as through employment generation.

12. **Tracking impacts against a baseline with reliable M&E systems helps decision makers and development partners (DPs) make evidence-based investment decisions.** To ensure that the Program investment is sound and stays on target, it becomes important to track impact against a baseline. SP 4.4 investments are needed both to establish the baseline against which impacts are measured, but also to assess if investment priorities should change over time as new information comes to light. By establishing a statistical system and a targeted M&E system, it becomes possible to implement sound investments in the future based on timely and reliable information.

II. Background

13. The GoR requested the World Bank to provide an Agricultural Program for Results (PforR) support operation for PSTA 3. The World Bank’s assessment methodology calls for an economic assessment of PSTA 3, which is supported by the Bank. The focus in this annex is to analyze the medium-cost funding scenario for ASIP, and comparisons are also made to the high-cost scenario. The economic assessment addresses four key aspects:

a. Rationale for Public Provision and Financing;
b. World Bank Added Value;
c. Program's Economic Impact; and
d. Results of Economic Evaluation.

14. This assessment aims to further enhance the design of the proposed PforR. The results of the economic assessment can also be used as a tool to help determine the most suitable composition of public agricultural investment costs. Where possible, the indicators and elasticities estimated in the model are used as proxies to discuss the proposed prioritization criteria listed below for PSTA 3's Results Framework (RF):

- Degree to which SPs/activities contribute to achieving Vision 2020 and EDPRS 2 strategic objectives and targets;
- Degree to which SPs/activities contribute to achieving increased crop, livestock productivity, and food security;
- Degree to which SPs/activities contribute to more inclusive agricultural private sector investment;
- Degree to which SPs/activities contribute to promoting enhanced market focus commercialization and value addition; and
- Degree to which SPs/activities contribute to accelerating agriculture export growth.

III. Rationale for Public Provision and Financing

15. In many cases, investments in productive activities are private goods for which there is no rationale for public sector financing. Public sector investments are generally justified in the case of provision of public goods and nonmonetary benefits, dealing with market failures, spillovers to non-Program areas, environmental externalities, redistribution of wealth, and social and political concerns.

16. **Development of hillside terraces includes high unit costs combined with long-term and downstream benefits**. In the case of the ASIP medium-cost scenario, investments in radical and progressive terracing do generate direct benefits to farmers. However, the investments also reduce long-term productivity losses from soil erosion, which cash-poor farmers are not able to internalize in their farm management plans. Reduced soil erosion also generates benefits for downstream irrigation systems that will experience reduced costs of clearing sediment loads.

17. **Irrigation developments include high unit costs that are later transferred to private Water Users' Associations (WUAs).** In the case of irrigation development, the unit costs are so high that cash-poor farmers are not able to cover the costs themselves nor to obtain financing without public sector support. Irrigation development has spillover effects on the local population through employment generation and improved availability of water for household use as well as livestock production. The investment includes the transfer of self-reliant and self-financing irrigation schemes to WUAs and other nonpublic entities.

18. **Key post-harvest investments have been delayed because of a lack to access to adequate financing but have the potential to generate key spillover effects.** With a lack of access to financing for farmers, and often also farmers' organizations, public sector funding can initialize investments in post-harvest infrastructure projects. Again, some of these benefits are captured by farmers, but spillover effects include increased employment opportunities and strengthening of high-value chains. In the case of building rural feeder roads, the public sector justification is clearer, as roads are classical public goods with substantial spillover effects of employment generation, greater productivity in all sectors, and easier access to health, education, and social facilities and services.

19. **Research, technology transfer, and extension are public goods with spillover effects to non-Program areas.** As is planned in the PforR operation, private sector investment can be incorporated in research and extension where sufficient private benefits can be captured to make investments economically viable. The PforR

operation is designed to reinforce and strengthen the government's own systems for delivery of key agricultural services, while putting in place processes to expand the role of the private sector in service provision. With respect to agricultural research and related knowledge-generation activities, these activities are nonexcludable, therefore making them classical public goods. At the same time, PSTA 3 will endeavor to expand the range of actors in promoting agricultural research, including the private sector, for higher-value crops.

IV. World Bank Added Value

20. World Bank financing in support of PSTA 3 would add comparative value given the Bank's position to draw upon a wealth of global experience in the following areas: (i) sustainable land management; (ii) input provision; (iii) increased irrigation in marshland and hillside approaches in support of increasing agriculture production and productivity; (iv) fostering of a more conducive policy environment for stimulating the private sector's role and investments in the agriculture sector; (v) increased marketing and sales of agriculture production and creation of on- and off-farm small and micro businesses; and (vi) provision of advice to the GoR on adapting relevant good practices and innovations to the Rwandan context. These experiences would support the GoR's effective implementation of PSTA 3, thereby contributing to achievements of strategic impact, outcome, and output level targets, underpinned by a strong results chain.

21. Achievements from the successful implementation of ongoing World Bank-supported operations in the sector provide a strong foundation upon which to prepare this proposed operation. Both the Rural Sector Support Project (RSSP) and the Land Husbandry, Water Harvesting and Hillside Irrigation Project (LWH) achieved commendable results in helping to transform Rwanda's rural farming sector. Under RSSP 1 and 2 (now closed) and the ongoing RSSP 3, farmers moved from low-value subsistence farming to a more productive irrigated system. Under RSSP, impressive improvements were made in marshland rehabilitation and protection of hillsides against erosion. Similarly, LWH made significant contributions to raising rural incomes, increasing productivity of hillsides, increasing crop yields, and improving participatory approaches of farmers' organizations.

V. Quantitative Methodology

22. **This economic assessment includes a quantitative cost-benefit analysis of nine SPs and qualitative discussion of the remaining 15 SPs.** An Excel-based cash flow model was designed to assess the *ex-ante* productivity, effectiveness, and efficiency of public sector investments in different SPs using the ASIP medium-cost funding scenario of US$1,195 million over five years, as shown in Table A7.1 (equivalent to ASIP public sector estimate of US$1,214 million with inflation and projected exchange rates).[92] While the costs of all SPs are included in the analysis, the model only quantifies direct benefits for 9 of the 24 SPs – covering 77 percent of the public sector investment. It is further assumed that the private sector and PPP investments mapped out in the ASIP costs will occur and be economically viable, even if the costs and benefits are not quantified in this current analysis. Some comparisons are made to the ASIP high-cost scenario, also shown in Table A7.1.

[92] The analysis reported in this annex is based on the Excel-based Economic and Financial Analysis Model version dated June 16, 2014. The exchange rate is RwF 650 to US$1.

Table A7.1: ASIP Public Sector Investments by SP as Included in the Analytical Model

Investment costs for 5-year period		Medium-cost Scenario		High-cost Scenario	
Subprogram		**(million USD)**	**(% of total)**	**(million USD)**	**(% of total)**
1.1. Land conservation		107	9	282	15
1.2. Irrigation		292	24	597	32
1.3. Mechanization		42	4	323	18
1.4. Improve soil fertility		71	6	115	6
1.5. Seed improvement		39	3	45	2
1.6. Livestock development		72	6	100	5
2.1. Research and technology transfer		36	3	12	1
2.2. Extension services		40	3	17	1
3.8. Market-oriented infrastructure		216	18	291	16
Sub Total		914	77	1,784	97
Remaining 15 SPs	**(2)**	280	23	61	3
Total Public Sector Investment	**(3)**	1,195	100	1,845	100

Note: (1) Amounts are in constant 2014 prices (no inflation). When including projected inflation and projected exchange rates for the 5-year period as reported in the ASIP report, the totals correspond to US$1,214 million in the medium-cost scenario and US$1,907 million in the high-cost scenario.
(2) In the analysis these costs are deducted from the net benefits of the other nine SPs.
(3) Analysis excludes ASIP costs assigned to private sector and PPPs (US$528 million in the medium-cost scenario and US$358 million in the high-cost scenario - excluding inflation and projected exchange rates).

23. The core of the analytical model estimates the impact of SP investments on revenues and costs in seven different enterprise models and two additional benefit flows. The analytical model and associated assumptions are an amalgamation of the Economic and Financial Analysis (EFA) models used in 2013 for two World Bank investment projects in Rwanda: LWH and RSSP. The current model therefore includes three cropping enterprises, one livestock enterprise, and three post-harvest enterprises as described below:

a) **Cropping on irrigated hillside areas** (command areas). This enterprise model includes a representative cropping pattern for the without- and with-Program situations. The crops include: avocado, banana, maize, mango, onion, tomatoes, and sorghum (see Table A7.2). Furthermore, the assumptions include farm-level yields, crop prices, and costs of: labor, planting, manure, fertilizer, chemicals, and irrigation operating and management fee, as applicable on the different crops. It is assumed that without the Program there is a 1 percent annual yield loss due to soil erosion. The annual gross margins per ha are calculated for each crop while allowing for delayed harvesting for up to two years after planting, and replanting of certain crops every 10 or 25 years, such as in the case of banana, avocado, and mango. Incremental Program impact is aggregated up by 12,300 ha developed for hillside irrigation. It is assumed that 5 percent of the hectares developed will be occupied by reservoirs without any agricultural production in the with-Program situation. It is also assumed that farmers on 95 percent of the area adopt the improved with-Program cropping practices, leaving 5 percent to achieve net benefits equivalent to those without the Program.

b) **Cropping on nonirrigated hillside areas**. This enterprise model has representative cropping patterns for the without- and with-Program situations with the following crops: banana, beans, cassava, Irish potato, maize, and sorghum (see Table A7.2). As in the irrigated hillsides enterprise model, the assumptions include yields, crop prices and operating costs as applicable to the different nonirrigated crops. It is assumed that without the Program there is a 1 percent annual yield loss due to erosion. Annual crop margins per ha take into account replanting of bananas every 10 years and a one-year delay after planting before first harvest. Incremental Program impact is aggregated up by 310,854 ha developed for nonirrigated hillside farming. It is assumed that 5 percent of the hectares developed will be silt trap zones in the with-Program situation. Incremental benefits are added from producing poles, charcoal, forage, and grass on these areas. It is also assumed that farmers on 95 percent of the area

adopt the improved with-Program cropping practices, leaving 5 percent to achieve net benefits equivalent to those without the Program.

c) **Cropping on irrigated marshlands**. In this enterprise model, it is assumed that sweet potatoes are grown in the without-Program situation, and the irrigation development enables two seasons of paddy rice. As in the irrigated hillsides enterprise model, the assumptions include yields, crop prices, and operating costs as applicable for sweet potatoes and paddy rice. Incremental Program impact is aggregated up by 13,500 ha developed for marshland irrigation. It is assumed that 5 percent of the hectares developed will be occupied by reservoirs without any agricultural production in the with-Program situation. It is also assumed that farmers on 95 percent of the area adopt the improved with-Program cropping practices, leaving 5 percent to achieve net benefits equivalent to those without the Program.

Table A7.2: Assumed Representative Farm Cropping Pattern Without- and With-Program by Area

Share of farm area / Yield	Irrigated Hillsides			Nonirrigated Hillsides			Irrigated Marshlands		
	Crop	**Share**	**kg/ha**	**Crop**	**Share**	**kg/ha**	**Crop**	**Share**	**kg/ha**
Without Program	Banana	33%	15,000	Banana	20%	15,000	Sweet Potato	100%	6,000
	Maize	33%	2,000	Beans	18%	600			
	Onion	2%	8,000	Cassava	9%	10,500			
	Sorghum	32%	1,600	Irish potato	7%	8,500			
				Maize	24%	1,600			
				Sorghum	22%	1,400			
With Program	Avocado	22%	8,000	Banana	1%	25,000	Paddy Rice **(1)**	100%	13,000
	Banana	10%	35,000	Beans	23%	2,300			
	Mango	19%	5,000	Irish potato	12%	20,000			
	Onion	19%	15,000	Maize	40%	4,000			
	Tomatoes	30%	15,000	Soybeans	24%	2,000			

Note: (1) Includes two seasons for paddy rice.
Source: Economic and financial analyses for the LWH and RSSP projects.

d) **Livestock cooperatives producing meat, milk, and manure**. Because data were more readily available at the cooperative level, net benefits of cow production were calculated for a single cooperative and aggregated up to the Program level based on the number of cooperatives involved in cow production. Individual farmers remain the direct beneficiaries from the cow production activities. This enterprise model includes herd projections and prices per head of calves and cows; milk and manure yields; and operating costs for veterinary care, forage, feed concentrates, stud fees, labor, and construction and maintenance of stables and forage installations. It is assumed that each cooperative in the without-Program situation has a total herd of 465 heads (cows, bulls, and calves) based on annual purchase of 35 heifers for a stable herd. The Program target is to distribute 210,796 higher-yielding cows, which when divided by 900 cooperatives constitutes 47 heifers per year for five years. This builds up to a stable herd of 653 heads per cooperative. It is also assumed that 95 percent of the cooperatives adopt the improved with-Program livestock production practices, leaving 5 percent to achieve net benefits equivalent to those in the without-Program situation.

e) **Post-harvest drying of crops on new drying floors**. Use of Program-financed drying floors ensures faster and more complete drying of crops, thereby reducing storage losses and improving the quality of products so they can command higher prices in the market. The benefit of investing in each drying floor is assumed to constitute an average of 225 tonnes/month for four months of the year with a 10 percent

quantity loss avoided and 10 percent price loss avoided. The value of the benefit is measured as the full drying capacity multiplied by the weighted average of prices of the share of crops that are typically dried, including paddy rice, sorghum, maize, and beans. Operating costs include materials and labor.

f) **Post-harvest storage of crops in new facilities**. Use of Program-financed storage facilities reduces storage losses and allows crops to be sold at higher prices compared to those prevailing immediately following the harvest. The benefit of investing in each storage facility is assumed to constitute an average of 400 tonnes/month for two 3-month periods of the year with a 20 percent quantity loss avoided and 20 percent price loss avoided. The value of the benefit is measured as the full storage capacity multiplied by the weighted average of prices of the share of crops that are typically stored, including paddy rice, maize, beans, sorghum, banana, and vegetables. Operating costs include materials and labor.

g) **Post-harvest transport on new or improved feeder roads**. Net benefits are calculated as a 5 percent avoided post-harvest transport loss due to new and improved feeder roads multiplied by the value of with-Program transported crops, including paddy rice, maize, beans, sorghum, banana, and vegetables. Further to this, it is assumed that this investment can yield a 5 percent reduction in input costs of seed, fertilizer, and chemicals for farmers. These cost savings are captured in the above cropping models. The estimated benefits from feeder road investments exclude any additional benefits captured by non-Program agricultural production and other sectors as well as benefits to communities by providing easier access to health, education, and social facilities.

h) **Employment opportunities in agriculture**. The incremental labor costs accounted for in the three cropping models, livestock model, and post-harvest drying and storage facilities are included as net benefits from greater employment opportunities in agriculture. This excludes any multiplier effects in other agribusinesses or other sectors. It also excludes labor generated from construction during Program implementation. For cropping farms in the without-Program situation or when there is no irrigation, it is assumed that 10 percent of the labor requirements are hired labor. On farms with irrigation, this is 50 percent.

i) **Economic value of increased carbon sequestration**. The links between land degradation and CO_2 emissions are numerous and complex, but studies from some countries suggest that sustainable land management (SLM) measures such as those that have been supported under the LWH project contribute to CO_2 mitigation by at least 0.5 tonnes of carbon per ha per year (or 1.785 tonnes of CO_2 per ha per year using a 3.57 transformation ratio). The estimate of 0.5 tonnes of C was used in the Kenya Agricultural Productivity and SLM Project and the Western Kenya Community Driven Development and Flood Mitigation Project. It can go as high as 12 tonnes of C from 5-year-old forest land used in the Western Kenya Integrated Ecosystem Management Project and even as high as 20 tonnes of C for regenerated closed areas to 40 tonnes of C for afforested land used in the Loess Plateau Watershed Rehabilitation Project. In the current analysis it is assumed that nonirrigated areas sequester 0.5 tonnes of carbon per ha per year while silt trap zones sequester 12 tonnes of C per ha per year. In terms of valuing sequestered C or CO_2, activities that result in increased carbon sequestration in Biocarbon Fund projects in 2009 typically were compensated at a level of US$5 per tonne of CO_2. Estimates of social price in different studies indicate US$5-125 per tonne CO_2.[93] From the literature on carbon finance, this can be interpreted as the social cost of CO_2 emission or as a pollution tax required to keep CO_2 emissions at the socially optimal level. In this Program, farmers will not receive direct

[93] Sources: Fankhauser, S. 1995. Valuing Climate Change: The Economics of the Greenhouse. London: Earthscan. Cavatassi, Romina. 2004. "Valuation Methods for Environmental Benefits in Forestry and Watershed Investment Projects," ESA Working Paper No. 04-01, FAO; and Dutilly-Diane, C., et al.. 2007. "Could Payments for Environmental Services Improve Rangeland Management in Central Asia, West Asia and North Africa?" CAPRi Working Paper No. 62, International Food Policy Research Institute.

compensation based on carbon sequestration and the benefit therefore only constitutes an economic value for a global public benefit. As a conservative estimate and, in line with the European Point Carbon price at the time of writing, the assumed value of carbon sequestration is set at US$7 per tonne of CO_2.

24. **Adjustment factors for economic analysis.** An economic benefit assessment is concerned with value addition to GDP and therefore ignores all transfer payments such as taxes, subsidies, grants, loans, interests, and repayments. Each of the above seven enterprise models and two benefit flows are calculated annually over a 25-year period using financial prices measured at the farm gate in constant 2014 amounts. The discount rate is set to 12 percent in line with the assumption in other World Bank projects in Rwanda. Financial prices and costs are converted to economic prices using adjustment factors. First, the shadow price of unpaid family labor is US$0.98 per day (RwF 634 per day), which is 14 percent below the market price of US$1.14 per day (RwF 740 per day) for unskilled hired labor used in agricultural production, in line with the Implementation Completion Report of RSSP 2. Second, the economic paddy rice price is assumed to be 80 percent of the financial price due to the import tariff imposed on imported rice from outside the East African Community (EAC). This is in line with findings in a rice value chain study.[94] Third, the financial analysis includes the current 50 percent fertilizer subsidy on maize and wheat while the subsidy is excluded from the economic analysis. Remaining financial prices and costs are converted to economic prices using a standard factor of 0.9. When investment costs do not indicate the proportion allocated to labor, it is assumed that 15 percent of the costs are labor in order to apply a different conversion factor to the two portions.

25. **Additional model refinements are implemented to analyze prioritization between SPs.** The analytical model outlined thus far enables an assessment of the *ex-ante* productivity, effectiveness, and efficiency of public sector investments overall and by SP for the base ASIP medium-cost case. However, a few more model refinements are necessary to be able to analyze the impact of reallocating funds between SPs and thus discuss budget prioritization.

26. **Linkages between SP investment costs and key enterprise model assumptions help quantify the relative impact of SPs.** Through the enterprise models described above, the key linkages to agricultural growth are quantified in that changes in public sector investment costs lead to changes in: the number of developed hectares with terracing or irrigation; the number of higher-yielding cows distributed; the number of infrastructures built for post-harvest drying and storage; and the extent of new or improved feeder roads. However, to further enable an analysis of the relative return of different SPs, some additional linkages are implemented in the analytical model. These linkages go across SPs and show the impact on: crop yields, input use and costs, and adoption of improved farming practices. These captured linkages are described below – keeping in mind that more intricate linkages should be considered in future improvements of this analytical model. As with all farm-level assumptions on revenue and costs, the relative contributions of each SP investment are based on expert assessment by the LWH and RSSP project team:

a) **Irrigated hillside yields.** The with-Program yield potential on irrigated hillside areas is achieved by investments in several SPs. As shown in Table A7.3, it is assumed that 10 percent of the yield increase is achieved through land conservation measures (terracing), 25 percent from irrigation, 5 percent from mechanization, and 20 percent to each of the SPs for improved soil fertility, seed improvement, and research and technology transfer. A numerical example is presented in Box 5.1. Note that the ASIP medium-cost area developed in SP 1.1 includes about 80 percent in progressive terraces and 20 percent in radical terraces. The radical terraces require large investments in manure and compost to build up organic matter and achieve yield improvements. If more radical terraces are built, this could be reflected by a higher yield impact than the 10 percent being allocated to SP 1.1.

[94] See Rwanda Rice Commodity Chain Strategic Options to Maximize Growth and Poverty Reduction, prepared by D. Stryker, 2010.

b) **Nonirrigated hillside yields.** It is assumed that the with-Program yield potential on nonirrigated hillsides is achieved through land conservation (10 percent), mechanization (5 percent), and 75 percent split evenly between improved soil fertility, seed improvement, and research and technology transfer (see Table A7.3). A numerical example is presented in Box A7.1.

c) **Irrigated marshland yields.** As shown in Table A7.3, the with-Program potential yield increase is achieved through irrigation (25 percent), mechanization (5 percent), and the remaining 70 percent split evenly between improved soil fertility, seed improvement, and research and technology transfer. A numerical example is presented in Box 5.1.

d) **Linkages to input use and input costs.** [95]

i. **Soil erosion and downstream irrigation fee.** It is assumed that a change in investments in land conservation (terracing) leads to a proportional change in the irrigation fee per ha for farmers. The rationale is that less terracing than planned does not reduce soil erosion as planned and a high level of sediment load increases the costs of maintaining downstream irrigation systems. This model linkage assumes that at least some of the incremental maintenance costs are passed on to farmers via the irrigation fee.

ii. **Mechanization and labor savings.** It is assumed that the investment in tractors, tillers, planters, harvesters, and so on can lead to a 15 percent per ha labor saving on farms. Most of the mechanization investment costs are included in SP 1.3 and some are also included in SP 3.8. The assumption is that 80 percent and 20 percent of the labor saving potential is achieved by the two SPs, respectively. For example, a 10 percent reduction in SP 1.3 means that only 92 percent of the labor saving potential is achieved (i.e., 14 percent labor saving rather than the full 15 percent).

iii. **Fertilizer and seed use.** The model linkages include a proportional change in fertilizer use in kg per ha for crops in all areas when the investment costs change in SP 1.4. It also includes a proportional change in seed use in kg or plants per ha when the investment costs change in SP 1.5. This comes parallel to the yield change discussed above from changes in SP investments.

iv. **Feeder roads and input cost savings.** It is assumed that if rural feeder roads are developed as planned, farmers can achieve a 5 percent cost saving on the costs of seeds, fertilizers, and chemicals. A reduction in SP 3.8 investment causes a proportional reduction in achieved cost saving.

e) **Adoption of improved farming practices.** It is assumed that in the base case, 20 percent of farmers on developed areas adopt the improved farming practices each year to a maximum of 95 percent, leaving 5 percent to achieve net benefits equivalent only to the without-Program situation. This adoption rate is linked to investment costs in SP 2.2 for extension services. A reduction in investment in this SP leads to a proportional reduction in the annual adoption rate. This is illustrated in Figure A7.1, showing the adopters, nonadopters, and silt trap zones on nonirrigated hillsides with 20 percent and 10 percent annual adoption rates.

[95] For future considerations in developing this model, one could consider the legitimacy of introducing multiplicative functions to capture the investment impacts. For example, this may imply that investing less in soil fertility (fertilizer use) may also lead to less seed use. Similarly, if soil erosion increases due to lack of terraces, fertilizer use will be less effective but seed use may not change equivalently. Further work is needed to obtain data to determine such functional relationships.

Table A7.3: Example of Model Linkages - Yield Impacts by SP

Share of max yield potential (1) / Subprogram (2)	W/P Yield on Irrigated Hillside Areas	W/P Yield on Nonirrigated Hillside Areas	W/P Yield on Irrigated Marshlands
1.1. Land Conservation	10%	10%	
1.2. Irrigation	25%		25%
1.3. Mechanization	5%	5%	5%
1.4. Improve soil fertility	20%	28%	23%
1.5. Seed improvement	20%	28%	23%
2.1. Research and technology transfer	20%	28%	23%
Total share of max yield potential (1)	100%	100%	100%

Note: (1) Each crop has its own assumed maximum yield potential in each cropping area. (2) Each SP contributes by a certain share of 100% to reach the maximum yield potential. Rounding errors may occur.

Box A7.1: Numerical Illustration of Model Linkages - Yield Impacts by SP

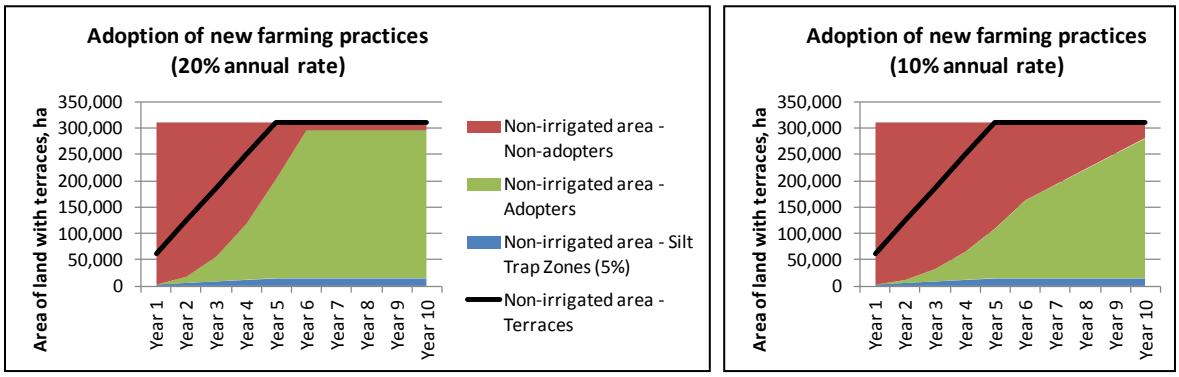
Table A7.3 shows how a number of SP investments are linked to key assumptions in the enterprise models. This is done to capture the effect investments have on the progress towards the maximum yield potential. Each crop has its own assumed maximum yield potential in each cropping area. The implication is that if investments are reduced in one of the SPs, the maximum yield potential is not reached.

For example: If the soil fertility SP's share of the ASIP investment halves from 6 percent to 3 percent, the maximum with-Program yield on irrigated hillsides will decrease by 50 percent of the 20 percent share allocated to soil fertility, equal to a 10 percent reduction. This means that one only reaches 90 percent of the yield potential on irrigated hillside crops.

At the same time, that investment cost change leads to a 50 percent decrease of 28 percent of the maximum yield potential on nonirrigated areas, equal to a 14 percent reduction. This means that one only reaches 86 percent of the yield potential on nonirrigated areas.

And finally, the 50 percent decrease in investment in SP 1.4 would halve 23 percent of the maximum yield potential on irrigated marshlands. This means that one only reaches 88 percent of the yield potential on irrigated marshlands.

Figure A7.1: Illustration of 20% and 10% Annual Adoption Rate on Nonirrigated Hillsides



Note: (1) Maximum adoption rate is 95 percent. (2) Left panel shows how a 20 percent annual adoption rate builds up to the maximum of 95 percent, while with a 10 percent annual adoption rate the maximum of 95 percent has not been reached by year 10.

VI. Quantitative Analysis of Key Subprograms

27. **This section presents the main results of the economic assessment.** First, the results are measured through proxy indicators for growth in agricultural GDP and poverty reduction through growth in income and employment. Second, results show how the different SPs rank in terms of driving the overall return on investment and employment generation. These items are covered first as they are of particular interest for prioritizing the government's investment between SPs. Third, other key results are discussed including: synergies between different SPs as well as the impact of Program delay and other risk factors. The unit costs of different SP activities are also discussed. Finally, the results are presented for the ASIP high-cost scenario.

28. **There is a sound return on public sector investment in the ASIP medium-cost scenario contributing to agricultural growth.** Estimates for the ASIP medium-cost scenario indicate that the planned US$1.2 billion five-year investment yields a sound overall economic NPV of US$585 million with an ERR of 21 percent. As shown in Table A7.10, the estimated 21 percent ERR lies within the range of rates of returns calculated on existing and closed investment projects in Rwanda and other Sub-Saharan African countries as implemented through different organizations (ERRs ranging from 14-93 percent on projects with a varying combinations of soil conservation, irrigation, and post-harvest components). Annual net benefits are shown in Table A7.11 and Table A7.12 for the financial and economic values, respectively. Note that these estimates are based on the 25-year model, which includes recurrent investment costs in year 6 and onwards from the ASIP cost estimate. Undiscounted, this is equivalent to an average annual economic net benefit of US$196 million (excluding carbon sequestration). Using this estimate as a proxy for annual growth in the agriculture sector, this constitutes 8.0 percent of the agricultural share of GDP.[96] The analysis seems generally consistent with an 8.5 percent growth target for the sector. In addition, this analysis does not capture incremental benefits from other enterprises, including those further up the value chain. Additional benefits will also be achieved outside the Program area but have not been accounted for here.

29. **Poverty reduction through farm-level income growth.** The ASIP medium-cost scenario drives a change in cropping pattern and farm management practices that greatly improve farm-level income. As shown in Table A7.4, estimates indicate a 77 percent increase in per ha gross margin on nonirrigated hillsides, and much larger increases on irrigated areas as shown in the table. With an average farm size of 0.6 ha, household incomes could increase by between US$320 and US$2,200 per year. If one assumes an average farm household of five people, this increase in income constitutes about 0.3 to 2.3 times the poverty line for Rwanda, or US$0.20-1.20 per person per day.[97] When targeting poor farmers, poverty can be reduced by increasing household income through increased productivity and also by switching more to cash crops such as maize and rice. These estimates are based on the cropping patterns shown in Table A7.2. For example, if the nonirrigated with-Program pattern instead included 23 percent banana and 1 percent beans, the gross margin would have increased by 123 percent rather than 77 percent. As such, the income effects will vary from area to area and farm to farm. Note that as is appropriate in a financial and economic analysis, the gross margins presented in Table A7.4 exclude the cost of the farmer's own labor. Further to this, the increased gross margins will help motivate farmers to adopt improved technologies. This is discussed further below.

[96] National Institute of Statistics of Rwanda (March 2014). Gross Domestic Product - 2013. GDP for 2013 was estimated as RwF 4,819 billion (US$7,414 million) of which 33 percent is value added by the agriculture sector.

[97] Official poverty line and extreme poverty line in 2012 prices are RwF 118,000 and 83,000 per person per year, which is equivalent to US$192 and US$132, respectively, in 2014 prices. (National Institute of Statistics Rwanda. 2012. The evolution of poverty in Rwanda from 2000 to 2011.)

Table A7.4: Poverty Reduction from Increased Annualized Financial Gross Margins by Cropping Area

(Apr-2014 prices)	Unit	Irrigated Hillside Areas	Nonirrigated Hillside Areas	Marshland Areas
Without Program	US$//ha	661	693	906
With Program	US$/ha	4,325	1,227	4,319
Incremental increase:	US$/ha	3,664	533	3,412
% increase	%	554%	77%	376%
Increase on 0.6 ha farm (5 persons)	US$/farm/year	2,198	320	2,047
Increase per person	US$/person/year	440	64	409
Increase as share of poverty line (2)	ratio	2.3	0.3	2.1
Increase as share of extreme poverty line (3)	ratio	3.3	0.5	3.0
Increase per person per day	US$/person/day	1.2	0.2	1.1

Note: (1) Estimates based on annualized and weighted averages of crops harvested in each area. Excludes the cost of the farmer's own labor.
(2) The Rwanda poverty line in 2012 prices was RwF 118,000 per person per year; converted to 2014 prices, it is US$192.
(3) The Rwanda extreme poverty line in 2012 prices was RwF 83,000 per person per year; converted to 2014 prices, it is US$135.

30. **Poverty reduction through generation of agricultural employment.** Under the ASIP medium-cost scenario, the NPV of increased agricultural employment due to changes only in cropping, livestock, and drying and storage facilities was estimated at US$39 million. The average economic net benefit was US$7.5 million per year, which is equivalent to 7.7 million work days with a daily economic wage rate of US$0.98/day. If one assumes 260 work days in a year, this translates to about 29,400 person-years, or with 130 work days in a year, over 58,800 person-years. This includes increases due to cropping intensification particularly on irrigated areas, decreases from mechanization, and increased livestock production, as well as employment in new drying and storage facilities. This is a conservative estimate and excludes employment generation in other agricultural production systems including export commodity chain and post-harvest businesses as well as labor for constructing terraces, irrigation systems, post-harvest infrastructure, and rural feeder roads. It also excludes any multiplier effects on employment inside and outside the Program area due to improved roads.[98]

31. **According to estimated elasticities, overall return to public sector investment is driven particularly by investments in soil conservation, research, and soil fertility.** To quantify the relative return on investment from different SPs, elasticities were calculated instead of using absolute or proportional measures, with the difference shown in equations 1, 2, and 3:

Absolute: $dY = NPV_{case} - NPV_{base}$ (eq. 1)

Proportional: $dY/Y = (NPV_{case} - NPV_{base})/ NPV_{base}$ (eq. 2)

Elasticity: $E = (dY/Y) / (dX^n / X^n) = dY/Y / (Cost_{case} - Cost_{base})/ Cost_{base}$ (eq. 3)

where

dY = Change in NPV
Y = Estimated NPV
E = Elasticity measure of NPV from changes in investment cost assumptions
dX^n = Change in investment costs in subprogram n
X^n = Investment costs in subprogram n

[98] For example, according to the RSSP2 Implementation Completion Report, the summary of findings from stakeholder consultations (Nov. 29 – Dec. 1, 2012) indicated that job creation had occurred both temporarily through construction activities and permanently through intensification. While there were emerging labor shortages during the peak season of crop activities, there had been use of community labor groups to cover labor shortages.

In line with a typical interpretation of elasticities and to explore the result's sensitivity to changes in investment level, the costs in each of the nine SPs were decreased by 1 percent from the ASIP medium-cost scenario. Table A7.5 shows that the economic NPV for the entire Program is most sensitive to changes in investments in land conservation (SP 1.1) and research (SP 2.1), where a 1 percent decrease in investment leads to a 1.6 percent or 1.2 percent reduction in economic NPV, respectively. There is also a relatively large impact of 0.9 percent when changing the investment in soil fertility (SP 1.4) by 1 percent. This result is driven partly by land conservation increasing yields, reducing soil erosion, and also by covering a large share of the developed area. It is also driven by the assumed linkages between SPs and yields in Table A7.3. It is worth noting that the negative relationship with investment level in market-oriented infrastructure (SP 3.8) needs to be investigated further; however, it is most likely because this SP is dominated by investments in rural feeder roads, for which only a part of the benefits have been quantified.

Table A7.5: Elasticities of Economic NPV and Employment When Reducing Investment Costs by 1%

Subprogram	**Base**	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**	**2.1**	**2.2**	**3.8**
Economic NPV (million US$)	585	576	582	584	580	580	581	578	583	586
Elasticity		1.6	0.5	0.2	0.9	0.8	0.7	1.2	0.4	-0.1
Increased employment (1,000 days per year)	7,650	7,652	7,622	7,669	7,650	7,650	7,540	7,650	7,640	7,654
Elasticity		0.0	0.4	-0.2	0.0	0.0	1.4	0.0	0.1	-0.1

Note: (1) Base is ASIP medium-cost scenario. SPs are listed in Table A7.1.
(2) Economic NPV is calculated using a discount rate of 12%.
(3) The economic labor rate used to value increased employment is RwF 634/day or US$0.98/day.

32. **According to estimated elasticities, the impact on employment in the agriculture sector is driven particularly by investments in livestock development, irrigation, and mechanization.** Equation 3 is also used to calculate how different SPs impact employment generation. A 1 percent increase in investments in livestock (SP 1.6) and irrigation (SP 1.2) increase employment the most, with elasticities of 1.4 percent and 0.4 percent, respectively (see Table A7.5). As can be expected, the SP for mechanization (SP 1.3) reduces the employment benefit due to labor savings from investing in tractors, planters, and other equipment.

33. **Most of the Program returns are from nonirrigated hillsides and livestock production, which together constitute 29 percent of the five-year investment costs.** While investments on nonirrigated hillsides cover 22 percent of the five-year investment costs, they generate US$257 million of the Program returns measured in economic NPV. Moreover, the analysis shows that most of the net benefits on hillsides are driven by the improved gross margins and not just the avoided yield loss (refers to the empirical finding that reduction of soil erosion will generate about a 1 percent increase in yields). From 7 percent of the public investment costs, improved livestock production generates another US$440 million of the economic NPV (see Table A7.6). Some enterprise models are close to or do not break even at a 12 percent discount rate, including storage facilities and feeder roads. This is discussed further below with respect to unit investment costs and benefits that have not been captured in this analysis. ERRs for a range of similar investment projects are listed in Table A7.10. Care should be taken when comparing returns due to different sizes of investments, the year in which the analyses were done, and the complexity of the projects compared to individual enterprise models.

Table A7.6: Net Return on Public Sector Investment by Enterprise Model and Benefit Stream

	Financial Values				Economic Values			
million USD	**Year 1-5 Investment (undisc.)**	**NPV (12% disc.)**	**Share**	**FRR**	**Year 1-5 Investment (undisc.)**	**NPV (12% disc.)**	**Share**	**ERR**
Irrigated hillsides	137	83	12%	21%	123	76	13%	21%
Nonirrigated hillsides	267	455	66%	33%	239	372	64%	31%
Irrigated marshland	194	52	8%	17%	174	19	3%	14%
Livestock (meat, milk)	84	487	71%	84%	76	440	75%	84%
Infrastructure (drying floors)	4	27	4%	118%	4	23	4%	117%
Infrastructure (storage facilities)	30	0	0%	12%	27	-1	0%	11%
Feeder roads (value of cropping)	196	-21	-3%	9%	175	-20	-3%	9%
Increased employment (agriculture)		46	7%			39	7%	
Carbon sequestration						34	6%	
Investment costs (15 other SPs)	280	-443	-65%		250	-396	-68%	
Net Return on Public Sector Investment	**1,195**	**685**	**100%**	**21%**	**1,068**	**585**	**100%**	**21%**

Note: Investment costs for years 1-5 are not discounted. NPV is calculated using a discount rate of 12% over a period of 25 years with recurrent costs after Year 6. Amounts are in constant 2014 prices.

34. **Positive synergies with livestock production.** As seen by the high return on investment in livestock development, projects such as the LWH and RSSP show that investments in terracing lead to increased livestock production due to higher farmer income as well as the availability of fodder and straw from silt trap zones. Subsequently, the increased availability of manure benefited the local cropping systems and for building organic matter on new radical terraces. In the LWH project it is emphasized that availability of fodder for livestock and improved access to water for livestock are incentives for farmers to diversify and expand their livestock enterprises and enhance adoption rates of improved breeds which are early maturing and high yielders. Finally it is noted that, in the case of RSSP, significant net benefits were also captured by beneficiaries who stocked irrigation reservoirs with fish.

35. **The net benefit from investments in storage facilities is dependent on a successful implementation of SPs that increase crop yields and prices.** The returns on investments in post-harvest infrastructure are highly dependent not only on their ability to avoid yield/price losses, but also on the value of the crops that are dried and stored. It is assumed that all facilities are used to their full capacity as described in Section V.[99] The value of the avoided yield and price losses are weighted averages of the obtained crop prices. While the NPVs of infrastructure investments are too small to have a significant impact overall, their individual rates of return should be explored to ensure that they are viable businesses. As shown in Table A7.6, the 11 percent ERR on storage facilities is marginal compared to a discount rate of 12 percent. The main crops that are stored are paddy rice and maize. So to achieve sufficient return on post-harvest investments, it is important to invest in other SPs to achieve the potential yields and prices. This is necessary to shift away from basic production practices towards higher value chain activities, including those with an export focus. Note that this analytical model currently does not include an enterprise model for export crops such as tea, coffee, or flowers.

36. **Program delay and low farmer adoption rates are key risk factors that can threaten the achievement of expected benefits.** As indicated in the risk framework, MINAGRI plans to monitor the implementation of terracing and irrigation schemes to avoid delays and thereby maximize Program returns. In addition, returns to Program investments are particularly sensitive to delays in improving livestock production and building post-harvest facilities and feeder roads. It is also important how many farmers ultimately adopt the new

[99] To investigate possible shortages or excess capacities, future refinements of the analysis should investigate the existing and new capacity for drying and storage versus the increase in crop production achieved by the program.

farming practices and how fast they do so. The original assumption is that 95 percent of the farmers adopt new practices eventually. Adoption rates from other projects range from 70-80 percent.[100] In the current model, a 70 percent final adoption rate leads to an economic NPV of US$376 million and a reasonable ERR of 16 percent. A switching values analysis shows that the break-even point for the investment is when adoption only reaches 56 percent of the total developed area – compared to the assumed 95 percent. The NPV also drops to zero if the annual adoption rate drops to 7 percent compared to the assumed 20 percent, thereby delaying incremental benefits. A farmer's incentive to adopt the new farming practices is driven by the increase in gross margins as well as sufficient extension services. As shown in Table A7.4, the gross margin incentives are strong on irrigated areas, but the smaller gross margin increase on nonirrigated areas may not be sufficient to encourage adoption.[101] Risk management strategies should ensure minimum Program delay while also increasing farmer adoption rates through extension for improved with-Program gross margins.

37. **Reduced livestock and hillside revenues are also potential risk factors.** Because a large share of total Program returns are generated by livestock production and crops on nonirrigated hillsides, the switching values analysis shows that results are somewhat sensitive to changes in the associated milk yields, crop yields, and operating costs. For example, the economic NPV becomes zero if the milk yield per head of cow falls by 50 percent from 8 to 4 liters/head/day, which is the same as the without-Program milk yield. Similarly, it takes a 64-75 percent drop in maize or Irish potato yields or prices before the economic NPV becomes zero. As set out in Table A7.3, yield increases are supported particularly through SPs for soil fertility, seed improvement, and research and technology transfer - and separately also livestock development. The relative impact of these SPs is illustrated in the elasticity analysis in Table A7.5.

38. **Incremental benefits of the public sector's share of investment in research, technology transfer, and extension have been captured through increased productivity and farmer adoption in the quantitative analysis.** Benefits are estimated through: improved gross margins at the farm level, technology adoption rates, and avoided post-harvest yield loss. An elasticity factor of 1.2 percent and 0.4 percent is calculated for a 1 percent change in research and extension investments, respectively. However, as these SPs were not quantified in separate enterprise models, no rates of return on investment have been calculated. Examples of different investment projects targeting research and extension have rates of return ranging from 12 percent to over 75 percent in different countries, indicating potentially large impacts on agricultural growth (see Table A7.7).

Table A7.7: Economic Returns to Investment Projects for Agricultural Research and Extension

Project	Year	Investment USD million	NPV @12%	ERR
West Africa Agricultural Productivity Program Support Project (WAAPP): World Bank	2007	49	n/a	40-75%
Africa-Agricultural Productivity Program for Southern Africa (APPSA): World Bank	2013	95	n/a	40-60% (3)
Eastern Africa Agricultural Productivity Program Project (EAAPP): World Bank	2009	90	n/a	
Ethiopia-Pastoral Community Development Project III: World Bank	2013	210	n/a	16%
Alston et al.: A Meta-Analysis of Rates of Return to Agricultural R&D Ex Pede Herculem?	2000	n/a	n/a	48%-81%

Note: (1) Investment costs are in USD from the year of analysis
(2) NPVs were calculated using 12% discount rate
(3) Refers to the same study by Alston et al. 2000
Source: Review of project documents.

[100] Examples include a 74 percent adoption rate in the Uganda-National Agricultural Advisory Services Project (NAADS) and a 70-80 percent adoption rate in the IFAD Rwanda Project For Rural Income Through Exports (PRICE).
[101] More information is required to determine at what level increased gross margins encourage adoption in the Program areas.

39. **The estimated rates of return are higher on nonirrigated areas compared to irrigated areas because the assumed incremental benefits are not large enough to outweigh the higher unit costs of establishing irrigation systems compared to terrace construction.** In addition, as pointed out in the RSSP 2 Implementation Completion Report and in CAADP 2 Background Study #1 (Stryker et al. 2014), hillside irrigation is more expensive than marshland irrigation due to the size requirement for dams as well as extra costs to line the main canals and to build a secondary pipe network. As shown in Table A7.8, unit costs vary greatly between areas and countries.

Table A7.8: Unit Cost Comparison of Different Investments

Unit prices	**ASIP (1)**		**CAADP (2)**	**RSSP2 (3)**	**LWH (3)**	**Sub-Saharan Africa (4)**	**South Asia (4)**
Investment	**RwF**	**USD**	**USD**	**USD**	**USD**	**USD**	**USD**
Progressive Terrace Construction, per ha	32,500	50	300	240	2,300	-	-
Radical Terrace Construction, per ha	975,000	1,500	3,000			-	-
Hillside Irrigation Construction, per ha	6,500,000	10,000	15,504	-	13,000-22,000	19,572	4,581
Marshland Irrigation Construction, per ha	7,800,000	12,000	9,302	3,700-6,800	-		
Drying floors constructed, per floor	14,000,000	21,538	-	22,600	-	-	-
Expanded storage facilities, per tonne	126,352	194	-	68	-	-	-

Note: (1) ASIP medium-cost scenario.
(2) Stryker et. al. (2014) p 8. Hillside irrigation interpreted as "Progressive terracing with irrigation" less "Progressive terracing without irrigation."
(3) RSSP2 Implementation Completion Report (2013) p. 39-40. Radical terracing was used more in LWH project than in RSSP2.
(4) Inocencio et al. (2005) p 18. Adjusted from 2000 to 2014 costs using the World Bank MUV index. Does not distinguish between hillsides and marshlands.

40. **The ASIP high-cost scenario has 54 percent higher investment than the medium-cost scenario and yields a 54 percent higher economic NPV but a lower ERR of 21 percent. Because of the focus on irrigation and livestock in the high-cost scenario, employment generation increased by 17 percent in spite of increased mechanization.** So far, the analysis has focused on the ASIP medium-cost scenario. In general, the so-called high-cost scenario is larger in scope by increasing investments in post-harvest infrastructure as well as program 1 for sustainable agriculture and animal resource intensification. Total public sector investment costs are 54 percent higher than in the medium-cost scenario. However, less is invested in research, extension, and the remaining SPs including value chain development (see Table A7.1). To analyze this, two main assumptions were made. First, farm-level cropping patterns and gross margins remain unchanged from the medium-cost scenario and the higher investment increases the size of the developed area. Second, because the high-cost scenario assumes a 50 percent higher unit cost in distributed cows under SP 1.6, milk yields increase by 25 percent. Otherwise, using the same model as above, the high-cost scenario of a 5-year US$1.8 billion investment yielded an economic NPV of US$898 million and an ERR of 21 percent. As such, the economic NPV is 54 percent higher than in the medium-cost scenario. The average annual net benefits in the high-cost scenario are US$303 million, which constitutes 12.4 percent of the agriculture share of GDP. This exceeds the 8.5 percent growth target. The result follows the pattern of the earlier elasticity analysis where net benefit from public sector investment is most sensitive to changes in research and technology transfer together with irrigation development and efforts toward soil fertility. Employment generation came to 9 million work days per year or 34,400 fulltime work-years, which is a 17 percent increase from the medium-cost scenario in spite of a higher investment in mechanization.

VII. Qualitative Discussion of Linkages To and Between Subprograms

41. **Agriculture growth driven by the nine quantified SPs is enabled through linkages to the remaining 15 SPs, which provide market access, agricultural finance, a strengthened institutional framework, and targeting of disadvantaged groups.** By including the public sector investment costs of all SPs, it is assumed explicitly that these are necessary investments to drive agricultural growth. These SPs include key activities such as: developing farmers' cooperatives; supporting value chain development; and enabling access to markets, finance, and insurance. The institutional development and cross-cutting issues are similarly linked to the successful outcome of all other SPs. As noted in the methodology and results, the incremental benefits of those 15 SPs were not quantified because of lack of time and resources to obtain the necessary information for such an analysis. These SPs are an integral part of the investment to transform Rwanda's agriculture sector, and therefore the analysis includes the 23 percent they constitute of the total public sector investment. The result is that the net returns discussed earlier are understated, given the undeniable incremental benefits from these 15 other SPs.

42. **Support for farmers' organizations helps improve access to inputs, markets, finance, insurance, and extension services.** Many of the benefits captured in the cropping and livestock models assume functioning markets for both farm inputs and outputs. The ability of farmers to obtain support from farmers' cooperatives and organizations affects how and at what cost they can obtain the necessary planting materials, fertilizer, chemicals, and extension services as well as irrigation services through WUAs, such as those as first established in RSSP 2. As pointed out in the risk framework, these benefits are currently captured by a few better-off farmers. At the same time, marginal smallholders and women farmers do not benefit much from agricultural commercialization. With increased investment in this area through SP 2.3, the aim is to establish more farmers' organizations and strengthen existing ones in management, post-harvest handling, and improved access to finance and agricultural insurance, especially for disadvantaged groups. No specific examples have been found on estimated return on investments in strengthening farmers' organizations because this is typically an integral and necessary part of rural development projects, not a separable component.

43. **To increase growth in the agriculture sector, investments are also planned for value chain development and private sector investment** (SP 3.1-3.8), of which the quantitative analysis has only covered incremental benefits from market-oriented infrastructure. Many of the assumed yields and prices incorporated in the analysis rely on access to markets via value chains for crops, dairy, and meat. In addition, increased productivity and cropping patterns toward cash crops can also target export crops in line with the strategic plan. This requires having access to improved drying, storage, and also transport, all key to be able to meet higher quality standards and sell perishable products to other than local markets. As shown in Table A7.9, 77 percent of the private sector investments as part of the ASIP medium-cost scenario target value chain development and include 39 percent of the PPPs. As stated in the methodology, it is assumed that these additional investments will occur and will be economically viable, even if the costs and benefits are not quantified in this current analysis.

Table A7.9: Private Sector Investments Excluded from Quantitative Analysis, ASIP Medium-Cost Scenario

	Private Sector		Public-Private Partnerships	
Investment Area	USD million	Share	USD million	Share
1. Agriculture and animal resource intensification	30	8%	42	32%
2. Research and technology transfer	62	16%	38	29%
3. Value chain development and private sector investment	305	77%	52	39%
Total excluded from analysis = US$528 billion	396	100%	132	100%

44. **Investments in SPs 4.1-4.3 help strengthen institutional development to support transfer of new technologies to farmers.** The impact of investments in research, technology transfer, and extension rely on effective institutions that can implement research programs and ensure farmer adoption of improved technologies and farming practices. Decentralizing service delivery can improve the relevancy to farmers as well as improve farm-level adoption rates. It is therefore important that investments in institutional capacity building and also the legal and regulatory framework continue to enable transfer of both national and internationally available technologies to farmers (SPs 4.1-4.3).

45. **To transform the agriculture sector toward higher value chains including exports, the legal and regulatory system needs to be strengthened and adapted.** The planned value chain development will require a more efficient import and export market for both farm inputs and outputs. This includes improving border control, using SPS measures, and certifying imports and exports. Investments to establish a system for registering farm inputs and plant breeders' rights will enable higher farm productivity as well as access to improved seeds and planting materials.

46. **Investments that increase productivity may be subject to elite capture unless parallel efforts are made to ensure that disadvantaged groups are also reached.** Investments in SPs 4.5-4.7 will ensure that disadvantaged groups are targeted by building capacity for mainstreaming gender issues in future projects and by targeting youth employment in the sector. Because of the complexity of the terracing and irrigation developments with respect to environmental impact, SP 4.6 builds capacity in the agriculture sector to manage future investments that take environmental externalities into account. While increased productivity in other SPs helps improve food and nutrition security, the final SP targets the most disadvantaged groups by ensuring that some benefits are captured directly by poor households.

47. **Tracking impacts against a baseline through reliable M&E systems helps decision makers and DPs make evidence-based investment decisions.** To ensure that the Program investment is sound and stays on target, it is important to track impacts against a baseline. SP 4.4 investments are needed to establish the baseline against which impacts are measured and to assess if the investment priorities should change over time as new information comes to light. By establishing a statistical system and a targeted M&E system, it becomes possible to implement sound investments in the future based on timely and reliable information. Communication of results and impacts also helps DPs and beneficiaries make informed investment decisions.

Table A7.10: Economic Returns to Different Agricultural Investment Projects in Rwanda

Project	Interventions	Year	Investment USD million	NPV @12%	ERR
Land husbandry, water harvesting and hillside irrigation (LWH): World Bank	Land husbandry, hillside irrigation, radical terraces, post-harvest and storage, produce collection centers	2009	166	73.8	29%
Second Rural Sector Support Project (RSSP2): World Bank	Marshland irrigation, soil and land management, co-operatives	2008	39	90	47%
Third Rural Sector Support Project (RSSP3): World Bank	Marshland irrigation, soil and land management, co-operatives	2011	101	228	93%
Kirehe Community-Based Watershed Management Project (KWAMP): IFAD	Hillside and marshland irrigation, radical and bench terraces, rural feeder roads, crop and livestock intensification	2008	49	n/a	17%
Bugesera Natural Region Rural Infrastructure Support Project (PAIR): AfDB	Soil and water conservation, marshland irrigation, post-harvest and storage, marketing support	2009	46	16.2	19%
Bugesera Agricultural Development Support Project (PADAB): AfDB	Soil and water conservation, marshland irrigation, post-harvest and storage, marketing support	2006	19	n/a	15%
Smallholder Cash and Export Crops Development Project: IFAD	Agricultural mechanization, farm inputs, seeds, extension	2011	15	5.2	18%
Post-Harvest and Agribusiness Support Project (PASP): IFAD	Climate resilience, agribusiness support, capacity development, post-harvest and storage	2013	47	8.3	16%
Project For Rural Income Through Exports (PRICE): IFAD	Coffee, tea, silk, horticulture development. Business support, export	2011	56	18.6	17%
Burundi - Rwanda - Project to Develop Roads and Facilitate Transport on the North-South Corridor - Phase III: AfDB	Roads and export	2012	127	58.5	19%
Rwanda Rural Feeder-road Development Program (RRFD): MINAGRI	Roads	2012	876	-	14%-59%
Uganda-Agricultural Technology and Agribusiness Advisory Services Project (ATAAS): World Bank	Soil conservation, seeds, agricultural research and extension	2010	666	80.2	40-60% (3)
Burundi - Agricultural Rehabilitation and Sustainable Land Management Project (PRASAB): World Bank	Soil conservation, irrigation, extension, post-harvest and storage	2004	55	35.5	58%
Kenya-Water Security and Climate Resilience Project: World Bank	Irrigation	2013	183	7.3	15%
Uganda - National Livestock Productivity Improvement Project (NLPIP): AfDB	Livestock, post-harvest and storage	2010	36	7.59	19%

Note: (1) Investment costs are in USD from the year of analysis
(2) Net Present Values were calculated using 12% discount rate
(3) Refers to the Alston et al. 2000

Source: Review of World Bank, African Development Bank, IFAD, and MINAGRI project documents

Table A7.11: Switching Value Analysis of Key Assumptions

Variable	Unit	Base Assumption	Switching Value	% change
Total farmer adoption rate W/P	% of area	95%	56%	41%
W/P-Milk production	liter/head/day	8.00	4.05	49%
W/P-Milk production	RwF/quantity	159	80	49%
Maize-Nonirrigated area-W/P-Price	RwF/kg	264	96	64%
Annual farmer adoption rate W/P	% of area	20%	7%	66%
Maize-Nonirrigated area-W/P-Yield	kg/ha	4,000	1,260	69%
Discount rate	percent	12%	21%	74%
Irish potato-Nonirrigated area-W/P-Price	RwF/kg	159	39	75%
Irish potato-Nonirrigated area-W/P-Yield	kg/ha	20,000	4,921	75%
Storage Facilities-Number of periods	3-months/ year	2	0	90%
Storage Facilities-Quantity dried/ stored per period	t/ 3-months	250	25	90%
W/P-Manure production	tonne/head	15	0	99%
WO/P-Manure production	tonne/head	15	34	126%
WO/P-Milk production	RwF/quantity	127	320	153%
WO/P-Milk production	liter/head	4.00	10.11	153%
Banana-Nonirrigated area-WO/P-Yield	kg/ha	15,000	39,427	163%
Banana-Nonirrigated area-WO/P-Price	RwF/kg	74	196	164%
W/P-Feed concentrates for cows/bulls/heifers	kg/head	720	2,145	198%
W/P-Feed concentrates for cows/bulls/heifers	RwF/quantity	106	315	198%
Cassava-Nonirrigated area-WO/P-Yield	kg/ha	10,500	33,844	222%
Cassava-Nonirrigated area-WO/P-Price	RwF/kg	159	512	223%
W/P-Veterinary care	RwF/quantity	65,527	222,371	239%
Irish potato-Nonirrigated area-W/P-Seeds	kg or plants /ha	2,500	8,731	249%
Irish potato-Nonirrigated area-W/P-Seed price	RwF/kg /plant	423	1,476	249%
Irish potato-Nonirrigated area-WO/P-Yield	kg/ha	8,500	38,513	353%
Irish potato-Nonirrigated area-WO/P-Price	RwF/kg	159	719	354%
Maize-Nonirrigated area-WO/P-Yield	kg/ha	1,600	8,102	406%
Sorghum-Nonirrigated area-WO/P-Yield	kg/ha	1,400	7,132	409%
Sorghum-Nonirrigated area-WO/P-Price	RwF/kg	264	1,404	431%
Fertilizer price	RwF/kg	528	2,821	434%

Note: Switching values calculated by changing one variable at a time - until the economic NPV becomes zero.

Table A7.12: Net Financial Benefit by Year - ASIP Medium-cost Scenario

USD million	Irrigated Hillside Areas	Nonirrigated Hillside Areas	Marshland Areas	Livestock	Drying Floors	Storage Facilities	Feeder Roads	Employment	All Other SP Costs	Total Financial Net Benefits
2014	-27	-62	-37	-16	-1	-6	-26	0	-55	-229
2015	-28	-64	-38	-3	0	-6	-27	0	-56	-220
2016	-24	-40	-32	10	1	-5	-29	1	-56	-175
2017	-18	-6	-23	25	2	-5	-34	3	-57	-112
2018	-8	40	-10	42	3	-4	-31	4	-57	-21
2019	27	104	37	56	5	3	19	5	-57	199
2020	35	111	37	66	5	4	20	7	-57	229
2021	39	114	37	79	5	5	20	9	-57	251
2022	40	117	37	100	6	5	20	10	-57	277
2023	40	120	37	115	6	5	20	11	-57	296
2024	48	254	37	126	6	5	19	11	-57	450
2025	40	124	37	133	6	5	20	11	-57	318
2026	39	125	37	136	6	5	20	11	-57	322
2027	39	126	37	135	6	5	19	11	-57	322
2028	38	128	37	135	6	5	19	11	-57	323
2029	38	130	37	135	6	5	19	11	-57	325
2030	40	137	37	135	6	5	20	11	-57	335
2031	41	140	37	135	6	5	20	11	-57	337
2032	41	142	37	135	6	5	20	11	-57	340
2033	41	145	37	135	6	5	20	11	-57	343
2034	49	271	37	135	6	5	19	11	-57	477
2035	41	149	37	135	6	5	20	11	-57	346
2036	40	150	37	135	6	5	19	11	-57	347
2037	39	151	37	135	6	5	19	11	-57	347
2038	39	152	37	135	6	5	19	11	-57	348
									Financial Net Benefits (average/year)	**231**
									Financial NPV (12%)	**685**
									Financial IRR	**21%**

Note: (1) Amounts are shown in constant 2014 dollars (i.e., no inflation is included).

(2) Net benefits from feeder roads. Employment only includes incremental benefits from crop and livestock production and labor operating costs for new drying floors and storage facilities.

(3) Net benefits (average/year) are not discounted. Financial NPV is calculated using a discount rate of 12% over a period of 25 years.

(4) Rounding errors may occur.

Table A7.13: Net Economic Benefit by Year - ASIP Medium-cost Scenario

USD million	Irrigated Hillside Areas	Nonirrigated Hillside Areas	Marshland Areas	Livestock	Drying Floors	Storage Facilities	Feeder Roads	Em-ployment	Total Direct Net Benefits	Carbon Sequestration	All Other SP Costs	Total Economic Net Benefits
2014	-24	-56	-33	-15	-1	-5	-23	0	-156	0	-49	-205
2015	-25	-57	-34	-2	0	-5	-24	0	-147	0	-50	-197
2016	-22	-37	-30	9	1	-5	-26	1	-108	1	-50	-158
2017	-16	-8	-23	23	2	-4	-30	2	-54	1	-51	-104
2018	-7	31	-13	38	3	-4	-27	3	24	2	-51	-25
2019	25	85	28	50	5	2	17	4	216	4	-51	169
2020	32	92	28	60	5	3	17	6	243	8	-51	200
2021	36	95	28	72	5	4	17	7	263	8	-51	220
2022	36	97	28	90	5	4	17	8	286	8	-51	243
2023	36	100	28	104	5	4	17	9	303	8	-51	260
2024	44	221	28	114	5	4	17	10	442	8	-51	399
2025	36	104	28	120	5	4	17	10	323	8	-51	280
2026	35	105	28	122	5	4	17	10	327	8	-51	284
2027	35	106	28	122	5	4	17	10	327	8	-51	284
2028	34	108	28	122	5	4	17	10	328	8	-51	285
2029	34	109	28	122	5	4	17	10	329	8	-51	286
2030	37	116	28	122	5	4	17	10	338	8	-51	295
2031	37	118	28	122	5	4	17	10	341	8	-51	298
2032	37	120	28	122	5	4	17	10	343	8	-51	300
2033	37	123	28	122	5	4	17	10	346	8	-51	303
2034	44	236	28	122	5	4	17	10	466	8	-51	423
2035	37	126	28	122	5	4	17	10	349	8	-51	306
2036	36	127	28	122	5	4	17	10	349	8	-51	306
2037	36	128	28	122	5	4	17	10	349	8	-51	306
2038	35	129	28	122	5	4	17	10	350	8	-51	307
											Economic Net Benefits (average/year)	**203**
											Economic NPV (12%)	**585**
											Economic IRR	**21%**

Note: (1) Amounts are shown in constant 2014 dollars (i.e. no inflation is included).

(2) Financial prices are converted to economic prices using adjustment factors.

(2) Net benefits from feeder roads. Employment only includes incremental benefits from crop and livestock production and labor operating costs for new drying floors and storage facilities.

(3) Net benefits (average/year) are not discounted. Financial NPV is calculated using a discount rate of 12% over a period of 25 years.

(4) Rounding errors may occur.

Annex 8: Program Action Plan

Action Description	Due Date	Responsible Party	Completion Measurement	Link to DLI *	Covenant*
Area 1: Enhanced Enabling Environment and Expanded Private Sector Role and Capacities					
Finalize RAB and NAEB Strategies	Dec. 15, 2014	RAB, NAEB	Approved strategies	DLI 7	
Prepare position paper on strategic PPP to pursue in the sector	Mar. 30, 2015	MINAGRI	Position Paper	DLI 5, 7	
Area 2: Evolving Public Sector Institutional Roles and Enhanced Capacities					
Ensure the reforms/strategic plans of RAB and NAEB are completed and implemented, including appropriate integration with the ongoing restructuring.	Mar. 15, 2015	RAB, NAEB	New structure in place	DLI 4	
Complete integration of independent SPIUs into RAB, NAEB structure (and support implementation of action plan for smooth transition, integration, and capacity development)	Jun. 30, 2015	MINAGRI, Public service reform commission	On-going restructuring completed, approved and implemented	DLI 1, 2, 4	
Prepare and implement capacity development plan for decentralized reforms/restructuring	June 30, 2015 Dec. 31, 2015	MINAGRI, MINALOC	Preparation of capacity development action plan for Districts; implementation of key milestones of the action plan	DLI 4	
Area 3: O&M Challenges and Requirements					
Confirm all rural sector infrastructure investments have adequate O&M arrangements.	June 30, 2015	MINAGRI (in collaboration with MININFRA)	Report (to be prepared by MINAGRI in collaboration with MININFRA)	DLI 1,2	
Implement O&M monitoring system to monitor O&M of major rural infrastructure (as part of the enhanced MIS for agric. sector)	Dec. 31, 2015	MINAGRI (in collaboration with MININFRA)	Periodic MIS Reports (to include monitoring indicators of O&M of rural infrastructure)	DLI 1, 2	
Conduct well-focused capacity development/training activities of farmer-level organizational structures on O&M capacity mechanisms	Dec. 31, 2014 June 30, 2015	MINAGRI (in collaboration with MININFRA)	Capacity development action plan prepared and approved	DLI 1, 2	

Area 4: Fiduciary, Environmental and Social Systems					
Prepare an operational action plan to address and strengthen relevant fiduciary aspects**,** with an emphasis on District-level capacities	Mar. 15, 2015	MINAGRI in collaboration with key actors	Action plan		
Provide on-the-job training to District Accounting staff focusing on the consolidation of nonbudget agencies at District level.	September 2014 September 2015 September 2016	MINALOC Districts	Improvement in the accounting and audit reports of Districts		
Assess the risk prone areas of the Program at the District level and develop a risk profile to be monitored through the Program life ensuring that timely mitigation measures are undertaken	June 2015	MINECOFIN (OGCIA)	Strengthen internal controls capacities to deter internal control risks		
Reconcile the accounting/financial statements before and after merger of both RAB and NAEB	December 15, 2015	MINAGRI, RAB, NAEB	Eliminate annual adverse audits from legacy issues.		
Implement the agreed fiduciary, including fraud and corruption systems actions	Dec. 31, 2015	MINAGRI	Report		
In collaboration with participating ministries and agencies develop a consolidated Environmental and Social Implementation Manual based on existing government guidelines; and conduct training on the understanding and application of this Manual at the National and District level.	November 2014 March 2015 November 2015 March 2016	MINAGRI, MINALOC, MINARENA/ REMA	Capacity development/training	DLI 1, 2	
Develop and implement a communications strategy to sensitize stakeholders about the Program and complaints mechanism	January 2015	MINAGRI	Communications strategy developed		
Develop and maintain a database of complaints and responses. Implementing agencies and Districts to report to MINAGRI on F&C complaints on a quarterly basis	January 2015 and on quarterly basis.	MINAGRI			
Provide on-the-job training and capacity strengthening to OM and RPPA investigators on annual basis	January 2015 January 2016 January 2017	RPPA OM	Strengthened capacity of investigators		
Area 5: Ag. Expenditure and Financing Framework					
MINAGRI to work closely with MINECOFIN to strengthen the ag. public expenditure planning and budgetary allocation system to ensure adequate and prioritized levels of funding to PSTA 3. An improved planning and budgetary process has been introduced since 2013/14 and TA support (from USAID and IFAD) to MINAGRI will provide further improvements. In addition, there will be intensified government-DP	MINECOFIN Annual Planning and Budgetary cycle calendar (September –	MINAGRI, MINALO, MINARENA, MINECOFIN	Formulation and approval of annual budget and updated MTEF for each annual budgetary cycle	DLI 1, 2, 3, 4	

dialogue as part of the budgetary cycle in support of the PSTA 3 requirements.	May)				

* This column should indicate the reference, if any, to either one of the Program DLIs or legal covenants (or both) as appropriate.

Inputs to the Program Action Plan (PAP) and Rationale

1. **In reviewing the strategic objectives, outcomes, outputs, and activities for each PSTA 3 subprogram (SP), and in discussion with counterparts, relevant actions to be undertaken by the Borrower to address key areas for improvement and/or activities of high importance to catalyze the achievement of the key PSTA 3 results were identified during the technical assessment**. These actions serve as inputs to the PAP, and consist of three types of actions: i) changes to the technical dimensions of the Program and to the formal rules and procedures governing the organization and management of the systems used to implement the Program; ii) actions to enhance the capacity and performance of the implementing agencies involved; and iii) risk-mitigating measures to increase the potential for the Program to achieve its results and to address fiduciary, social, and environmental system concerns. Below are potential actions as inputs into the preparation of an "expanded" PAP and to support timely and effective implementation of the overall PSTA 3.

Program 1: Agriculture and animal resource intensification

2. **Agricultural mechanization**. A detailed roadmap for government to draw down its investment in mechanization and promote private sector investment should be elaborated. How the private sector investment could complement existing efforts by the government to achieve the 25 percent coverage by 2018 should be detailed. Additionally, the government should set in motion a strategy to create an enabling policy environment for investment and provide extension services and capacity building on mechanization to relevant stakeholders. The integration of the mechanization and irrigation taskforce into RAB and subsequent assimilation of its activities should be finalized.

3. **Agrochemical use and markets**. To create a competitive fertilizer marketing sector, the government should promote more private sector participation beyond the current three companies to import and distribute fertilizers in the country. Mechanisms to ensure quality assurance at the retail level, which might include recruiting of staff and training in fertilizer sampling, testing, and analysis in accredited laboratories should be elaborated. An updated fertilizer policy and its effective implementation would play an important role.

4. **Seed development.** A strategy to promote private sector investment in the seed sector beyond the current three companies should be elaborated. Since RAB also produces seed, the GoR should take steps to relocate the seed inspection function from RAB to MINAGRI to avoid a potential conflict of interest. Strengthening the capacity of the seed regulatory body should be given priority**. Again, an updated seeds policy would pull together various initiatives and play an important role in realizing the potential benefits from seeds.**

Program 2: Research, technology transfer and professionalization of farmers

5. **Research, technology transfer and extension services for producers**. Finalize restructuring of RAB, including an action plan on addressing the capacity gaps and enhancing research-extension linkages (MINAGRI and RAB). The M&E capacity, including data processing and arrangements for reporting for research and technology transfer, and for targets set under food crops are in existence but need to be strengthened. This would form a part of the enhanced MIS for the agriculture sector (discussed above). While the results set under research and extension are straightforward to measure and report, measuring and reporting the yield results at the national level is more demanding. A reliable and elaborate structure and system to capture and process the data on production, productivity levels, and area under different crops is currently not in place, and therefore needs to be well developed. The action plan to improve the M&E system at various levels and institutions will address these issues.

6. **Farmers' Cooperatives and Organizations**. Detailed operational guidelines for implementing new decentralized approach for cooperatives and farmer-to-farmer extension model (MINAGRI/RAB). Finalize capacity-building strategy and plan for cooperatives/farmers' organizations and staff and LSPs (MINAGRI/RAB). Baseline of current 1,877 cooperatives/farmers' organizations and designing of monitoring and tracking system (MINAGRI/RAB).

Program 3: Value chain development and private sector investment

7. **Creating an environment to attract private investment, encourage entrepreneurship and facilitate market access**. Conduct/review market demand analysis for each priority export value chain and incorporate findings in Ag. PforR program planning/NAEB's strategic plan for 2013-18 (NAEB).

8. **Development of priority food crop value chains**. There is need to strengthen M&E systems and capacity at the District and national levels to capture and analyze data on production and area under different crops and yields. This will ensure that that the DLIs and indictors are well monitored and reported on by MINAGRI, RAB, and LG.

9. **Development of priority export crop value chains**. The specific objectives of increasing overall production, productivity, and value addition in target value chains as well as creating an enabling environment conducive to increased private sector participation are well aligned with the set target for increasing the value of exports in priority value chains by 28 percent p.a. by 2018. However, a more in-depth understanding needs to be developed in terms of mid-term market demand dynamics expected for each value chain as well as a clearer prioritization among the various levers available to the government (i.e., expansion, intensification, value addition) in terms of achieving the export growth target in a sustainable way. How much of this target will come from intensification and how much is expected from expansion in terms of contribution to achieving the target? Early engagement with the private sector suggests intensification should be considered a first priority over expansion, given Rwanda's land constrained environment, particularly for well-established, more traditional export value chains (tea and coffee). Intensification efforts could very well be supplemented by expansion based on a clear value proposition for farmers in target areas. There is also more clarity needed regarding the areas in which FDI is required and in what volume to achieve targets. For all these export sectors, the target areas for planned expansion of production need to be reviewed from a poverty reduction and social risk standpoint, as it involves farmers switching from predominantly food crops to cash crops. Intensive training support may be required as these farmers move into producing new crops for which they lack experience. For investment promotion-related activities, NAEB will have to work closely with RDB, the focal point institution for investment promotion and facilitation in Rwanda. For reviewing and updating the regulatory framework for export value chains, it will have to work closely with MINAGRI as the main policy-setting institution.

10. **Agricultural finance**. Major action items for the agricultural finance and legal basis for agricultural catalytic fund SPs should be to: i) develop a proposal on immediate support to enhance the institutional capacity to oversee, formulate, and support agricultural finance policies in MINAGRI and carry out the specific action items listed under the RF; ii) develop and sign an MOU with Access to Finance Rwanda (AFR) with targeted responsibilities for achieving some of the results under the relevant expected outcomes of the RF; iii) develop clear links between the RF and outcomes through thorough demand assessments and analysis of the status of the private sector, and likely private sector response to the proposed interventions under the relevant outcome; iv) provide appropriate mitigation measures for the risks listed above; v) design a program of public support for agriculture insurance in Rwanda based on a comparative study of agriculture insurance schemes globally; vi) identify the implementation arrangements, with private insurers as candidates for participation in the program, and have a system to

bring on board other insurers; and vii) build consensus amongst government, donor community, and private sector stakeholders.

11. **Market-oriented infrastructure for post-harvest**. Promote efficient and equitable transport systems. MINAGARI, MINIFRA and Ministry of Local Government (MINALOC) have capacity-building activities[102] within each sector program and should be sufficient to strengthen the Districts and national entities responsible for feeder roads oversight. There is also a need to strengthen the planning, collaboration, and prioritization of road investments among the various stakeholder government ministries, such as MINAGRI, MINIFRA, and MINALOC, in the context of the budgetary planning processes. Support and oversight needs to be provided to confirm that capacity-building activities are undertaken. Greater attention is needed to enhance O&M arrangements and funding for rural infrastructure.

12. **Reduce staple crop post-harvest losses at the producer and first aggregator level**. Considering the appropriate roles of public and private sector, additional storage facilities vital for enhancing food security will be built, with their number and capacity determined before the start of the project. MINAGRI should explore the opportunity to tender the leasing of these stores and the management of the strategic grain reserves within the stores to the private sector. MINAGRI should take immediate steps to revise ISAR's Post-Harvest Team to include agricultural engineers and economists. A capacity-building program on identification and prioritization of the list of economically relevant post-harvest technologies and dissemination strategies for ISAR's Post-Harvest Team should be developed.

Program 4 – Institutional development and agricultural cross-cutting issues

13. Institutional capacity building. The above mentioned capacity development (CD) assessment exercise (to be completed by MINAGRI in 2014) is expected to consolidate an updated action plan for enhanced capacity development at various levels (central and subnational) and actors (MINAGRI, RAB, NAEB, SPIUs, and Districts), in terms of the program/budgetary cycle, involving: strategic planning and prioritization, budgetary aspects, implementation, M&E (including youth- and gender-responsive approaches), and accountability aspects (Table A8.1 illustrates the type of information expected to be generated from this assessment exercise).

[102] Support to the Districts and national coordination entities capacity building, includes: i) technical assistance to the Districts infrastructure, finance, procurement, environmental management, and planning units through adoption of systems and manuals and provision of training to District staff; and ii) strengthening the capacity of national coordination entities, through provision of training on feeder roads development planning, monitoring and maintenance for MINAGRI and RTDA staff.

Table A8.1: Framework for Capacity Development Assessment of the Program Cycle for the Agriculture Sector (Central and District levels)

Capacity Development Area (and their operational linkages)	Government: Central Level (synthesis of priority needs and lines of action, to be presented for each entity, with a cross-cutting focus)	District Level [103] (synthesis of priority needs and lines of action)
1) Planning Aspects	MINAGRI/RAB/NAEB	
	Other key ministries/entities (that are actively engaged with MINAGRI)	
	Private sector	
2) Budgetary Aspects	MINAGRI/RAB/NAEB	
	Other key ministries/entities (that are actively engaged with MINAGRI)	
	Private Sector	
3) Implementation Aspects	MINAGRI/RAB/NAEB	
	Other key ministries/entities (that are actively engaged with MINAGRI)	
	Private sector	
4) Accountability and Management Information System (includes M&E System)	MINAGRI/RAB/NAE	
	Other key ministries/entities (that are actively engaged with MINAGRI)	
	Private sector	

14. **Decentralization in Agriculture**. Various recent reports (as cited above), especially the key actions addressing the identified challenges, provide sound and proactive actions for enhancing the decentralization process to enable achievement of this SO. Given the important role of the Districts in enhancing efficiencies and effectiveness in the implementation of PSTA 3, the PAP for the Ag. PforR support operation includes strengthening the harmonization and operationalization of an enhanced M&E system between MINAGRI and the Districts (and this will form part MINAGRI's action plan for enhancing the MIS for the agriculture sector, at various levels). The above assessment of the program cycle at the District level can provide useful inputs for the action plan for strengthening decentralization in and "for" sustainable agriculture.

15. The ongoing support for strengthening the further mainstreaming of decentralization in the agriculture sector (currently being actively supported by the EU) will enhance the efficiency and effectiveness of ongoing decentralization initiatives. This also provides a good framework for the decentralized implementation of the recently prepared ASIP, with efforts to integrate and contextualize relevant elements of ASIP in each District Development Plan (DDP).

16. **Develop regulations for organic agriculture, pesticide, and limestone use**. Given the relative importance of organic farming, MINAGRI should develop and implement a certification system. Emphasis should also be placed on building the capacity of stakeholders to carry out the certification of organic products but MINAGRI should retain regulatory oversight of the organic agricultural subsector.

17. **Agricultural MIS: M&E, Agricultural Statistics and Agricultural Communications.** The above paragraphs addressing the Agricultural MIS challenges have highlighted the high degree of strategic relevance of supporting the effective implementation of this SP and the various constraints at the

[103] Note: should focus at the District level, with relevant linkages at the sector, cell, and village levels.

national and subnational levels involving technical, staffing, and organizational requirements. MINAGRI has taken steps to initiate the formulation of an action plan for enhancing an MIS for the agriculture sector, building on the experience/lessons of implementing MINAGRI's M&E framework of 2011 and the recently updated M&E framework (June 2014). These improvements are expected to include the following elements:

i. A well-aligned and harmonized M&E framework (including the evaluation framework of PSTA 3) with PSTA 3's RF (using the recently prepared "core" RF as a reference point);
ii. Operationalized in a sound and phased manner to ensure the data collection systems, processes, and institutional roles at national and subnational levels focus on generating realistic, reliable, and timely data on the key results and their "SMART" indicators at the impact, outcome, and output levels;
iii. Ensuring organizational and coordination improvements to better integrate the agricultural M&E systems at national and subnational levels, with a focus on the main indicators outlined in the RF and evaluation framework of PSTA 3 (e.g., continue the monthly planning and M&E meetings convened by the DG of Planning, the active role of the recently established MIS working group, supported by appropriate follow-up activities);
iv. Supported by adequately qualified and experienced technical MIS staff at the national and subnational levels (e.g., increase the M&E staff of MINAGRI's Department of Planning to better coordinate and consolidate diverse M&E systems spread among several entities; promote the posting of a M&E officer at the District level (currently being promoted by MINALOC as part of the decentralization strategy), who can devote increased attention to coordinating and integrating M&E activities with MINAGRI's enhanced M&E framework;
v. Ensuring that M&E activities devote adequate attention to systematizing relevant experiences and good practices that can be scaled up and out as part of PSTA 3's implementation period and used as inputs for the design of PSTA 4; and
vi. MINAGRI devising and imparting a training program for strengthening the various MIS activities outlined above, involving relevant staff at national and subnational levels.

18. During implementation of the proposed operation, the PforR will need to support MINAGRI's efforts to prepare and implement a plan to address the relevant MIS capacity development gaps highlighted above (which should be supported through a well-formulated PAP and coordinated with other DPs).

19. **Gender and youth in agriculture**. The Agricultural Gender Strategy, together with its capacity-building strategy, plan, and budgetary aspects, should ensure that all gender-sensitive activities/TA are incorporated at the operational level at national and subnational levels (MINAGRI).

20. **Environmental mainstreaming in agriculture**. Environmental considerations in rural infrastructure, especially rural roads. See market-oriented infrastructure for post-harvest action plan issues which cover environmental consideration for rural roads.

21. **Planning for climate change**. Although MINAGRI is tasked the lead in climate change matters in the sector, no clear institutional structure(s) exists for coordination and promotion of climate change issues. Various stakeholders' low awareness of climate change issues, particularly the farming community, is a major challenge that needs to be addressed. To address the capacity, institutional, and awareness challenges, MINAGRI should consider setting up a climate change unit that will champion, focus, and coordinate climate change actions in the sector in a more systematic and strategic manner**.** The unit should be staffed with personnel with the appropriate skills, which should be upgraded over time.

22. **Nutrition and household vulnerability**. Capacity-building plan for local multisectoral teams and community representatives (SHG leaders) and linkages with other SP areas (e.g., extension, cooperatives, and health workers (MINAGRI and Ministry of Health, District health officers). The capacity-building plan should build on current nutrition education and behavior change training provided through health workers and MINAGRI, as well as more comprehensive training on linkages with nutrition and agriculture (both quality and quantity aspects), linkages between nutrition and sanitation, and food safety measures, especially aflatoxin. The capacity-building plan should also focus on improving the quality of "last miles" services and ensuring that community leaders and health workers have an institutional platform that enables them to build farmers' capacity in a cost-effective way.

Annex 9: Integrated Risk Assessment (Stage: Board)

PROGRAM RISKS	
Technical Risk	**Rating: Moderate**
Description : (a) Enabling Policy Environment and Expanded Private Sector Role and Capacities: - Key PSTA 3 Program goals, objectives and targets hinge on an expanded role of a broad-based private sector in carrying out numerous strategic programs/SPs, involving input, output and value chain markets. The stage and capacity of an expanded private sector, especially in the agriculture sector, is still at an early stage of development, although recently showing positive signs of growth and maturity (from a low base). - There is a need to strengthen policies to stimulate a more dynamic private sector role in input, output and value chain markets, although currently government is formulating policies involving seeds, fertilizers, agricultural mechanization, and agricultural finance. Once approved and effectively implemented, these policies are expected to play a key role in phasing out current and unsustainable input subsidies (for seeds, fertilizers, mechanization and finance), and stimulating market-based and efficient input and output markets and enhanced producer, trader and processor incentives to achieve the ambitious targets of PSTA 3. - Most farmers' organizations and cooperatives are young and developing and need to strengthen their organizational structure, operational functioning in the provision of quality services to their members, and transparency and accountability to their members (especially marginal smallholders and women farmers). (b) Evolving Public Sector Institutional Roles and Capacities: In conjunction with the above risk area (a), various recent assessments have identified specific constraints in the institutional capacities of key public sector actors to fulfill efficient and effective changing roles at central and subnational levels. These constraints and associated risks are outlined below. Central Level: (i) MINAGRI's capacity to coordinate efficiently and effectively the large and varied number of PSTA 3 SPs (24), including an integrated and responsive M&E system, which can serve as an effective management tool, is stretched thin (currently the M&E is	**Risk Management:** (a) Enabling Policy Environment and Private Sector Development: These policy-related and private sector capacity risks will be addressed in a coordinated manner through numerous ways and levels, through supporting MINAGRI to take an active role (in close collaboration with other key state and nonstate actors) to: (i) enhance the enabling environment by removing key policy, institutional, and investment constraints (already identified in the PSTA 3 RF); (ii) formulate comprehensive and sound policy reforms (currently underway, to be finalized in 2014) for seeds, fertilizer, agricultural mechanization, and agricultural finance, including removal of subsidies for these programs (by 2016); (iii) promote private sector investments in value chain development of competitive food and export crops by further clarifying public-private roles and provision of sound, market-based, and sustainable incentive framework, support to business plan preparation and implementation, and expanded access to finance; (iv) promote improved and sustainable land-use models, which will encourage more efficient land use markets and promote expanded domestic and foreign investments; (v) promote strategic PPPs, while reflecting clear and sound roles for the public and private sectors; (vi) provide appropriate capacity development activities targeted to cooperatives and farmers' organizations, with a strong market and self-reliance orientation, while ensuring inclusive approaches are taken to benefit small and marginal farmers and women members. (b) Evolving Public Sector Roles and Capacities: Given the ongoing institutional reforms and roles of the central and subnational levels, MINAGRI will be supported/encouraged to ensure these ongoing reforms: (i) are completed expeditiously (by end of 2014, which currently appears to be on track); (ii) continue to get political and leadership support at various levels to ensure efficient and timely implementation of the proposed reforms. The Bank has provided technical inputs to the strategic and operational plans of MINAGRI, RAB, and NAEB, while also encouraging complementarity of these institutional reforms. The Bank's ongoing support of various major ongoing projects being implemented by these entities (through one of the SPIUs) also provides another avenue for regular

fragmented among various agencies, and provides partial responses to various challenges, and weak linkages at the District level, in the context of decentralizing agricultural functions and services); (ii) RAB and NAEB are undergoing important institutional reforms outlined in the ongoing formulation of their Strategic Plans (due to be completed in 2014), including the challenges of: adopting a decentralized structure and staffing presence; promoting the roles of and collaboration with multi-stakeholders from the public at large (including subnational levels), NGOs, private sector (including farmers' organizations/cooperatives), and to assuming increasingly a facilitator and catalyzing role to Program implementation; RAB and NAEB effectiveness in making this smooth transition will be a key factor in achieving many of the ambitious targets outlined in the PSTA 3; (iii) SPIUs play a key role in the efficient and timely implementation of donor-supported programs and projects of MINAGRI. There is a risk that the capacities of the SPIUs will not be transferred to the permanent units and staff of MINAGRI. Subnational Level: Various types of capacity constraints exist at the subnational level for effective planning, implementation, and M&E activities of agricultural programs (as well as other sectors). Continued decentralization of public functions and staffing to the District level will pose additional challenges, although there are various ongoing initiatives to address these constraints (e.g., ongoing local government restructuring process, which includes increased technical staff at the District, sector, and cell levels and commensurate increases in revenues to finance these expanding functions and staff). (c) Operation and Maintenance (O&M) Requirements: The PSTA 3 will finance a significant expansion of productivity- and market-augmenting rural infrastructure, especially soil conservation works, irrigation facilities, and rural feeder roads, to help achieve the expected targets. The sustainability of the incremental benefits will hinge on the beneficiary farmers, farmer groups and cooperatives having the incentives and organizational arrangements to provide the required O&M activities on a regular basis. From past similar investments in Rwanda, there has been the adequate response by the beneficiaries to provide such O&M, but experience also shows that the beneficiaries/ groups need to be properly mobilized and organized from the outset to provide the required O&M. Otherwise, there is a high risk that the infrastructural works will deteriorate, resulting in a loss of sustained production/productivity and marketing benefits. Various mechanisms and processes need to be established, functional, and strengthened for each type of works and need to be supported efficiently and effectively by the relevant institution (e.g., Irrigation Water User Organization, to be supported by the District support system, RAB; farmer cooperative/farmer organization, and rural road maintenance brigades). Many of these entities have limited capacity and need strengthening from the outset, and on a periodic basis. Given the "public good" nature of some of these	policy, institutional and technical dialogue and appropriate operational support. It will be important for the Bank to monitor closely these institutional transitions over the next 1-2 years, and to provide appropriate and timely support to MINAGRI and its implementing entities; and (iii) through support for the PAP, the Bank will support the strengthening of a sector-wide M&E system, with strong linkages with relevant entities, so that it becomes a more effective tool to assess progress and stimulate the achievement of the key PSTA 3 objectives and targets (as outlined in the RF). In addition, the Bank will actively support MINAGRI management intentions and actions to integrate the roles and activities of the SPIUs in the overall MINAGRI organizational and functional structure; this transition will enhance the balance of the efficiency, effectiveness, and sustainability aspects in the implementation of the PSTA 3 investment programs. Regarding the ongoing decentralization processes currently underway, the Bank will monitor these activities and transition, and through the PAP, provide needed technical and capacity development support, especially at the subnational levels, given that there are already substantial capacity-building activities with central agencies (note: these priority capacity gaps and coordination with other DPs will be identified and agreed during appraisal of the Ag. PforR operation). There also will potentially be TA funds available for other DPs for supporting the PAP and also demand-driven capacity requirements that would emerge during implementation. (c) O&M Support Arrangements: The PSTA 3 Program design and implementation arrangements accord high priority to ensuring adequate O&M support is provided to each of the infrastructural investments and devotes resources to providing adequate capacity development of the various farmer-level organizational structures (IWUOs, farmers' organizations/cooperatives, road brigades) to ensure they provide the required O&M, with technical support from the relevant technical agencies. There will be increased attention to the introduction and "handover" phases of the improved infrastructural works to secure a stronger commitment from the beneficiary groups (e.g., say, through a MOU, which specifies O&M roles, responsibilities, and possible penalties if there is neglect). The M&E system includes relevant indicators for monitoring on an ongoing basis the O&M aspects of the enhanced facilities. This would include quarterly reporting of these results and required interventions to ensure adequate O&M, and therefore, sustainability

<table>
<tr><td rowspan="2">infrastructural works, it is unlikely one individual beneficiary will provide the needed O&M attention without the coordinated support of the larger group of beneficiaries.</td><td colspan="4">of the benefits. Accordingly, the PSTA 3 M&E system, with strengthened linkages to the District-level O&M system, will devote special attention to tracking the adequacy of O&M, and ensuring corrective actions are taken on a timely basis. After 2 years of implementation, it is proposed that MINAGRI arrange an independent evaluation exercise to determine the degree and quality of O&M being provided by the relevant actors, and to identify operational recommendations to strengthen the performance of O&M activities.</td></tr>
<tr><td>Resp: GoR and Bank teams</td><td>Stage: Appr. and Implementation</td><td>Due Date: App. & Imp. Support Miss.</td><td>Status: Key issues are being addressed</td></tr>
<tr><td>Fiduciary Risk</td><td colspan="4">Rating: Moderate</td></tr>
<tr><td rowspan="2">Description: Overall, the fiduciary aspects of the relevant agencies are sound, although there are identified weaknesses, especially at the District level, which need strengthening, particularly as an increasing proportion of funds are being channeled through Districts. More specifically, the fiduciary assessment highlighted the following aspects that need strengthening and appropriate mitigation measures to ensure robust accountability at all levels:

a) Periodic expenditure variance analysis by the OAG revealed erroneous postings, unsupported debtors balances and unexplained reconciling items in the case of the RAB. In addition, the Districts do not incorporate the transactions of nonbudget agencies;

b) There is scope for improvement in internal controls in light of the main internal audit findings related to noncompliance with procurement guidelines, inadequate supporting documentation, and gaps in filing of accounting records and overexpenditure on certain budget lines;

(c) The internal audit function across MDAs is still at a nascent stage and capacity building is required to enhance expertise in IT audits, Value-for-Money audits, risk management, procurement, and payroll reviews. The review of the internal audit staffing structure also needs strengthening to ensure adequate staffing across the public sector;

(d) Regarding external audit, the enforcement of accountability at the District level is limited, given the absence of public accounts committees for that tier of government;

(e) While Rwanda has an acceptable public procurement legal framework, the assessment revealed inadequate implementation of the procurement law, regulations, and procedures; the assessment specified several specific examples of these shortfalls and irregularities, also attributable to skilled staffing constraints.</td><td colspan="4">Risk Management:

- The Governance PforR operation will address many of the areas identified in the fiduciary assessment for strengthening at the District level. Before appraisal, consensus will be secured on what will be covered by the Governance PforR and what will be covered by the Agriculture PfoR.

- MINAGRI (with support from its SPIUs), and in collaboration with MINALOC and a “representative” sample of Districts, will prepare an operational action plan to assess in greater detail and to strengthen relevant fiduciary aspects, with an emphasis on District-level capacities in the following areas: procurement; internal controls; internal audit; external audit accountability at the District level; more effective and consistent implementation of the procurement law, regulations, and procedures; and F&C strengthening at the District level.

- Based on the results of the above exercise, include the implementation of the agreed actions in the PAP being supported by the Ag. PforR support operation (including a representative sample of Districts, whereby this capacity development experience can be scaled up through the support of other programs).</td></tr>
<tr><td>Resp: GoR (with support from the Bank)</td><td>Stage: App. and Implementation</td><td>Due Date: App. & Imp. Support Miss.</td><td>Status: Ongoing</td></tr>
</table>

The review concluded that the systems and processes for dealing with F&C issues shows that Rwanda has strong institutional, organizational, and legal frameworks for controlling F&C when it occurs. At the same time, the assessment identified some areas that need strengthening (e.g., inadequate arrangements to address F&C at the District and sub-District level; retention of qualified staff, especially investigators; and difficulty in obtaining needed evidence to prosecute corruption cases).				
Environmental and Social Risk	**Rating: Moderate**			
Description: The environmental and social risks are assessed as "Moderate," based on the review of the national environmental and social systems and those of MINAGRI, RAB, NAEB, the SPIUs, and the Districts and also based on a comparison of overall PSTA 3 targets with risks in the existing Bank-supported portfolio (RSSP 3, LWH Project, LVEMP, and LAFREC). The Program involves supporting a number of physical and economic activities involving various groups of participants. These activities are expected to have limited potential adverse environmental and social impacts, and in most cases, are expected to generate positive environmental and social effects (again, drawing from ongoing experience). Those with potential adverse environmental and social impacts, which would be identified through the Program monitoring system, can effectively employ mitigation measures given the adequate environmental and social systems of the implementing agencies. Two key actions need to be completed during 2014 (as envisioned by government authorities) that could potentially pose a road block during implementation: (i) the legislation of the land and expropriation policy, already updated and approved by the Cabinet, by the Parliament prior to implementation; and (ii) designation of National Parks, demarcation of buffer zones for protected forests, and demarcation of protection zones for rivers and lakes. The lack of clarity of these buffer and protection zones could potentially delay implementation.	**Risk Management:** In the spirit of taking a proactive preventive approach to possible adverse environmental and social effects, four key actions should be included as part of the mitigation strategy: (i) ensure "SMART" indicators are included in the monitoring plan of PSTA 3 to track and ensure there are no adverse environmental and social effects and to review their progress on a regular basis; (ii) monitor and follow up to ensure the two key pending actions are taken by GoR (involving the final legislation of the land and expropriation policy; and the designation and demarcation involving National Parks); and (iii) development of a consolidated Environmental and Social Implementation Manual based on existing government guidelines; and conduct training on the understanding and application of this Manual at the National and District level (in collaboration with participating ministries and agencies).		
	Resp: GoR and Bank Team	**Stage:** Appraisal and Implementation	**Due Date:** Appraisal and Implementation	**Status:** Assessment and Appraisal
Disbursement linked indicator risks	**Rating: Moderate**			
Description : - Development and implementation of terracing and irrigation schemes could be delayed, and there could be inadequate O&M actions and support; - Strong research-extension linkages which could affect the flow of appropriate enhanced technologies to farmers and farmer adoption rates of improved technologies to achieve the targeted productivity increases; - Delayed or inadequate response from the private sector to assume an expanded role in input distribution/provision and competitive marketing, and access to finance, based	**Risk Management:** MINAGRI will ensure both adequate funding and timely completion of key Ag. PforR results and associated DLIs and closely monitor implementation, taking the appropriate and timely required actions. Key actions would include: (i) building on the extensive experience of MINAGRI, Districts, and contracts in implementing the targeted productivity-enhancing infrastructural works; (ii) timely approval and implementation of the policy papers (all four papers are currently in draft form and expected to be approved in 2014), with adequate stakeholder consultation; and (iii) completion and effective implementation of RAB's strategic plan, including restructuring to strengthen field presence (strategic			

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<tr><td rowspan="2">on the expected approved policies (for seeds, fertilizer, mechanization and finance);</td><td colspan="4">plan currently in draft form).</td></tr>
<tr><td>Resp: GoR and DP teams</td><td>Stage: Prep., Appraisal and implementation</td><td>Due Date : Continuous</td><td>Status: Ongoing</td></tr>
<tr><td>Other Risks (Optional)</td><td colspan="4">Rating: Moderate</td></tr>
<tr><td rowspan="2">Description :
- Adequate financing to ensure funding of the PSTA 3 (medium-cost scenario), with adequate funding support from MINECOFIN, DPs, and private sector;</td><td colspan="4">Risk Management: Build broad-based support and ownership for the Program within the implementing agencies, MINAGRI, MINECOFIN, and an inclusive private sector and farmer groups. Ensure the budgetary requirements are reflected in the MTEF of MINAGRI and the annual budgets. MINAGRI management needs to convene periodic meetings of the SWAp group and the ASWG and to draw from participatory Joint Sector Reviews and results from its enhanced sectoral M&E system to ensure effective implementation, with a strong results-orientation and solid ownership and engagement by key stakeholders.</td></tr>
<tr><td>Resp: GoR</td><td>Stage: Ongoing</td><td>Due Date: Continuous</td><td>Status: Ongoing</td></tr>
<tr><td colspan="5">3. OVERALL RISK RATING: MODERATE</td></tr>
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Technical Risk Rating/Assessment

The Bank's technical team reviewed all PSTA 3 SPs. Based on the technical assessment findings, the Bank team provided a technical risk rating with relevant justification and relevant risk mitigation and improvement measures for each SP (also reflected in Annex 4) as input to the PforR operation's integrated risk assessment and PAP. Below are the results of the detailed risk review.

Program1: Agriculture and animal resource intensification

1. **Soil Conservation and Land Husbandry**. **Overall risk rating: Moderate.** Shortfalls in funding and delayed funding releases (from Treasury) for infrastructure development. Lack of proper maintenance of erosion control infrastructure and soil fertility management leading to aging of top soils and yield reduction. Lack of regular soil testing facilities and services to calibrate recommendations which can lead to inappropriate and inefficient blanket recommendations. Lack of capacity at the District level to properly coordinate and implement these programs, and weak farmers' organizations and cooperatives to mobilize farmers effectively, especially to provide the required ongoing maintenance.

2. **Irrigation and water management**. **Overall risk rating: Moderate.** Limited and high cost of energy for pressurized irrigation development. Shortfalls in funding and delayed funding releases (by Treasury) for irrigation infrastructure development. Lack of a good framework for O&M leading to a lot of challenges for large irrigation schemes. Lack of proper incentives for private sector investments in irrigation development. Lack of capacity at the District level to properly implement these programs. Weak Irrigation Water User Organizations, which constrain adequate O&M of irrigation facilities.

3. **Agricultural mechanization**. **Overall risk rating: Moderate.** The major risks in achieving PSTA 3's mechanization objectives include: i) lack of capacity in adequate operation and management of machinery; ii) lack of mechanization specialists; iii) lack of standards and technical specification of machineries not yet identified; iv) lack of policy related to standards; v) lack of farmers' financial capacities to finance mechanization; vi) limited access to finance from the banking system, including high interest rates; and vii) low engagement of the private sector in agricultural mechanization (i.e., only 20 percent of the mechanization services/powered fleet is owned by the private sector and the rest undertaken by the GoR). In fact, only seven private companies and importing agents are involved; out of that, only three companies are operating in tractors and power tillers services delivery. RAB is the current organization for testing and certification but does not handle agricultural machinery. In any case, there are no facilities for testing and certification of agricultural machinery. The draft mechanization policy needs to be finalized and implemented to ensure a clear and sound roadmap for the development of the sector, especially to expand the role of the private sector, including clear provisions to promote operational leasing appropriate for hiring of tractors and other farm machinery.

4. **Agrochemical use and markets**. **Overall risk rating: Moderate.** A number of potential risk areas would have to be mitigated to increase the chances of successfully achieving PSTA 3's agrochemical and markets objectives. For instance, there is a lack of monitoring of soil nutrient levels to inform the specific types of fertilizer to be recommended for use in each commune. Without these site-specific recommendations, farmers run the risk of paying for nutrients they may not need, thereby reducing the profitability of using fertilizers. Farmers' knowledge of the benefits of and how to use the fertilizers efficiently is not strong enough to stimulate increased use. This is worsened by the typically high farm-gate fertilizer prices that may be beyond the means of farmers without a subsidy. Also, the quality of fertilizers on the market needs to be monitored for quality assurance. Although the RBS has drafted fertilizer specifications (requirements for nutrient content; testing; labeling; packaging), these have yet to be finalized, published, disseminated to stakeholders, and enforced. The lack of capacity for quality assurance does not rid the sector of potential faking/adulteration of fertilizers. The issue of private sector participation in the fertilizer industry is critical for sustainability of the supply chain management. While increasing, there is presently limited private sector participation in the fertilizer supply chain,

potentially reducing access by farmers to fertilizers at competitive prices. In addition, laws and regulations of direct consequence for fertilizer marketing, including registration procedures, packaging and labeling requirements, and quality control measures (e.g., pre-shipment inspection and final retail inspection and enforcement), are critically inadequate. It is important for the GoR to finalize, approve, and implement the draft fertilizer policy, which should address the above challenges.

5. **Seed development. Overall risk rating: Moderate.** One risk to the achievement of PSTA 3's objectives relates to weak institutional arrangements to promote the seeds sector, with an expanded role of the private sector. Apart from the fact that RAB Seed Program Unit has a weak capacity for seed certification, it is inappropriate to house the seed inspection and certification unit in RAB, given that these arrangements pose a potential source of conflict of interest, since RAB also is involved in both seed production and distribution. For overall coordination of the seed sector development, there needs to be a National Seed Council, presently lacking in Rwanda. To ensure effective and efficient national seed varieties are developed and released, Rwanda needs to an active National Variety Evaluation Committee and a National Variety Release Committee, both of which are not operational. Although the government is willing to promote private sector investment in the seed sector, only 3 percent of the seeds used in the country are from the private sector, an indication of weak capacities of private seed producers and traders. Quality assurance is important, yet RBS (responsible for ensuring quality) is not fully involved in providing quality assurance for seeds. There is a difficulty in estimating effective demand for production planning: the current "demand" level is artificial as a result of the subsidy program, and hence estimated figures are unreliable for planning purposes. There is also a risk that controlling seed releases by the government may constrain the introduction of valuable seed varieties from other international research efforts, thereby limiting potential productivity gains at relatively low costs.

6. **Livestock development**. **The risk rating is considered: Moderate.** The main risk relies on the lack of prioritization of species to be supported, which might lead to scattering of resources and focus on subsectors with lower potential for growth and competitiveness. Another risk is that the need to respond to the lack of natural resources and accessibility of animal feed as a major bottleneck to livestock intensification is not sufficiently addressed in Program 2 to generate and transfer technologies that would tackle this issue.

Program 2: Research, technology transfer and professionalization of farmers

7. **Research, technology transfer and extension services for producers**. **Overall risk rating: Low**. Most of the research (introduction of enhanced technologies) and extension, crop indicators, and proposed DLIs can be achieved if institutional changes in RAB and the climate change adaption and mitigation measures are adopted and implemented.

8. **Farmers' cooperatives and organizations. Overall risk rating: Moderate**. The key risk is that the benefits arising from farmers' organizations and cooperatives are captured by a few farmer households, and the majority of smallholders, including women, do not benefit from these services. The cooperative model will not be viable or cost-effective if the majority of farmers, especially those in the bottom 50 percent, do not benefit from their services. Most of the institutional indicators can be achieved if there is capacity within MINAGRI and the local level to provide necessary facilitation and technical assistance in forming and strengthening small groups, farmers' organizations and cooperatives. Investments in human capacity development – building capacity at the local level (staff and LSPs) as well as farmer-to-farmer extension are critical for mitigating these risks.

Program 3: Value chain development and private sector investment

9. Creating an environment to attract private investment, encourage entrepreneurship, and facilitate market access. **Overall risk rating: Moderate** Rwanda's comparative advantage and excellent growing conditions are proven for each of the four priority PSTA 3 export crops. However, key export targets and outcome indicators in relation to productivity and production are ambitious and will not be achieved unless the government succeeds in attracting experienced private investors, including foreign investors, to help increase production and productivity and in introducing new technologies and improved market access across all priority value chains. It is vital for MINAGRI to complete, approve, and implement key policies for seeds, fertilizer and agriculture finance.

10. Development of priority food crop value chains. The risk rating is considered: Moderate. Although the set production targets of the priority food crops can be achieved, several critical elements of the value chain development are weak or lacking. Value chain development will also depend on the progress made in organizing farmers, provision of business development services, links to the market, and private sector development and investments.

11. **Development of priority export crop value chains. Overall risk rating: Moderate to Substantial.** In terms of specific value chains, horticulture and pyrethrum targets have a higher risk than the targets set for tea and coffee. The horticulture targets can almost certainly not be achieved without an influx of 10-20 experienced international "anchor" investors.

12. **Development of priority dairy and meat value chains**. **The risk rating is considered: Moderate to Substantial.** The SP's overall objective of doubling the national consumption of milk and dairy products within a three-year period seems overambitious. In addition, the overall objective of intensification and market competitiveness may be contradictory with the One-Cow (Girinka) Program, where the disbursement of dairy cows across many households might increase production, collection, and marketing costs.

13. **Development of priority fisheries and apiculture value chains**. **The risk rating is considered: Substantial.** Although these two value chains have strong potential for growth given the demand and are important to ensure inclusive growth, the lack of human resources, in both quantity and skills, remains a major bottleneck for the implementation of these two SPs.

14. **Agricultural Finance**. **Overall risk rating: Substantial.** Some of the major risks to achieving the targeted outcomes relate to the overall macroeconomic dynamics that affect interest rates, liquidity, and supply of bank financing in the country. Models for economic analysis of the interventions should account for scenarios where: i) donor funding decreases over time, thus increasing government borrowing, crowding out the private sector, and further increasing interest rates; and ii) inadequate access to international credit due to international financial movements. In addition, more program specific risks to achieving the Program results include:

i. Inadequate analysis of demand and private sector response to the proposed interventions;
ii. Misalignment between the Program interventions and the private sector development trajectory;
iii. Lack of stakeholder analysis and buy in;
iv. Coordination failures, especially in developing nationwide systems such WRSs; and
v. In the case of agricultural insurance, the main risk may be the inability for any of the parties (GoR or farmer beneficiaries) to finance *ex-ante* premiums. However, a comparative analysis of other emerging countries shows that GoR support in this area is one of the most likely ways to achieve the objective of widespread farmer coverage.

15. **Market-oriented infrastructure for post-harvest**. **Promote efficient and equitable transport systems. The risk rating is considered: Moderate.** The road rehabilitation works in PSTA 3 are expected to be implemented by Districts, which have limited experience with and capacity for

implementing rural feeder road works. Cost overruns could occur due to unforeseen high-frequency, low impact geo-hazards, such as landslides caused by hydrological and geological factors. The risk rating takes into account the delays ongoing transport works are experiencing in Rwanda, in particular the timely processing of procurement tasks with acceptable quality, as the challenge is expected to be more profound at the District level. Currently, there is no mechanism for a stable flow of funds for financing District Class 2/feeder roads and sustainability of the feeder roads network is at risk, without strengthening of the community-based rural road O&M brigades.

16. **Reduce staple crop post-harvest losses at the producer and first aggregator level**. **Overall risk rating: Moderate**. RAB currently lacks the capacity to respond to farmers' needs for post-harvest technologies and hence needs capacity building. There might be a time lag in getting staff trained to be able to deliver on the objective of identifying and extending post-harvest technologies to farmers. Recruiting agricultural engineers and agro-economists to assist in the evaluation of potential technologies and build commercial strategies may also take time. The availability of funds to secure the services of these additional staff may also be an issue. **Clarifying the roles of the public and private sectors will be important to ensure that the government does not overinvest and that the private sector does not underinvest (also linked to sustainable productivity increases and incentives for private sector role).**

Program 4: Institutional development and agricultural cross-cutting issues

17. **Institutional capacity building**. **Overall risk rating: Moderate.** Given that there have been several recent diagnostic assessments of the capacity needs and required priority actions to address various capacity constraints by the main implementing actors, generally, these reports and ongoing activities provide a sound basis for identifying and addressing relevant risks regarding adequate capacity to implement the ASIP and Ag. PforR support operation. In addition, numerous ongoing projects (being implemented by the SPIUs) provide various types of capacity development of farmers' cooperatives and organizations. This would enhance marketing and value chain/enterprise activities especially under Program 3 of PSTA 3. There does appear to be a gap in capacity development activities of other private sector actors, especially farmer and private sector advocacy associations (e.g., Chamber of Commerce, Private Sector Foundation). The enhanced institutionalization of the capacity management aspects as cited above, in addition to ongoing initiatives that can strengthen diverse private sector actors in value chain development, will help ensure that moderate risks are effectively managed at various levels and by the above actors, and on a timely basis.

18. **Decentralization in agriculture**. **The risk rating is considered: Moderate.** The main rationale of enhanced decentralization is to bring improved agricultural services closer to farmers as the main clients, together with strengthening delivery and financial accountabilities, thereby reducing the moderate risks of not providing relevant, efficient, and effective expanded agricultural services. MINAGRI's recent progress report on decentralization (April 2014) highlights the following main challenges to achieving the above SO (see the progress report for further details, including specific recommendations for each challenge/risk area):

i. Progress in continued operational mainstreaming and integrating decentralization aspects of RAB, NAEB and the three SPIUs;
ii. Progress in strengthening the planning, budgetary, governance, and M&E aspects at the subnational level, with respect to implementing the various SPs of PSTA 3 (and linkages with the DIP), which is also linked to progress at the overall level; special attention is placed on the implementation of the earmarked transfer funds which contribute to the achievement of the relevant SP targets implemented primarily at the District/sector levels;
iii. Progress in carrying out the District-level MTEF, Strategic Issues Paper, Action Plan, and performance contract (especially with regards to the agriculture sector);
iv. Progress in implementing earmarked funds at the District level;

v. Progress in expanding the proportion of "open funds" at the District level (and a decrease in the proportion of earmarked funds), and ensuring that District priorities reflect the priorities for achieving the targets of PSTA 3, as relevant at the District level; and
vi. Progress in strengthening various ongoing and proposed mechanisms and processes of enhanced decentralization, including: further strengthening efficiencies and effectiveness in decentralization of agricultural services – e.g., strengthened capacities of key staffing (especially with respect to District agronomists, vets, M&E expert); closing process "gaps" at the District level; strengthening relatively weak M&E capacities; carrying out relevant capacity development initiatives; and operationalizing the role and effectiveness of the newly appointed MINAGRI focal point staff person for agricultural decentralization; and translating and implementing the ASIP investments into efficiently implemented operational plans at the District level.

19. **Develop regulations for organic agriculture, pesticide, and limestone use. The risk rating is considered: Moderate.** Although the organic agriculture sector can depend on foreign certification, it would be efficient and cost-effective to invest in the certification of products locally. Public investment would be necessary, especially since regulatory responsibility lies with the government. To address the apparent lack of capacity on the part of the companies to carry out certification, passing the cost of such capacity building onto the companies is recommended, while MINAGRI maintains the functions of designing and executing the capacity building with support from NGOs, donors, etc. as appropriate.

20. **Agricultural MIS: M&E, Agricultural Statistics and Agricultural Communications**
The risk rating is considered: Moderate. Currently, the agricultural MIS is highly fragmented and focused on tracking output targets reflected in the annual performance contracts for MINAGRI and each of the Districts. Achieving this operational reorientation of the MIS, and giving adequate attention to assessing progress at the impact and outcome levels will require effective and concerted leadership by MINAGRI management, its two implementing entities (RAB and NAEB), and the Program Coordinators of the three SPIUs, enabled by an operational action plan (to be formulated and agreed), and by implementation of a well-focused, short-term training plan to be carried out at national and subnational levels. These follow-up actions should include relevant support for each of the three components of the agricultural MIS – M&E, statistics, and communications. In addition, effective coordination with other key actors outside the direct control of MINAGRI will be vital.

21. **Gender and youth in agriculture**. **The risk rating is considered: Moderate.** There is risk of exclusion of the most vulnerable women and youth from benefits of various SP areas if adequate thought is not given up-front to confidence and capacity building of the vulnerable groups and linkages with other programs. Women-headed households fall in the category of extreme poor and own an average of 0.1 ha of land. Women provide the bulk of labor in the crop sector but function mainly at subsistence level with insufficient skills, access to markets, and control over land and other facilities. This group of vulnerable women would require extra technical and institutional support to help them benefit from various interventions. As gender equality is cross-cutting, this risk can be addressed by ensuring that all other SP areas (extension, finance, markets, etc.) focus on inclusion and equity, and address capacity and information gaps faced by women to access inputs and services. Similarly, there is high risk of excluding youth if they are not effectively mobilized and counseled and are not participating at the community level in cooperatives and SHGs. MINAGRI could prepare rural youth, especially most vulnerable ones, for employment and income generation and opportunities provided through other ministries such as Youth, ICT, and Commerce.

22. **Environmental mainstreaming in agriculture**. **Environmental considerations in rural roads**. **Risk Rating: Moderate to Substantial**. Road works are not designed or executed in a manner fully consistent with the GoR's safeguards policies. Where widening of hillside roads and construction of embankment along marshlands are required, this may involve farmland expropriation. During construction environmental mitigation, including health and safety measures, may not be mainstreamed in contracts and implemented. Challenges include: i) dealing with landslides in the hilly areas and

requirements for raising the embankment of roads; and ii) provision of abundant cross drains in the swampy areas, which do not restrict the natural flow of water.

23. **Planning for climate change**. **The risk rating is considered: High.** Climate change is a major risk to the sector as over 90 percent of Rwanda's production is rainfed. Although the policy and plans for mainstreaming climate change are prepared, there is limited institutional capacity and coordination at the national level. Furthermore, the capacity and awareness at the District and farmer level are low and need to be strengthened**.**

24. **Nutrition and household vulnerability**. **Overall risk rating: Low**. Most of the activities in the SP area are achievable and have been launched on the ground. There are institutional platforms at the local and national levels. In term of risks, adequate capacity of linkages at the local level could be addressed through further improving the skills of the local staff and strengthening technical and operational linkages with the Ministry of Health and Ministry of Education.

Annex 10: Detailed Program Implementation Support Plan

1. While nine of the subprograms (SPs) consume 88 percent of the budget, the remaining 15 SPs are also key to delivering the results, DLIs, and key impacts desires for PSTA 3. Therefore, a multi-disciplinary set of technical specialists along with fiduciary and environmental and social specialists will be needed to support the GoR in the overall implementation of the PSTA 3/PforR operation. While results and DLIs are planned to be assessed as completed annually, a 6-month approach to implementation support, where a specific one- to two-week implementation support mission would be carried out, will be employed. In addition, a number of technical specialists are based in the region, subregion, and country office, which will allow timely follow-up on specific issues and/or areas of concern if needed.

2. **Thus the Agriculture PforR operation in Rwanda will require considerable well-coordinated, focused technical support from the Bank team, particularly during the early stages of implementation**. One challenge will be to coordinate the actions agreed in the Program Action Plan (PAP) with operational activities on the ground, ensuring that information flows effectively and on a timely basis between policy makers and implementation agents (MINAGRI, RAB, NAEB, SPIUs, and Districts). While channels of communication are generally good within Rwanda, there will be a continual flow of information to and between implementing entities during the Program relating to the implementation of PSTA 3. At the District level, implementation actors will need to confirm that their planning is timely to ensure that available funding can be absorbed and results delivered in time and within expected budget envelopes. The team recognizes that the PforR mode of operation, which transfers performance risk to the implementing agents, provides a challenge, particularly at the local level. The fact that the World Bank Group's Ag. PforR program support staff are highly decentralized, with task team leader and key team members based in Rwanda and Kenya, will facilitate overall implementation and timely communication with the client and other various stakeholders involved in the implementation phase.

3. The focus of Bank implementation support will emphasize making the results-based incentive system work to its full potential. This will include: i) reviewing implementation progress, including the PAP and achievement of Program results (of core results of PSTA 3, as reflected in the RF) and DLIs; ii) providing support on resolving emerging Program implementation issues and bottlenecks and on building institutional capacity of the key actors; iii) monitoring the adequacy of systems' performance, and monitoring compliance with legal agreements; iv) supporting the government in monitoring and managing changes in the various types of risks; and v) confirming that MINAGRI has prepared and is implementing the plan to enhance the relevant MIS capacity development gaps identified in the Technical Assessment.

4. Key to the Bank's effective implementation support will be the coordination and timing aligned with critical points in the planning and verification of results for disbursement requests to the World Bank. The first implementation support mission will take place as soon as possible after effectiveness to provide direct and timely feedback on the quality of implementation plans (MINAGRI, RAB, NAEB, and Districts) and their likely soundness and acceptability, as well as assessing initial results emerging from 2013/14). It is expected that at that stage initial progress will have been made towards achievement of the first set of results and DLIs and achievement of many of the actions in the PAP. These will be reviewed during the initial review mission. The first mission is therefore expected to include all team members (i.e., technical, environmental, social, and fiduciary specialists). Subsequent implementation support will have a stronger emphasis on verification/M&E skills and technical implementation expertise, varying according to the actual needs as specified in the PAP.

5. An outline of the indicative implementation support required is shown in Table A10.1, Table A10.2, and Table A10.3.

Table A10.1: Main Focus of the Bank's Implementation Support

Time-frame*	Focus	Skills Needed	Resource Estimate
Months: 0 - 12	Implementing the PAP; changing operational procedures and their communication to implementing agents (MINAGRI, RAB, NAEB, Districts); establishing arrangements for independent verification of compliance with the DLIs; enhancing District and national planning and budgetary processes; strengthening the M&E system at various levels.	Legal; fiduciary; procurement; social; M&E; technical (land husbandry, irrigation & water management, mechanization/ input markets, livestock, research and technology, extension, farmers' cooperatives /nutrition/gender and youth, food and export crop value chains, post-harvest infrastructure/ transport, rural finance and trade, capacity building, M&E, economics and finance)	2 implementation support missions 2 x 15 people x 2 weeks = 60 weeks Total 60 weeks over 12 months
Months: 13-36	Reviewing implementation progress; cross-checking linkages between planning, budgeting, and results; providing support in case of disputes relating to DLI verification.	Legal; fiduciary; social; environmental; M&E; technical (land husbandry, irrigation & water management, mechanization/ input markets, livestock, research and technology, extension, farmers' cooperatives / nutrition/ gender and youth, food and export crop value chains, post-harvest infrastructure/ transport, rural finance and trade, capacity building, M&E, economics and finance)	2 implementation support missions per year including midterm review 2 x 2 yrs x 10 people x 2 weeks = 80 weeks Total 80 weeks over 24 months

Note: * PSTA 3's first year of implementation was 2013/2014. Accordingly, timeframe refers to the period after approval of the PforR support operation (expected in late 2014).

Table A10.2: Task Team Skills Mix Requirements for Implementation Support (entire Program life)

Skills Needed	Number of Staff Weeks	Number of Trips	
Legal	2	1	
Fiduciary systems	8	6	
Social systems	6	6	
Environment systems	6	6	
M&E	8	6	
Economics and finance	8	6	
Livestock	8	6	
Food and export crop value chains	8	6	
Input markets, mechanization	8	6	
Nutrition	8	6	
Research and technology	8	6	
Extension	6	6	
Farmers' cooperatives	8	6	
Post-harvest infrastructure	8	6	
Transport	6	6	
Gender and youth	6	6	
Rural finance and trade	8	6	
Land husbandry	8	6	
Irrigation & water management	8	6	
Social development	6	6	

Table A10.3: Role of Development Partners in Program Implementation

Devt. Partner	Role
USAID	Co-financier and participation in implementation support.
EU	Co-chair of Agriculture Sector Working Group – coordinate and harmonize DP financing of PSTA 3. Co-financier and participation in implementation support.
IFAD	Co-financier and participation in implementation support.
DFID	Co-financier and participation in implementation support. Technical Assistance support for Program Action Plan and capacity strengthening of MINAGRI.