Prioritizing Sanitary and Phytosanitary (SPS) Investments for Market Access in Rwanda

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Acronyms

CAADP	Comprehensive Africa Agriculture Development Programme
CBOs	Capacity Building Options
COMESA	Common Market for Eastern and Southern Africa
EU	European Union
GAP	Good Agriculture Practices
GHPs	Good Hygiene Practices
GMPs	Good Manufacturing Practices
GVPs	Good Veterinary Practices
HACCP	Hazard Analysis and Critical Control Points
IPPC	International Plant Protection Convention
ITC	International Trade Centre
MCCs	Milk Collection Centres
MCDA	Multi Criteria Decision Analysis
P-IMA	Prioritizing SPS Investments for Market Access
RASFF	Rapid Alert System for Food and Feed
RSB	Rwanda Standards Board
STDF	Standards and Trade Development Facility
SPS	Sanitary and Phytosanitary
TOT	Training of Trainers
USAID	United States Agency for International Development
UNOPS	United Nations Office for Project Services
WTO	World Trade Organization

Executive Summary

The Standards and Trade Development Facility (STDF)[1] has developed the framework, "Prioritizing SPS Investments for Market Access (P-IMA)"[2], based on Multi Criteria Decision Analysis (MCDA), to help inform and improve evidence-based Sanitary and Phytosanitary (SPS) capacity building planning and decision-making processes. The STDF, in collaboration with USAID and COMESA has so far piloted the framework in eleven countries in East and Southern Africa and currently being applied in East African regional trade with support from Trademark East Africa. COMESA views the P-IMA framework as a unique planning and sector-wide resource mobilization tool and encourages its Member States to use P-IMA to take stock of SPS capacity needs, prioritize and cost investment options with the best returns, and integrate SPS investments into national investment frameworks.

COMESA Secretariat has secured funding from the STDF and Enhanced Integrated Framework (EIF)[3] and is currently implementing a regional P-IMA project, which builds on the past applications of the framework, to further expand the use of the P-IMA framework in Ethiopia, Kenya, Malawi, Uganda and Rwanda. The objective of the project is to improve SPS capacity and enhance market access through a multi-stakeholder, evidence-based approach of mainstreaming SPS capacity building into national investment frameworks for agriculture, trade, health, and/or environment. The P-IMA initiative is also building synergies with the COMESA European Union's (EU) Trade Facilitation Programme, specifically on SPS capacity building in risk-based food safety management in priority value chains.

Thus, this report is the result of the application of the P-IMA framework in Rwanda. A total of fourteen (14), out of an initial proposed Eighteen (18), SPS capacity building options were subjected to the P-IMA priority setting framework. The priority setting was based on a structured process of identifying SPS capacity building options that were relevant for marker access, prior agreed objectives (called decision criteria), and agreed weights assigned to the decision criteria. In all, it will cost approximately US$9 million to implement all the 14 capacity building options. In return, these 14 capacity building options could generate additional exports worth US$255.5 million. Overall, the following are the options that consistently ranked as first best options:

1 www.standardsfacility.org

2 https://www.standardsfacility.org/prioritizing-sps-investments-market-access-p-ima

3 https://www.standardsfacility.org/PG-606

- HACCP certification for Honey cooperatives and honey processers,
- capacity building in apiculture;
- establish and operationalize Residue Monitoring Plans for animal and animal products; and
- the development of pest control mechanism for pest and diseases surveillance

While the following consistently rank lower:

- accreditation of pesticide testing laboratory at RSB
- upgrade and strengthen the slaughter chain,
- pesticides residues monitoring plan for horticulture products, and to some extent
- aflatoxin control and management in dairy products

1.0 Introduction

The Standards and Trade Development Facility (STDF) of the World Trade Organization (WTO) has developed the framework, Prioritizing SPS Investments for Market Access (P-IMA), based on Multi Criteria Decision Analysis (MCDA), to help inform and improve evidence-based SPS capacity building planning and decision-making processes. The STDF, in collaboration with USAID and COMESA, initially piloted the framework in Belize, Ethiopia, Malawi, Mozambique, Namibia, Rwanda, Seychelles, Uganda, Vietnam, and Zambia, from 2011-15, to prioritize SPS investment options and leverage resources for capacity development under relevant investment frameworks. The framework was also recently applied in Madagascar.

COMESA views the P-IMA framework as a unique planning and sector-wide resource mobilization tool and encourages its Member States to use P-IMA to take stock of SPS capacity needs, prioritize and cost investment options with the best returns, and integrate SPS investments into national agriculture sector investment plans (CAADP) and other relevant frameworks.

Consequently, the COMESA Secretariat has secured funding from the STDF and UNOPS and is currently implementing a regional P-IMA project, which builds on the past application of the framework, to further expand the use of the P-IMA framework in Ethiopia, Kenya, Malawi, Uganda and Rwanda. The objective of the project is to improve SPS capacity and enhance market access through a multi-stakeholder, evidence-based approach of mainstreaming SPS capacity building into national investment frameworks for agriculture, trade, health, and/or environment. The project would enable the current version of this decision-support tool to be further improved and tailored to efforts to mainstream SPS capacity building within various investment frameworks to promote safe trade in agricultural products.

Thus, this report provides the outcomes of the application of the P-IMA process in Rwanda. Rwanda piloted the P-IMA framework, then called MCDA, in 2012, which identified 10 SPS capacity building investment needs. The following were consistently ranked as top priorities:

- Drying services for a range of stored crops
- Providing domestic capacity within Rwanda for third party certification
- Detection of potato flavor in coffee beans
- GAPs for procurement of cereal and cassava.

Annex 2 presents the 2012 capacity building options and how they differ from the new ones.

2.0 Overview of SPS Sensitive Trade

Like most East African Countries, Rwanda maintains a large trade deficit; exporting, in most cases, less than 35% of what she imports over the last ten years (2009-2018). In general, Rwanda's exports have improved; from about US$260 million in 2009, peaking at US$653 million in 2014 and maintained similar levels, roughly around US$600 million, till 2017 before dropping drastically to about US$353 million in 2018[4]. Similarly, Rwanda's imports have shown increasing trends from slightly over US$1.1 billion in 2009 to almost US$2 billion in 2013 before declining back to its 2009 levels in 2018.

Rwanda's traditional exports (at 2-digits HS Code level), ores, slag and ash; and coffee, tea, maté and spices, accounts for 54% of total exports on average over 2009-2018. Apart from these products, most export sectors remain undeveloped. At a detailed level, the five largest exported products in 2018 include Niobium, tantalum or vanadium ores and concentrates; Coffee (excluding roasted and decaffeinated); Tin ores and concentrates; Black fermented tea and partly fermented tea; and Tungsten ores and concentrates (see table 1). Overall, agricultural products constitute about 40% of total exports, on average over 2009-2018. Major agricultural products exported in 2018 include coffee, tea, durum wheat, vegetable saps and extracts, beans, fresh cut rose and buds, milk and cream, and raw hides and skins. Maize (incl. maize seed for sowing) and rice were also of significant export in the past. Rwanda's imports, on the other hand, include generally manufactured products (machinery and transport equipment, chemicals, iron and steel, and other manufactures), fuels and agricultural products[5].

According to ITC Export Potential map, agricultural products, particularly coffee, not roasted, not decaffeinated, black tea, raw hides and skins, and vegetable saps and extracts holds the greatest export potential for Rwanda.

According to the most recent (2019) WTO Trade Policy Review, Rwanda's intra-Africa trade has expanded drastically from 35.2% in 2011 to 49.7% in 2017, displacing Europe as the largest market in 2011 at 49.4% and now down to merely 13.7% in 2017. The main markets in Africa comprises of DRC (29.1% in 2017; up from 14% in 2011), Kenya (12.4% in 2017, down from 15.8% in 2011), and Uganda (3.7% in 2017, up from 1.7% in 2011). The rest of Africa's share in Rwanda's export has also increased from 3.7% in 2011 to 4.4% in 2017. Apart from the European market, the most dramatic changes in Rwanda's markets outside of the African region has been the rise of UAE, from less than 1% in 2011 to 25.6% in 2017. The UAE is the main market for Rwanda's gold exports. The Asian market has also contracted from 10.8% in 2011 to 6.1% in 2017. Generally, traditional exports, which also happened to be Rwanda's major exports, are mostly destined to the international markets while increasingly the non-traditional exports (mainly live animals &

4 Although the 2018 figures must be read with caution, in that they are mirror data – that is an estimated data

5 WTO (2019) Trade Policy Review on Rwanda

animal produce, vegetable produce, agro-processed goods and light manufactured goods, and hides and skins) are mostly destined to regional markets.

Interestingly, Rwanda has had very limited export rejections by the US and EU due to SPS issues. The EU through its Rapid Alert System for Food and Feed (RASFF) had eight SPS issues against Rwanda between 2008 and 2019 and all of it relates to agri-food exports (see table 2 below). The U.S, on the other hand, has only two SPS notifications related to Salmonella in flour and meals n.e.s. and insanitary manufacturing, processing or packing of Filefish, Hot Smoked, from 2011 to 2019. These notwithstanding, most agri-food exports from Rwanda are susceptible to SPS compliance requirements (See Annex 1). In addition, there's observable efforts since 2012 including sector specific strategies and interventions in addressing specific SPS challenges. Both Rwanda's Strategic Plan for Agriculture Transformation (2018-2024) and National Agricultural Policy (2018) recognised the need to address SPS issues in order to access high-end consumer markets. In effect, one of the strategic orientation of the plan is a focus on upgrading the provision of SPS/quality standards for the horticulture, vegetable, poultry, pork and fisheries sectors. The plan intends to focus on two broad value chains, i.e. animal resources and horticulture, and therefore attention must be paid to SPS issues related to these value chains to facilitate agri-food trade, particularly to high-end markets.

Table 2: Border Rejections/SPS Alerts Against Rwanda by EU

product category	date	reference	product type	notification type	notification basis	notified by	subject	action taken
cereals and bakery products	16/09/2008	2008.BLM	food	border rejection	border control - consignment detained	United Kingdom	aflatoxins (B1 = 4.5; Tot. = 14.9 µg/kg - ppb) in maize, sorghum and soybean meal from Rwanda	destruction
cereals and bakery products	14/07/2017	2017.1036	food	alert	official control on the market	Belgium	benzo(a)pyrene (2.1 µg/kg - ppb) and polycyclic aromatic hydrocarbons (sum of PAH4: 5.6; 1.64 µg/kg - ppb) in biscuit flour from Spain	public warning - press release
cocoa and cocoa preparations, coffee and tea	7/9/2011	2011.1218	food	alert	official control on the market	Greece	undeclared milk ingredient in cocoa powder manufactured in Germany, packaged in the Czech Republic	recall from consumers
dietetic foods, food supplements, fortified foods	4/12/2017	2017.2095	food	alert	food poisoning	France	foodborne outbreak suspected (Salmonella Agona) to be caused by infant formula from France	withdrawal from the market
fruits and vegetables	20/08/2014	2014.1161	food	alert	consumer complaint	Belgium	glass fragments in cherries in glass jar from Hungary, via Germany	informing recipient(s)
herbs and spices	21/11/2018	2018.3372	food	alert	company's own check	Belgium	undeclared milk ingredient and mustard in ground nutmeg from Belgium	withdrawal from recipient(s)
ices and desserts	9/8/2018	2018.2278	food	alert	consumer complaint	France	Bacillus cereus (4500 CFU/ml) in dairy dessert from France	recall from consumers

nuts, nut products and seeds	16/09/2008	2008.BLL	food	border rejection	border control - consignment detained	United Kingdom	aflatoxins (B1 = 99; Tot. = 307.2 / µg/kg - ppb) in peanut flour from Rwanda	destruction

3.0 The P-IMA Framework

The P-IMA framework employs a Multi Criteria Decision Analysis (MCDA) tool that engages a multi-stakeholder approach to identify SPS capacity gaps, cost and rank the investment needs based on agreed economic and social defined decision criteria. The aim is to generate a set of evidence-based SPS priorities that gives the best return on investment and can be mainstreamed into national investment frameworks and/or leverage external resource mobilization. The rationale behind the framework is that priorities need to be established on the basis of a range of economic and social considerations that may, at least on the face of it, be difficult to reconcile. In turn, this assumes that the rationale for investments in SPS capacity-building is not compliance with export market SPS requirements per se, but the economic and social benefits that might flow from such compliance, whether in terms of enhanced exports, incomes of small-scale producers and/or vulnerable groups, promotion of agricultural productivity and/or domestic public health, etc. The framework provides an approach for different decision criteria to be taken into account, even though they may be measured in quite different ways.

In this regard, the framework aims to:

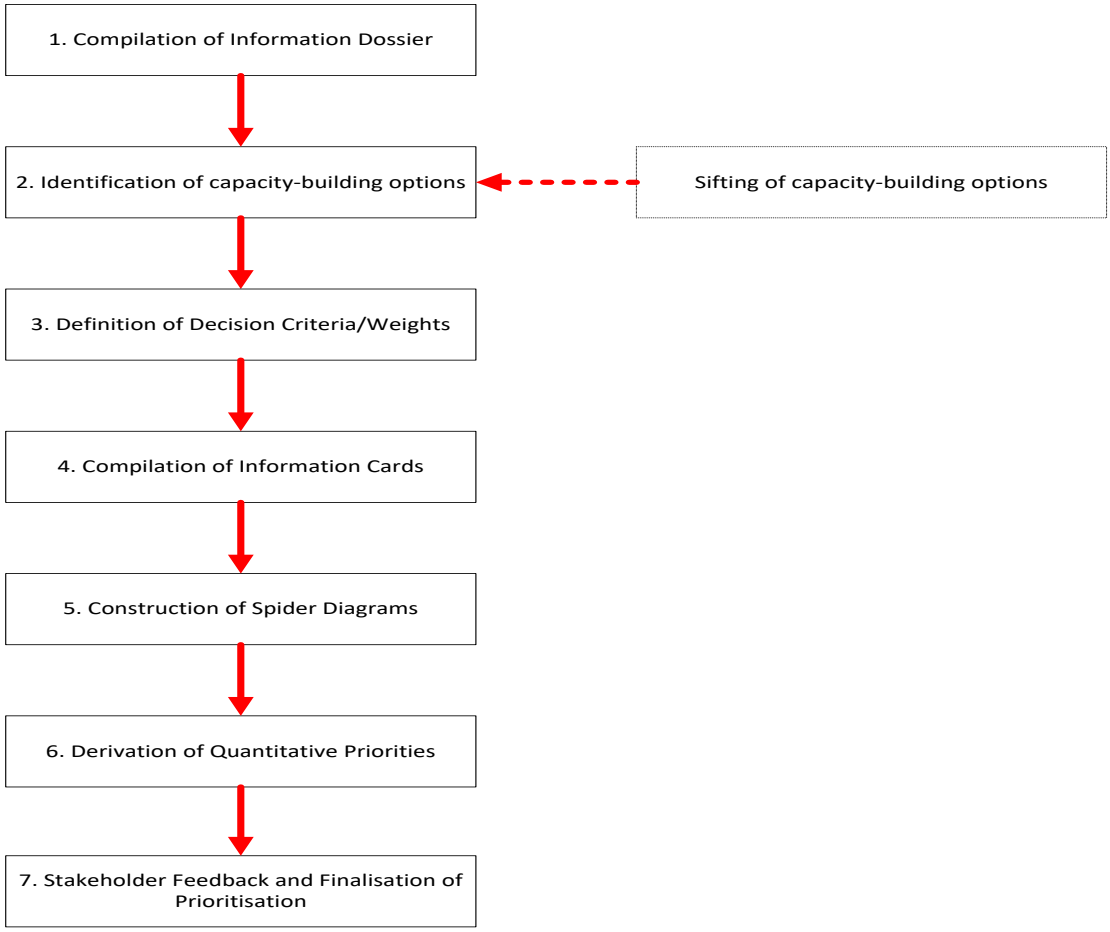
- Identify the current set of SPS-related capacity-building investment options in the context of existing and/or potential exports of agri-food products. Below this is termed the choice set.
- Determine the decision criteria that should drive the establishment of priorities between SPS-related capacity-building investment options and the relative importance (decision weights) to be attached to each.
- Prioritize the identified SPS-related capacity-building investment options on the basis of the defined decision criteria and decision weights.
- Examine the sensitivity of the established priorities to changes in parameters of the framework.

The framework employs a highly structured process that aims to be applied in a wide variety of contexts and to provide various diagrammatic and numerical outputs. The framework and its practical implementation are described in detail in a user's guide[6].

6 User Guide can be found on STDF website: http://standardsfacility.org/prioritizing-sps-investments-market-access-p-ima

Below, a relatively brief outline of the seven stages of the framework (Figure 1) is provided, with a particular focus on how they were implemented in Rwanda.

Figure 1. Stages of the P-IMA Framework



Stage 1: Compilation of Information Dossier

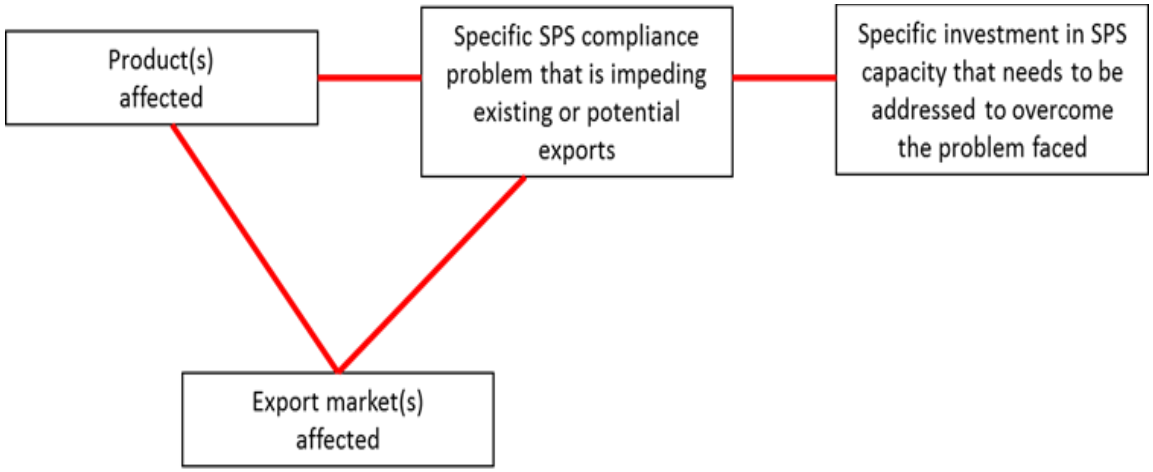
The first stage of the analysis involved the compilation of a comprehensive dossier of existing information on the SPS challenges facing agri-food exports in Rwanda and the associated capacity-building investment needs. In so doing, the aim was to ascertain what work had already been undertaken to identify capacity-building options and the definition of priorities for related investments. Consequently, the current study built on the previous

work done in 20127, received sector specific presentations from the various Competent Authorities based on their sector specific assessments, and a synthesized SPS-sensitive trade flow study during a High-Level inception meeting on 3rd September 2019.

Stage 2: Definition of Choice Set

In order to identify the SPS capacity-building options to be considered in the priority-setting framework, a three-day stakeholder workshop was held from 4th to 6th September, 2019. The workshop comprised of training of key stakeholders on the P-IMA framework and on the D-Sight Software, which powers the P-IMA framework, and two days dedicated to the identification of Rwanda's SPS Capacity Building Investment Options, Decision Criteria and Weights. Participants were presented with a series of cards and asked to identify the SPS capacity-building needs that is mutually-exclusive and consist of four key elements (Figure 2). First, the product(s) affected. Second, the specific SPS issue faced by exports of this product(s). Third, the market(s) where these SPS needs were an issue. Fourth, the capacity-building investment option(s) that would solve the SPS issue being faced. The combination of these four elements defined a distinct capacity-building option. Respondents were free to define as many specific SPS capacity-building needs as they wished.

Figure 2; Definition of SPS capacity-building options



The Capacity Building Investment Options generated from the above workshop was further reviewed and validated in a sector-specific working session from 28th October to 1st November 2019. At this stage, certain capacity building options were excluded (see section 4.15) if they are not SPS issues related to trade, not mutually exclusive, part of an existing project, are not real or clear requirement from the market, etc. The options that were included are list and defined in section 4.

7 Establishing Priorities for Sanitary and Phytosanitary Capacity-Building in Rwanda Using a Multi-Criteria Decision-Making Framework (November 2012)

Stage 3: Definition of decision criteria and weights

In the second stage of the stakeholder workshop, respondents were asked to define an appropriate set of criteria to drive the priority-setting process and to assign weights to these. First, participants were presented with a series of potential decision criteria and asked which (if any) should be excluded and whether any potentially important criteria were missing. To define the decision weights, the workshop participants were each asked to assign 100 points amongst the ten decision criteria. The scores of participants were then collated and an average weighting calculated. This average weighting was reported back to the workshop to identify any discrepancies. The final agreed weightings are reported in Table 2 below.

Table 2; Decision criteria and weights for setting priorities of SPS capacity-building options1

Objective	Decision Criteria	Average Weight
Cost	Up-front investment	16.8
	On-going cost	7.9
	Difficulty of implementation	7.5
Trade Impact	Change in absolute value of exports	11.4
	Export diversification	7.4
	International Reputation	8.1
Domestic Spillovers	Agricultural productivity	10.9
	Public health & Environment	11.7
	Poverty impact	10.0
	Vulnerable Groups	8.4

Stage 4: Construction of Information Cards

Having identified the choice set of SPS capacity-building options and the decision criteria and weights to be applied in the priority-setting exercise, information was assembled into a series of information cards. The aim of these cards is not only to ensure consistency in the measurement of each decision criterion across the capacity-building options, but also to make the priority-setting exercise more transparent and open to scrutiny.

First, the specific nature of each of the SPS capacity-building options was described in some detail on the basis of existing documentation, consultation with stakeholders, etc. and are set out in Section 4. The metrics to be employed for each of the ten decision criteria were then defined, taking account of currently available data and the range of plausible ways in which each of the criteria might be represented. Table 2 sets out the final metrics. Note that the choice of metrics involves a sometimes difficult compromise between the availability and quality of data, and the imperative to employ continuous quantitative measures. While the cost element and trade impacts were estimated by a core team of sector players based on the component of the capacity building investment options and the lost trade and/or potential trade, respectively, other decision criterion were measured collectively by stakeholders during the working session based on available data

and information. However, it is important to recognize that the aim of the framework is not to provide a final and definitive prioritization of the capacity-building options. Rather, the priorities that are derived should be revisited on an on-going basis and revised as more and/or better data for the decision criteria become available.

Information cards for each of the SPS capacity-building options were then compiled. These are reported in Annex 3. Each card presents data for the ten decision criteria, measured according to the scales outlined in Table 3. For each criterion, details are provided of how measures for each of the decision criteria were derived. There is also an indicator of the level of confidence in the measure reported. Where there is a lack of underlying data and/or these data are of dubious quality, a low or medium level of confidence is indicated. Conversely, where fairly rigorous and comprehensive prior research is available, a high level of confidence is reported. These confidence measures need to be considered in interpreting the results of the prioritisation exercise, and in considering how the analysis might be refined in the future.

Table 3; Decision Criteria Measurement Metrics

Decision Criterion	Details	Measurement
Cost		
Up-front investment	Monetary costs of investments to upgrade SPS capacity	Absolute value ($)
On-going costs	Direct costs of maintaining and operating the upgraded SPS capacity	Absolute value ($)
Difficulty of implementation	How easy or difficult will the type of proposed intervention be?	Yes (1) / No (-1)
Trade Impact		
Change in absolute value of exports	Predicted enhancement of exports or avoided loss of exports five years from implementation of the intervention	Absolute value ($)
Export diversification	Would the implementation of the intervention allow for access to new/lost market or trade in a new products?	Yes (1) / No (-1)
International Reputation	Would the implementation of the intervention enhance the reputation of trade from Rwanda?	Yes (1) / No (-1)
Domestic Spillovers & Social Impacts		
Agricultural productivity	Changes in productivity of agricultural or fisheries production of commodities to export and/or domestic markets	Large negative (-2); Negative (-1); No change (0); Positive (+1); Large positive (+2)
Public health & environment	Changes in domestic public health, through food safety, occupational exposure to hazards, etc. and Changes in protection of natural environment	

Impact on Poverty	Change in the incidence of poverty
Vulnerable Groups	Impact on the health and/or income of Women, Youth, Underage, People with Disability, the Elderly or the sick

Stage 5: Construction of spider diagrams

Through Stages 1 to 4, the inputs to the priority-setting process were collected and then assembled into the series of information cards. The aim of Stage 5 was to present the information in the information cards in a manner that permits easier comparison of the capacity-building options. Thus, spider diagrams were derived that plotted the SPS capacity-building options against the eleven decision criteria. Scrutiny of these diagrams (Section 3 Results) identified the decision criteria against which each of the capacity-building options performed relatively well/badly compared to the other capacity-building options in the choice set.

Stage 6: Derivation of quantitative priorities

The formal priority-setting analysis involved the use of outranking through the D-Sight software package. The mechanics of the analysis are described in some detail in the user guide to the framework. The inputs to the model are the data assembled in the information cards. For most of the decision criteria preferences were modelled using a level function since these were measured using categorical scales. However, the up-front investment, on-going cost and absolute change in value of exports criteria were measured continuously and modelled using linear functions. Three models were estimated using D-sight:

- *Baseline model* using decision weights derived in Stage 3.
- *Equal weights model* in which all of the decision criteria are weighted equally.
- *Costs and trade impact model* in which only the cost and trade impact decision criteria are included in the analysis, all of which are equally weighted.

The baseline model is considered to provide the most reliable set of priorities, in that it uses the full set of information derived through Stages 1 to 4. The two subsequent models were estimated in order to examine the extent to which the derived priorities are sensitive to changes in the decision weights; if the broad ranking of the SPS capacity-building options remains generally the same under the three scenarios presented by these models, we can be reasonably confident that the results of the framework are robust.

Stage 7: Validation

The final stage of the priority-setting analysis is completed with this report on the results of the analysis. The aim of the validation process was to ensure that the results of the priority-setting framework were broadly in accordance with expectations, or that unexpected rankings can be explained through the pattern of data in the information cards. To facilitate this process, the draft report was disseminated to stakeholders by email with a request for comments. Further, the preliminary results were presented at

stakeholders' validation workshop on 18th March, 2021, the participants at which are reported in Appendix 2.

4.0 Brief Description of the Capacity Building Options (CBOs)

4.1 Capacity Building in GAPs, Pre & Post-Harvest Management, GHPs, & GMPs for Horticulture Crops

Rwandan horticultural export industry has grown tenfold within the last 5 years, while the number of local exporters targeting the EU market has increased dramatically. Despite the limited skills and capacity among local private operators, the implementation of Global GAP standard has been the main dream/objective for all exporters targeting the international market for fresh fruits and vegetables. However, the new EU regulations on plant protection require strict measures of inspection at all level of production. The main purpose of this capacity building option is to train TOT inspectors to develop and implement food safety and quality standards for horticultural crops along the fresh produce supply chain, as well as providing skills and capabilities in post-harvest management, good hygienic practices and good manufacturing practices for HACCP systems compliance in the horticulture export industry, especially those operating pack houses.

To support exporters to implement SPS measures, both public and private operators in horticulture export logistics, will be HACCP certified, at least at pack house level. Combined with an improved knowledge in market information and market requirements, this will help to include training and coaching component on market access and market penetration strategies. Technical assistance will target both public and private operators, to build national capacity in quality standards certification programs. Selected local experts will be trained to achieve the level of lead auditors and farm assurer, where specials courses are needed.

4.2 Pesticides Residues Monitoring Plan for Horticulture Products

Private and public actors request for support to meet the SPS standards and access domestic, regional and international markets. Pesticide residue monitoring plan is a very important tool to implement SPS measures regarding horticultural value chain from production to consumption. A clear and coordinated regular monitoring plan is the key to facilitate exports from developing countries like Rwanda, with a special focus on small scale producers, geared towards improving governance and meeting international standards, which helps to better grab better trade opportunities.

Currently, Rwanda does not have a pesticide residue monitoring plan and the capacity to test for MRLs for horticulture product samples are usually tested outside the country which tends to be expensive. In order to control pesticide residues in horticultural commodities, a clear residue monitoring plan with provision for periodic residues testing as well as disease surveillance is required. The development of the pesticide residue

monitoring plan will contribute to the implementation of food safety standards as the basis of SPS measures as well as their proper application.

4.3 Develop Food Safety Policy and Legislation on Plants and Livestock Products

The existing drafted National Food Safety Policy requires revision, documentation, validation and establishment of its Implementation Plan, to enhance the health and safety of all Rwandans, and those visiting Rwanda, as well as those persons around the world who consume food commodities originating from Rwanda. Through this policy the Government of Rwanda implements programmes that promote high standards of food hygiene and safety and maintain systems of surveillance and controls to ensure compliance with those standards. Current system is responding only reactively to food safety problems and not giving enough attention to its preventive functions.

The policy will provide a framework that establishes and maintains rational control measures for foods from farm-to-fork with a safety system that harmonizes inter-agency efforts, minimizes inter-agency conflicts and overlaps, and ensures the protection of public safety and food trade in a manner consistent with WTO/SPS and other international markets requirements. This policy will lay the ground for an effective and efficient food safety system in Rwanda through regulatory frameworks that prevents the risks of food-borne diseases, protect and inform consumers over the risks linked to hazards in food, and that promote fair trade.

4.4 Develop Pest Control Mechanism for Pest and Diseases Surveillance

Within the framework of the strategic plan for agriculture transformation Phase 4, to ensure strong quality assurance and regulatory services, Rwanda has ratified the International Plant Protection Convention (IPPC) to guide the assurance of safe movement of plant and plant products from within and outside of Rwanda.

Pest surveillance is essential in plant protection and one of the tools to justify phytosanitary measures related to trade of agricultural products. Through the NPPO, pest and disease surveillance mechanism will be put in place to cover key activities such as: early detection of pests new to an area, compilation of host pest lists, commodity pest lists and pest distribution records (e.g. to support pest risk analysis and phytosanitary certification), in order to establish and maintain pest free areas and areas of low pest prevalence for export production.

The determination of pest status in areas of export production and changes in characteristics of pest characteristics or pest incidence (e.g. for areas of low pest prevalence or for research) will be published for public awareness and communicated to importing countries. Much focus will be put on the horticultural crops for export i.e. French beans, Chillies, Eggplants, Avocadoes, Passion fruits, and ornamental flowers, for the purpose of compliance. Major pests will be FCM, thrips and Potato virus (PVY) and fruit flies, the most prevalent in recent interceptions on the EU market.

4.5 Accreditation of Pesticide Testing Lab at RSB

MRL Testing continues to be a challenge in horticulture products for Rwanda. However, NAEB and RSB are in process to acquire accreditation on various testing methods and processes, which will help exporters to access new markets and improve their competitiveness and international reputation.

There are a few accredited laboratories in the region for testing pesticides residues such as in Kenya, and Rwandan exporters of agricultural products usually have to send samples to EU laboratories due to a limited investment capacity and resources in the region. While Rwanda's main markets are neighbouring countries, and the Middle East where standards are relatively easy to meet; credible control must be in place for exporters to ensure compliance with EU market requirements concerning MRLs, and other countries such as India, where pesticide limit tests are carried out at the port of entry.

There is an increased competition on international stage, and market demand for high quality and value added products. Though the main mechanism to control pesticide residues requires the application of certified Good Agricultural Practices (such as Global GAP), generally backed-up by the testing of crops on the basis of risk assessment along the value chain rather than on consignment testing, there is a need of accreditation for existing testing capacities in Rwanda, to minimize cost and time spent on such services through testing laboratories mostly in importing countries.

In addition to the operational and running costs with regards to the accredited testing laboratories, the existing facilities and basic equipment at RSB and NAEB need to be upgraded in terms of facilities and equipment to meet requirements for international standard compliance. Besides, the capacity building option for accreditation of testing labs requires an up-front investment for processing and coaching services, PT scheme, as well as certification fees. This will help Rwanda to position itself on the status of quality service delivery, not only for local markets but also for regional exports, which would increase international reputation.

4.6 Aflatoxin Control and Management in Cereals

Although Rwanda does not export much maize, maize is the basic ingredient in some processed products that are exported e.g. super cereal plus to WFP. Aflatoxin control in maize therefore is very relevant in ensuring that these products are aflatoxin safe.

In Rwanda there is Aflatoxin working group to discuss strategies to foster multi-sectorial engagements for aflatoxins prevention and control, particularly addressing health and nutritional hazards, and how to raise awareness among key players.

Farmers are not aware of the food safety issues associated with mycotoxins. They are also not aware of the harvest, drying and storage techniques necessary to prevent mycotoxins growth in maize value chain. There is a need for capacity development and training for all of those involved in the maize value chain. Storage of product is also a problem, particularly for the small farmers and the householders. A warehouse marketing

system is one way of controlling storage conditions and product stored in such facilities would be required to be monitored for quality and food safety factors.

In summary there are a number of areas that need addressing to control the aflatoxins and food safety issues associated with maize. These include government initiatives, effective surveillance systems, collaboration between the many stakeholders, research (particularly related to preventative measures), adequate storage facilities and capacity development and training of the stakeholders. As exposure to aflatoxin leads to several health related bad conditions and economic losses, the government, food industries and all stakeholders in agri-food chain should work together to increase food production and ensure food safety for the protection of the health of citizens.

There is a need for monitoring and surveillance systems for aflatoxin as it is the most microbial carcinogen; its exposure has an impact on human growth and immune system. Pre and post-harvest aflatoxins control like handling and methods of storage mostly of cereal need to be improved to prevent food contamination.

4.7 Aflatoxin Control and Management in Dairy Products

Aflatoxins contaminate many people through staple food, cash crops and animal products and can occur throughout the value chain making it difficult to prevent and control. Aflatoxins is a significant threat not only to public health but also to agriculture and food systems in Rwanda as it also affects production, trade, rural incomes, worker productivity, and consumer confidence. The entry point of aflatoxin into the dairy value chain is through aflatoxin contaminated feeds. Most animal feeds are produced from remnant products e.g. maize, which are often highly contaminated with aflatoxin and this passes on into the dairy value chain. This capacity building will focus on awareness creation of feed manufacturers and dairy farmers.

4.8 Establish a Structured Animal Disease Surveillance System

In general, surveillance is aimed at demonstrating the absence of infection or infestation, determining the presence or distribution of infection or infestation or detecting as early as possible exotic diseases or emerging diseases. Animal health surveillance is a tool to monitor disease trends, to facilitate the control of infection or infestation, to provide data for use in risk analysis, for animal or public health purposes, to substantiate the rationale for sanitary measures and for providing assurances to trading partners.

Currently in Rwanda, there is no known Animal disease surveillance systems, although different measures to control diseases are taken especially when outbreak occurs. There is need to put in a place a well-structured animal disease surveillance system taking into account both active and passive surveillances and including for example disease reporting systems, surveys, risk-based methods, ante-mortem and post-mortem inspections, clinical surveillance, early warning system, etc. In addition, there is need to train and equip different stakeholders involved in such system for its efficiency.

4.9 Capacity Building in Traceability System for Livestock and Livestock Products

Traceability is the ability to track any food through all stages of production, processing and distribution (including importation and at retail). It ensures that movement of food can be traced one step backwards and one step forward at any point in the supply chain and such history is important in the event of a customer complaint or a detected product defect after the product has left the factory.

An effective traceability system relies on being able to track product one step forward and one step back at any point in the supply chain by putting in place procedures for identifying producers, suppliers, customers and products and the records keeping.

Traceability enables corrective actions (such as a product recall) to be implemented quickly and effectively when something goes wrong. When a potential food safety problem is identified, whether by a food business or a government agency, an effective traceability system can help isolate and prevent contaminated products from reaching consumers.

In Rwanda, this important component in food products value chains as well as in trade especially international trade is not complied with as required. There is need to help business operators by building their capacity in putting in place and operationalize traceability in their respective food production chains. Business operators in different livestock value chains should be trained on different standards covering traceability especially on food receipt and food recall. In addition, training should cover the different component of traceability as well as their different functionalities, the identification of the unit being traced, proper documentation and data recording.

4.10 Establish and Operationalize Residue Monitoring Plans for Animal and Animal Products

Chemical residues including pesticides, antibiotics and heavy metals in food products especially animal products are becoming a global concern and requirement to access some markets. They present a very serious chemical hazard harming the health of consumers. Food producer's especially animal products should take care to monitor these hazards in acceptable ranges. This involves not only putting in place the appropriate plans for the monitoring but also the appropriate and timely implementation of the established plans.

Currently in Rwanda and specifically in the sector of livestock, only honey value chain has a residue monitoring plan. And this made one of the requirements for Rwanda to be listed as third country allowed exporting honey to EU markets. This should be done for other livestock value chains such as meat, dairy, poultry and eggs. It should take into consideration not only the training and coaching of livestock chain operators but also their operationalization for sustainability.

4.11 Upgrade and Strengthen the Slaughter Chain

Slaughter chain includes all processes and operations undertaken for live animals from farm to the abattoir until the safe meat is produced. It involves the identification of the

slaughter animals, the transportation to the abattoir, the ante mortem exam, the slaughtering and the post mortem exam. This requires also the appropriate and adequate infrastructures and facilities such as identification system, the appropriated and equipped waiting areas at abattoirs and the adapted and well equipped abattoirs with the respective cold chains.

Currently in Rwanda there are about twelve modern abattoirs where this chain is tried to be respected. Although Rwanda does not currently export much meat and one of the twelve abattoirs is certified for export, however, there is need to strengthen and upgrade the existing slaughter chain as well as the capacity of the existing abattoirs in terms of infrastructures and facilities so that produced meat can access export market which look like increasing.

4.12 Capacity Building in Apiculture

Beekeeping in Rwanda has made major advances in the last decade. Productivity and production of bees have sharply increased and consequently improved rural incomes. Many beekeepers are lacking skills in honey and honey products production and processing, the training in production mechanisms and processing can lift the beekeepers to next level which will allow them to avail honey and honey products for export either in quality or Quantity. The primary role of P-IMA is to set the capacity building guidelines to improve and sustain the skills development achievement in the line of maximizing the productivity which will further increase sector growth. To facilitate knowledge and skill disbursement amongst producers, the development of training will be crucial for management of apiaries and quality control enhancement at production level. However, trainings are a continuous activity to empower as many as more beekeepers as possible and this can be possible achievable by starting the training of trainers among the beekeepers and technical personnel in order to equip them enough practical knowledge or experience on beekeeping.

4.13 HACCP Certification for Honey Cooperatives/Honey Processing

Many Rwandans honey firms lack adequate skills in quality and food safety management. This in turn limits their ability to export, as international buyers are motivated by consumer concerns, increasingly require potential suppliers to have comprehensive food safety systems in place. One such system is Hazard Analysis and Critical Control Points (HACCP), a management system for the analysis and control of biological, chemical, and physical hazards from the raw material procurement and handling stage through to the manufacturing, distribution and consumption of the final product. The support of P-IMA to honey Cooperatives in HACCP will open up new markets for honey companies by acquiring the equipment needed to comply with the HACCP requirements.

4.14 Capacity Building in GHPs, GVPs, and GMPs for the Dairy Sector

Dairy sector in Rwanda is growing faster with increasing yield. However, this increase in quantity should go hand-in-hand with quality. At the moment, the sector is organized in a way that milk from farmers need to pass through Milk Collection Centres (MCCs) before being sold to consumers for quality test and analysis. The Ministerial Order governing

collection, transportation and selling of milk in Rwanda requires that any person involved in milk business shall possess the following milk quality testing equipment: alcoholmeter, lacto-densimeter, thermometer, antibiotic residue test kit and mastitis test kit. That is, this should be done at every chain point including the farm level. Unfortunately, this capacity is not yet available everywhere and for everybody.

In addition to these quality tests and analysis, milk is a highly perishable product which needs to be handled carefully in very high hygienic conditions along its value chain to avoid the contamination with harmful micro-organisms. It is therefore understood that capacity building in Good Hygienic Practices (GHPs), Good Veterinary Practices (GVPs), and Good Manufacturing Practices (GMPs) are highly needed. With this P-IMA process, it is expected that capacity would be built among dairy value chain actors to increase both quantity and quality of Rwandan milk. Dairy value chain actors should not only be trained on GHP, GVP and GMP but also equipped with adequate equipment for milk quality test and analysis.

4.15 Excluded or Merged CBOs

The following capacity building options that were originally identified have either been excluded with their stated reasons or merged with other capacity building option:

	CBO	Reason
1	Aflatoxin control and management in soya beans	This is not a major concern
2	Pest management for rice	This is a minor export product. In fact, Rwanda is a huge net importer of rice
3	Aflatoxin control and management for wheat	This is a minor export product. In fact, Rwanda is a huge net importer of wheat
4	Develop IPM for FCM (FCM resistance variety)	Merged into “Develop Pest Control Mechanism for Pest and Diseases Surveillance”
5	Pest surveillance (e.g. FCM, Thrips & FAW)	Merged into “Develop Pest Control Mechanism for Pest and Diseases Surveillance”
6	Control measures for Maize Lethal Necrosis Disease	This is not a big export issue
7	Capacity Building in GVP, GHP and GMP for Livestock sector	It was thought that the gap is in structured animal disease surveillance system
8	Strengthen regulatory framework for animal and animal products	This is a regulatory issue that is already under consideration
9	Accreditation of honey testing Lab	This is not a major concern

10	Capacity building in GHP, GVP, and GMP, incl. Mobile Abattoir for the Poultry sector	This was dropped because it's not a major concern

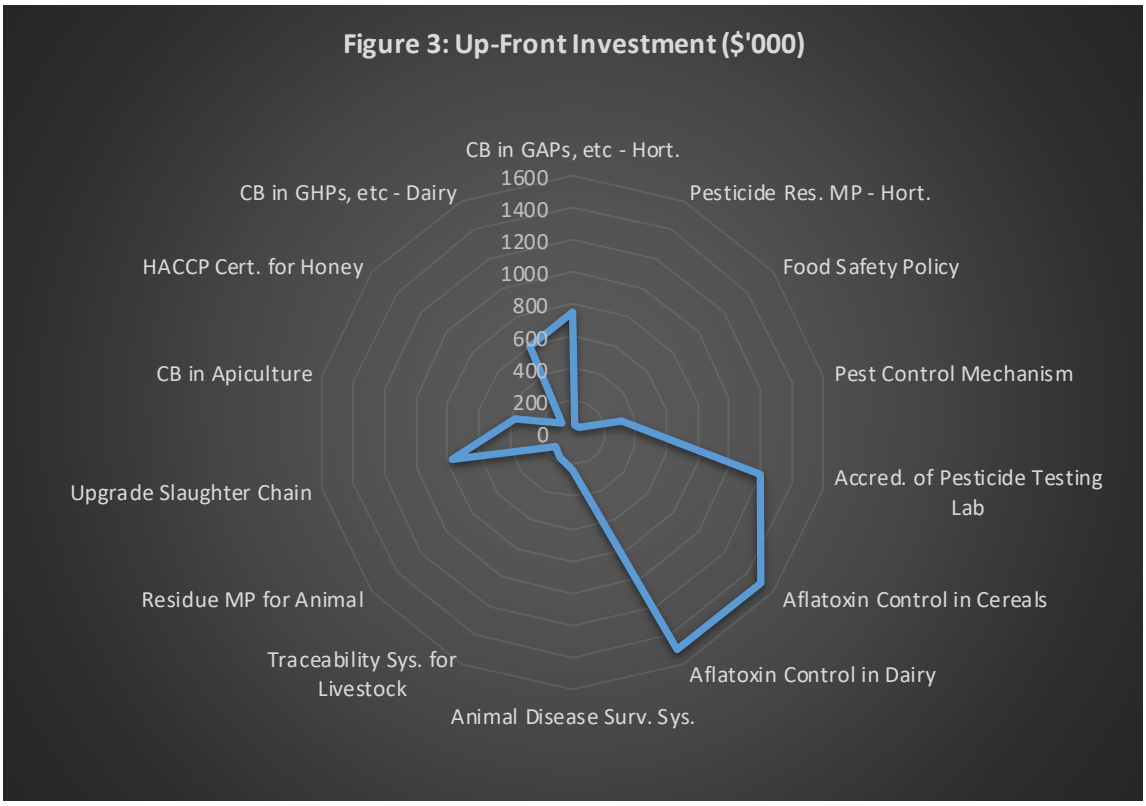
5.0 Results

Overall, the study estimated a total cost of approximately US$9 million needed to implement all the fourteen (14) capacity building options, which is estimated to generate about US$255.5 million worth of additional exports (See table 4 below). Figures 3-5 presents a quick overview of the relative strengths and weaknesses of the capacity building options against the decision criteria upfront investment, on-going cost, and change in the absolute value of exports. The relative strengths and weaknesses of the decision criteria measured using non-linear data, i.e. difficulty of implementation, export diversification, international reputation, agricultural productivity, public health and environment, poverty impact, and vulnerable groups, has not been presented here as the spider diagrams do not show striking differences for easy visual comparisons.

Figure 3, which depicts the relative strengths and weaknesses of the fourteen CBOs against the decision criteria "up-front investment" shows that the options related to aflatoxin controls (at $1.5 million each) and accreditation of pesticide testing laboratory (at $1.2 million) are more expensive and therefore are weaker in comparison with other CBOs. On the other hand, pesticides residues monitoring plan for horticulture products, development of food safety policy and legislation for plants and livestock products, and HACCP certification for Honey cooperatives and honey processers tend to be relatively cheaper, at $45,000, $50,000, and $92,000, respectively, and thus would pose stronger in terms of pairwise comparison.

Table 4: Sectoral Breakdown of Costs of Investments and Potential Trade

Sector	Cost of Implementation	Change in absolute value of exports
Horticulture	2,870,000	38,500,000
Livestocks Incl. Dairy & Honey	4,587,000	202,400,000
Cereals	1,500,000	14,600,000
Cross-Cutting	50,000	-
Total	**9,007,000**	**255,500,000**



In figure 4, the capacity building in Good Agriculture Practices (GAPs), pre & post-harvest management, Good Hygiene Practices (GHPs), and Good Manufacturing Practices (GMPs) for Horticulture Crops; and the capacity building in apiculture have the highest on-going costs at $300,000 each, followed by accreditation of pesticide testing laboratory at $161,000 and establishment of a structured animal disease surveillance system at $125,000.

In terms of impact on exports, figure 5 shows that the options with the strongest potential are capacity building in apiculture at $56 million and HACCP certification for Honey cooperatives and honey processers at $42 million. This notwithstanding, the basis of these figures require further investigation, as the highest exports of honey and honey products from Rwanda over 2014-2018 has never exceeded $61,000. Generally, most options also have relatively strong potentials in generating exports ranging from $5 million to $27 million, except the options related to food safety policy and accreditation of pesticide testing laboratory, which are expected to generate no immediate impact on trade in the five years period.

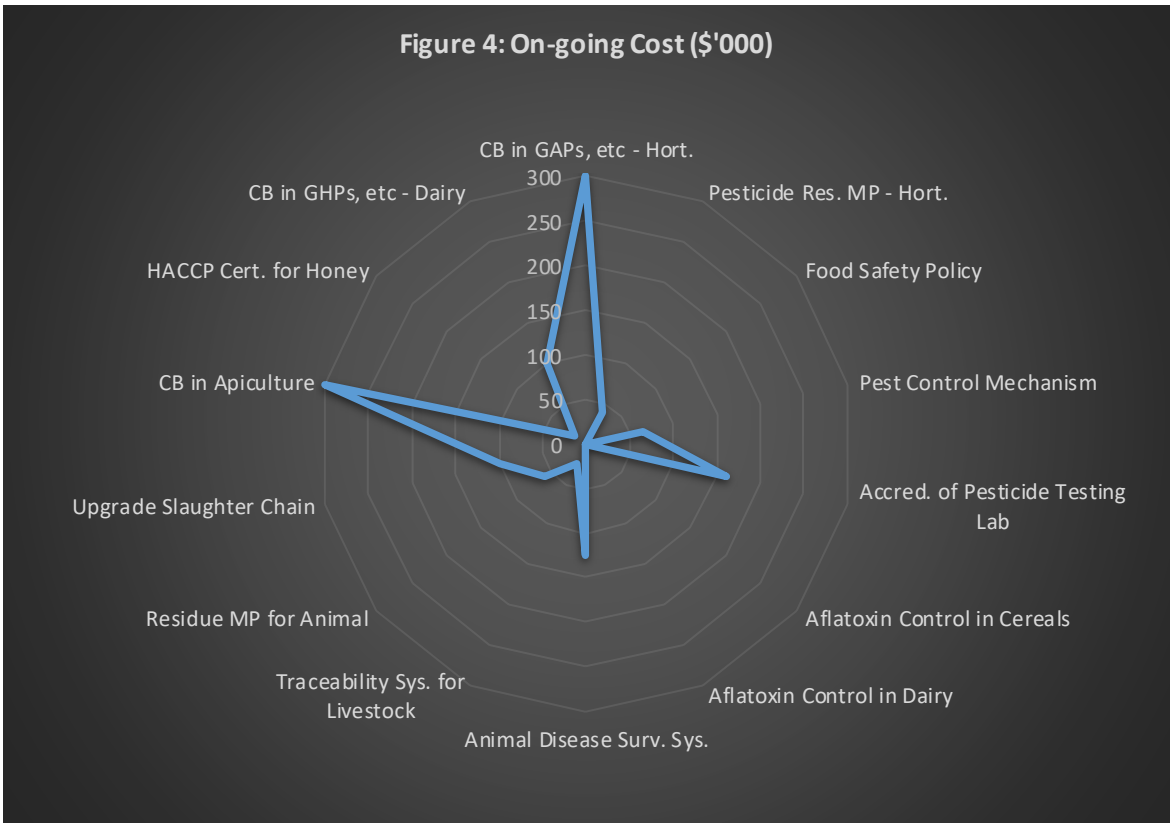


Figure 4: On-going Cost ($'000)
CB in GAPs, etc - Hort.
Pesticide Res. MP - Hort.
Food Safety Policy
Pest Control Mechanism
Accred. of Pesticide Testing Lab
Aflatoxin Control in Cereals
Aflatoxin Control in Dairy
Animal Disease Surv. Sys.
Traceability Sys. for Livestock
Residue MP for Animal
Upgrade Slaughter Chain
CB in Apiculture
HACCP Cert. for Honey
CB in GHPs, etc - Dairy
300
250
200
150
100
50
0

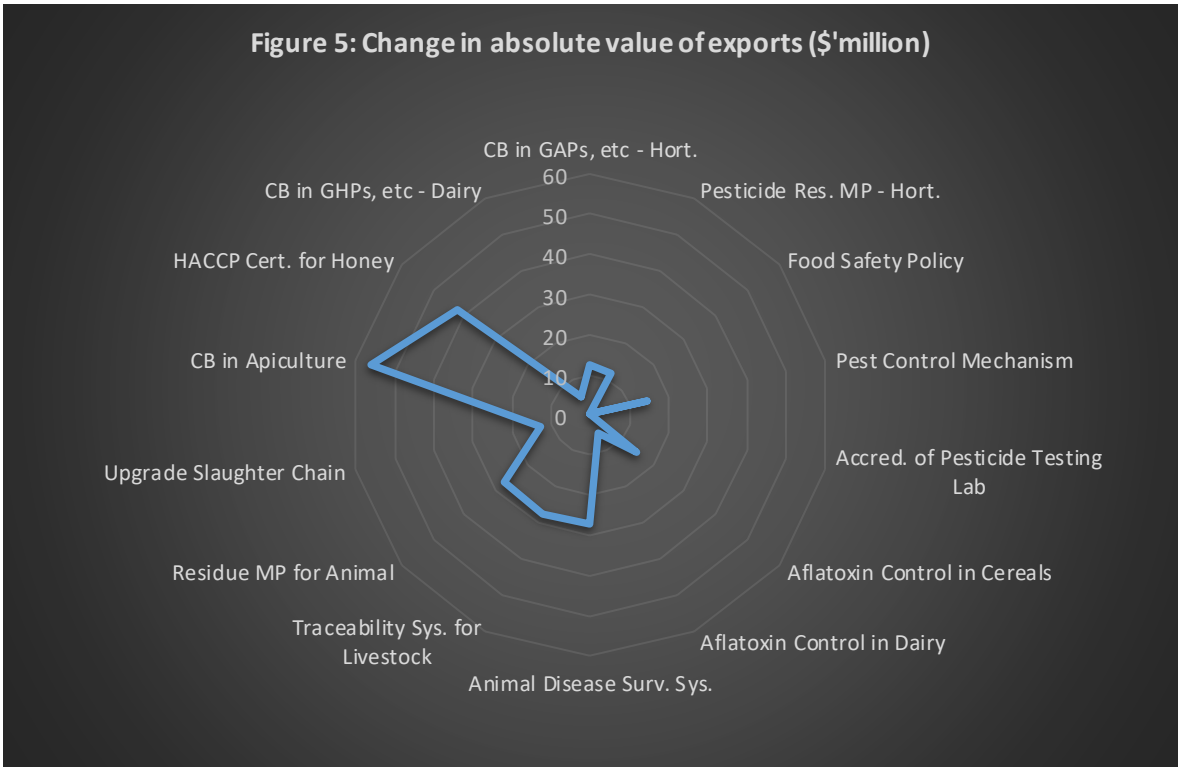


Figure 5: Change in absolute value of exports ($'million)
CB in GAPs, etc - Hort.
Pesticide Res. MP - Hort.
Food Safety Policy
Pest Control Mechanism
Accred. of Pesticide Testing Lab
Aflatoxin Control in Cereals
Aflatoxin Control in Dairy
Animal Disease Surv. Sys.
Traceability Sys. for Livestock
Residue MP for Animal
Upgrade Slaughter Chain
CB in Apiculture
HACCP Cert. for Honey
CB in GHPs, etc - Dairy
60
50
40
30
20
10
0

Figures 6-8 presents the results of the prioritization framework using outranking in the D-Sight software package using the decision criteria and weights agreed by stakeholders. Figure 6 is the main result. This shows that HACCP certification for Honey cooperatives and honey processers, capacity building in apiculture, and establishing and operationalizing Residue Monitoring Plans for animal and animal products are top three ranked capacity building options while accreditation of pesticide testing laboratory at Rwanda Standards Board (RSB), upgrade and strengthen the slaughter chain, and aflatoxin control and management in dairy products rank the lowest. That's, the top ranked options would bring the best benefits across trade, productivity and social impacts than the lower ranked ones. It should, however, be noted that because an option ranked low does not imply that it's not important for implementation, but rather, it simply shows that, in terms of priority setting, based on assigned costs and flow of benefits, a lower ranked option is not the best option to be implemented now given limited resources.

Figure 7 explains the contribution of each decision criteria towards the overall performance of a capacity building option. In effect, it is noticeable that the top ranked options have greater contribution from almost all decision criteria than lower ranked options. For instance, you would see that the capacity building options related to aflatoxin control and management had very minimal contribution from up-front investment because they are the most expensive options. Similarly, the top two options on honey and apiculture, respectively, had higher contributions from change in absolute value of exports (around 11%) than any other capacity building option because these two had higher estimated impacts on trade.

Figure 6: Ranking of CBOs Using Baseline Model

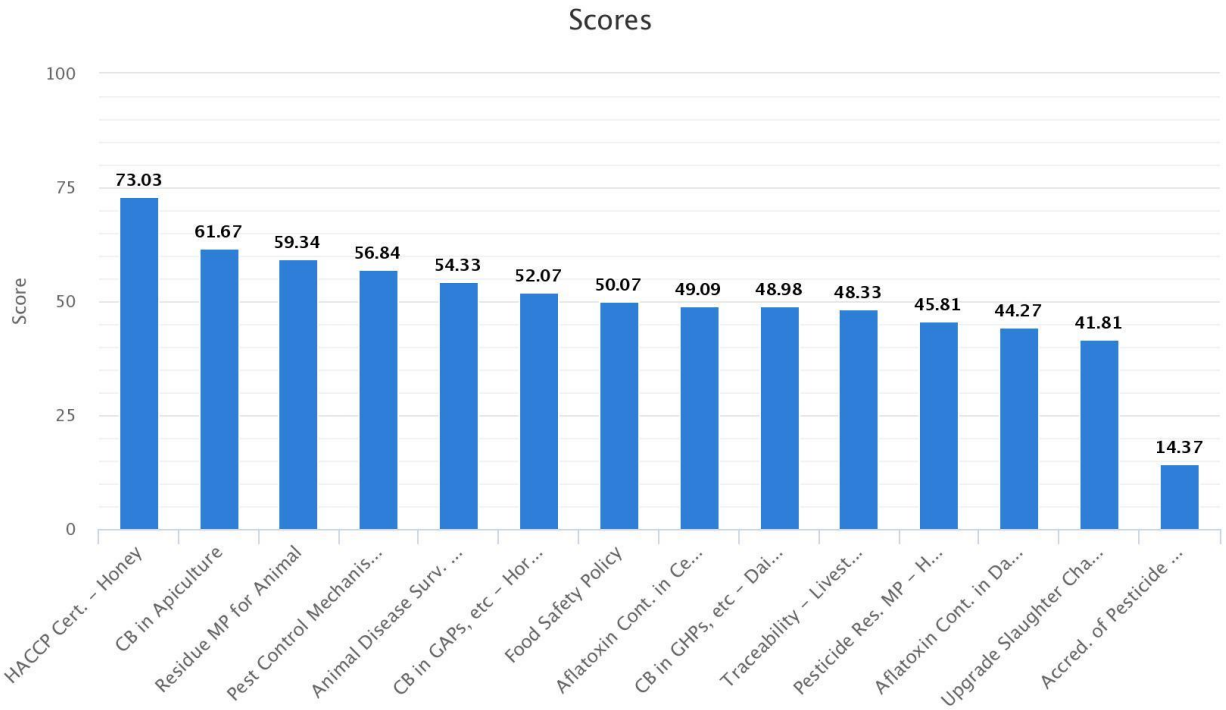
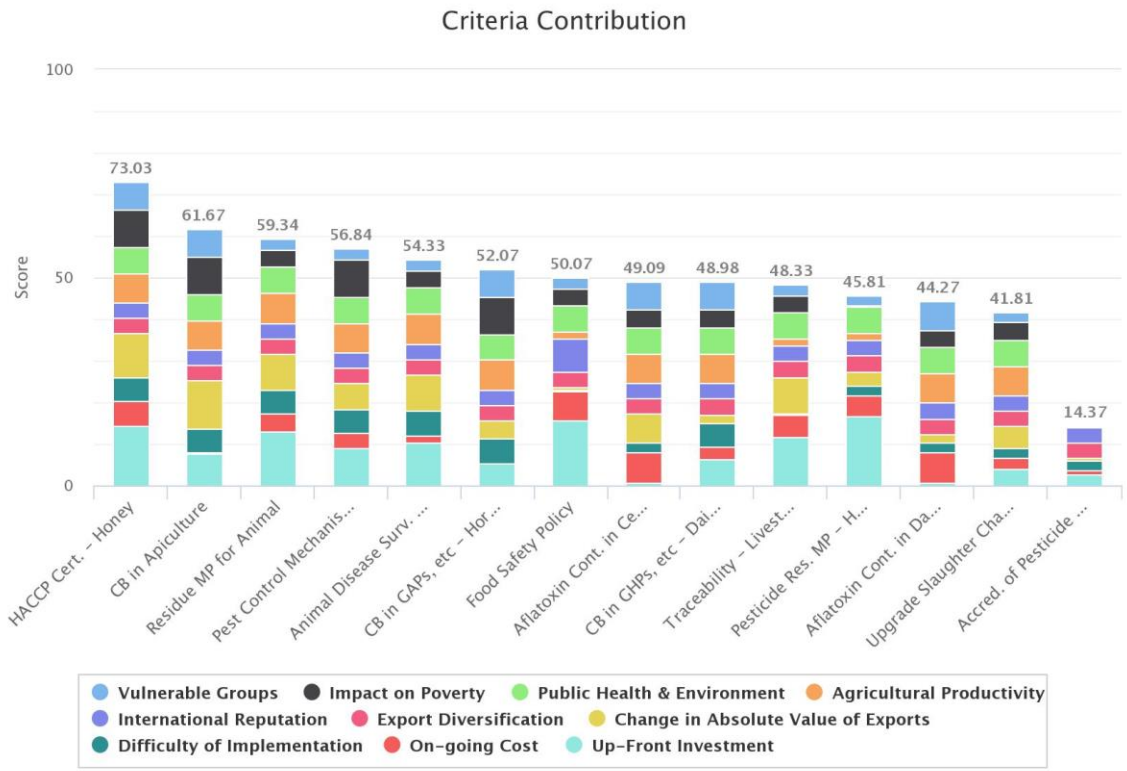


Figure 7: Criteria Contribution of Baseline Model Ranking



To test the robustness of the above result, two sensitive analyses were performed by setting the weights equal and running a cost and trade impact only model but using the baseline model relative weights. The results are shown in Figures 8 and 9 below, respectively.

In the equal weights scenario, the top four ranked options in the main results remained the same; so also the lowest ranked option, accreditation of pesticide testing laboratory at RSB. There is however, observable movements between the 5th to 13th positions. For instance, the development of Food Safety Policy and Legislation on plants and livestock products had moved from its seventh position in the main result to tenth place in this model.

There's, however, some more drastic changes in the cost and trade model, although the top one and the bottom one still remains in their original positions as in the previous two scenarios. The most dramatic movements are the capacity building in apiculture and the development of pest control mechanism for pest and diseases surveillance from their usual second and fourth top positions to seventh and eighth positions, respectively. Similarly, the capacity buildings in traceability system for livestock and livestock products, and pesticides residues monitoring plan for horticulture products have moved from the bottom-five to the top-five.

Figure 8: Ranking of CBOs Using Equal Weights with Criteria Contribution

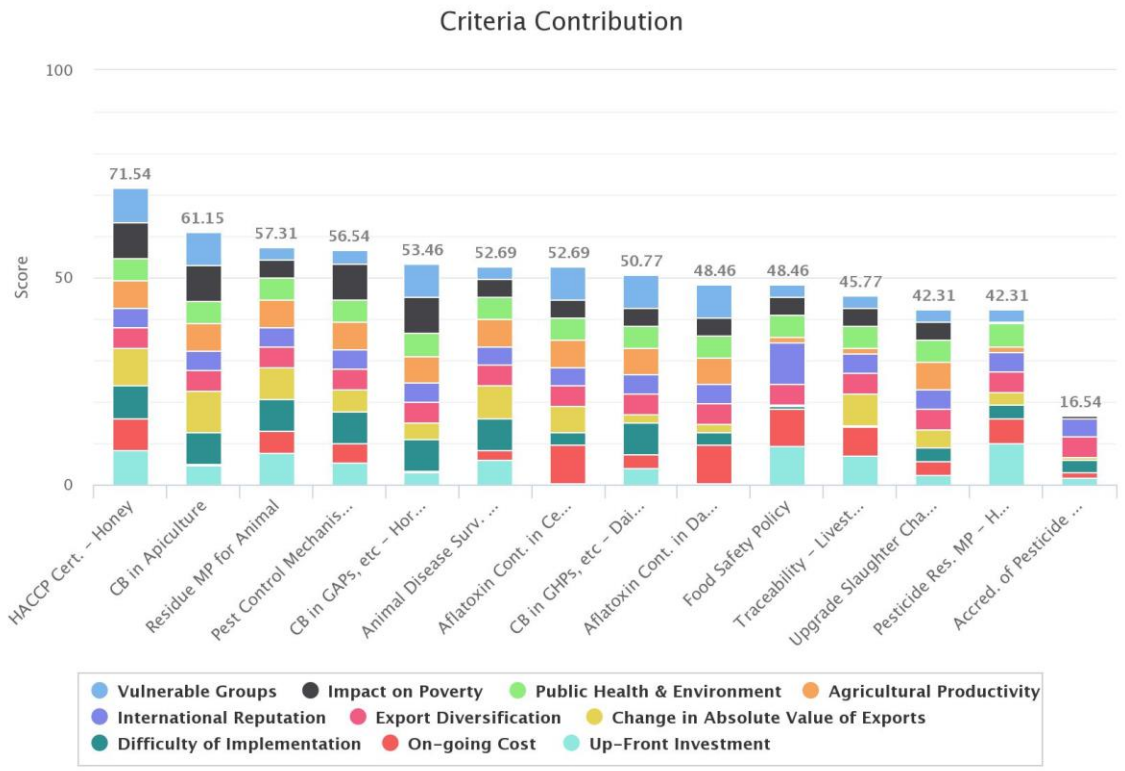
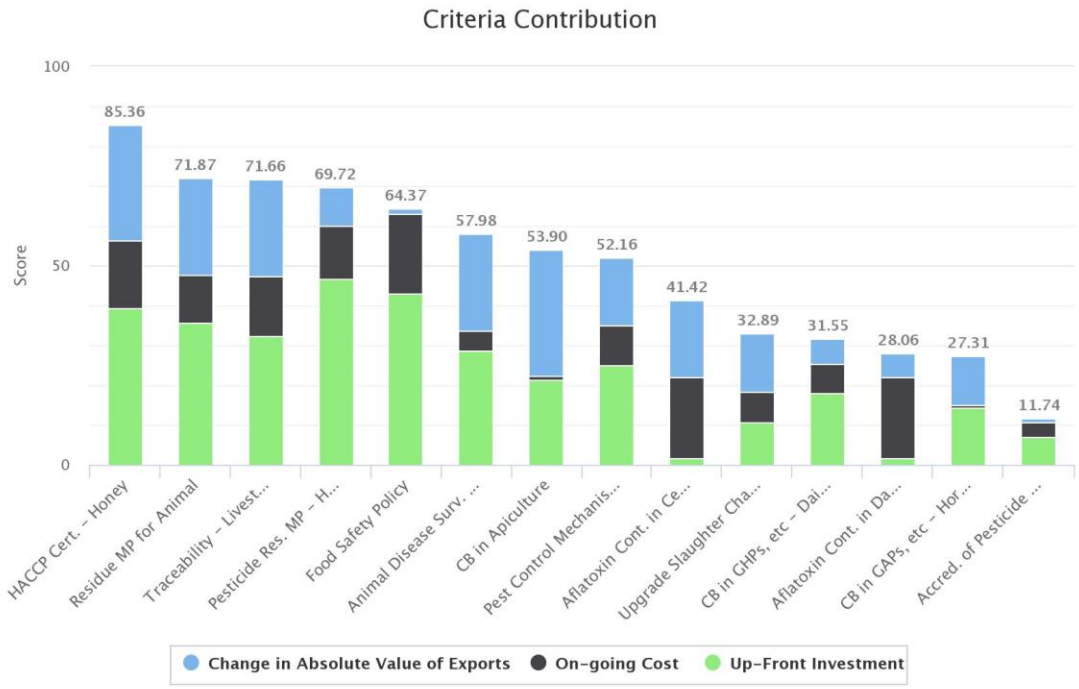


Figure 9: Ranking of CBOs Using Cost and Trade Model with Criteria Contribution



Now, due to the observed flaws in the estimation of the trade (change in absolute value of exports) data for honey and apiculture, at $42 million and $56 million, respectively, a third sensitivity analysis was performed assuming a zero change in the absolute value of exports for these two options, to see if these trade figures really matter. The result is shown in figure 10. Interestingly, the result is fairly and largely similar to the baseline and equal weights model. Apart from the capacity building in apiculture jumping to sixth place, similar to the cost and trade only scenario, almost all options remained in their top or bottom half as was in the main result and the equal weights model.

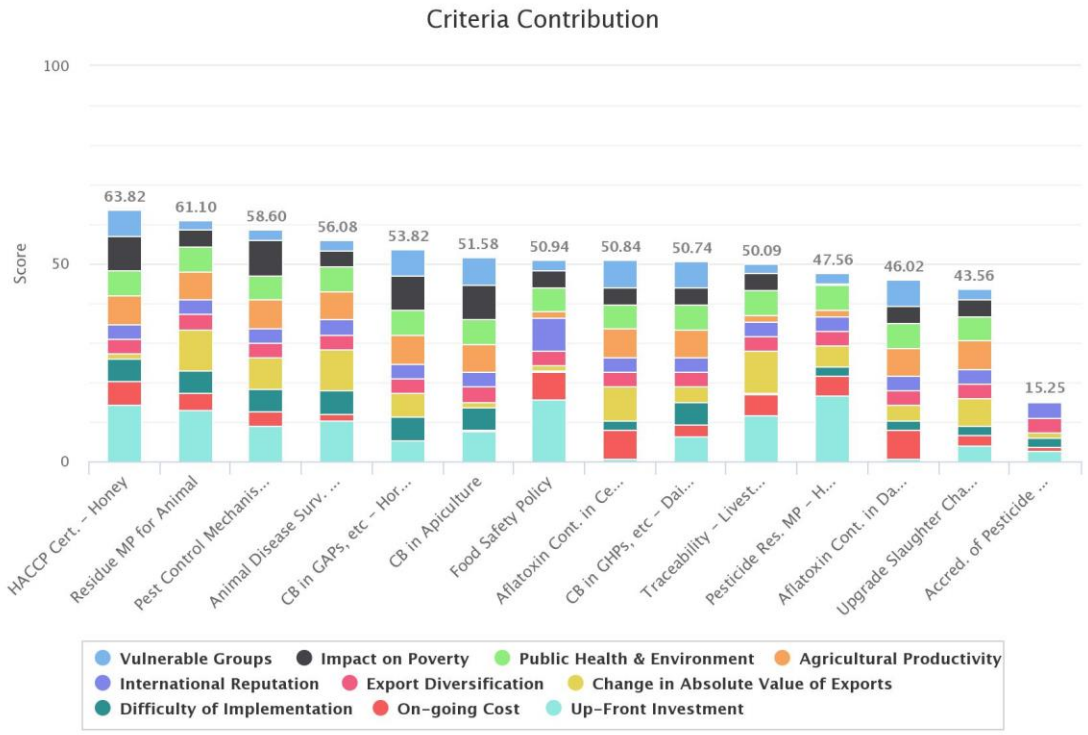
Thus, despite these sensitivities, HACCP certification for honey cooperatives and honey processers remains robust at top first, while accreditation of pesticide testing laboratory at RSB remained consistently at the bottom. We can, therefore, safely say that the following options are more desirable as first best choices, particularly if trade considerations are not the sole goal, as the case really is:

- HACCP certification for Honey cooperatives and honey processers,
- capacity building in apiculture;
- establish and operationalize Residue Monitoring Plans for animal and animal products; and
- the development of pest control mechanism for pest and diseases surveillance

While the following are less desirable as first choices:

- accreditation of pesticide testing laboratory at RSB
- upgrade and strengthen the slaughter chain,
- pesticides residues monitoring plan for horticulture products, and to some extent
- aflatoxin control and management in dairy products

Figure 10: Ranking of CBOs with Zero Trade Impact for Options Related to Honey and Apiculture



6.0 Conclusion

At the outset, it must be noted that the results from this framework are based on the availability and quality of data. As such, the results must be revised in an on-going basis once a better data becomes available. In this regard, as part of the COMESA P-IMA project, a minimum of 8 persons were trained as P-IMA National Experts to assist in subsequent revision/re-application of the framework.

This report presents the outcomes of 14 SPS capacity building options that were ranked based on a structured process of identifying the SPS capacity building options that are relevant for market access, prior agreed objectives (called decision criteria), and agreed weights assigned to the decision criteria. The actual priority setting was carried out using Multi-Criteria Decision Analysis (MCDA) in the D-Sight software package. In all, a total of approximately US$9 million is required to implement all the 14 CBOs whose estimated trade impact could be US$255.5 million. The following are, however, the options that consistently ranked above the others and therefore are desirable as first choice options:

- HACCP certification for Honey cooperatives and honey processers,
- capacity building in apiculture;
- establish and operationalize Residue Monitoring Plans for animal and animal products; and
- the development of pest control mechanism for pest and diseases surveillance

While the following consistently ranked low and should be considered for implementation only after the first best options:

- accreditation of pesticide testing laboratory at RSB
- upgrade and strengthen the slaughter chain,
- pesticides residues monitoring plan for horticulture products, and to some extent
- aflatoxin control and management in dairy products

It must however be noted that the ranking of certain capacity building options low does not presuppose that they are not important. Rather, it simply meant that, based on agreed objectives and limited resources availability, they do not come as first priorities. With time and availability of resources, all these capacity building needs must be resolved. It is also important to remember that this document is a 'living document', thus, it must be revised regularly, particularly, once a new data and/or a better data becomes available.

Annex 1; Rwandan agri-food exports and attendant SPS requirements **(average annual exports between 2009 and 2018)**

Category	Average Annual Exports (US$'000)	Proportion of Total SPS Sensitive Exports (%)	Sensitivity				
			Plant Health	Animal Health	Food Safety	Environmental standards	Private standards
01 Live animals	4,949.60	2.56%		XXX		X	
02 Meat and edible meat offal	36.22	0.02%		XXX		X	
03 Fish, crustaceans, molluscs, aquatic invertebrates, nes*	858.60	0.44%		XXX	XXX	XXX	XX
04 Dairy products, eggs, honey, edible animal product, nes	1,713.10	0.89%		XX	XX	X	XXX
05 Products of animal origin, nes	44.38	0.02%		X		XX	
06 Live trees, plants, bulbs, roots, cut flowers etc	625.30	0.32%	XX			XX	
07 Edible vegetables and certain roots and tubers	3,583.70	1.86%	XX				XXX
08 Edible fruit, nuts, peel of citrus fruit, melons	378.50	0.20%	XXX				XXX
09 Coffee, tea, mate and spices	121,716.70	63.01%	X		X	X	XXX
10 Cereals	8,327.20	4.31%	XX		XX	X	
11 Milling products, malt, starches, inulin, wheat gluten	14,432.40	7.47%	X		XX		
12 Oil seed, oleagic fruits, grain, seed, fruit, etc, nes	1,711.60	0.89%	XXX		XX		XXX
13 Lac, gums, resins, vegetable saps and extracts ne	1,720.30	0.89%			XXX		XXX
14 Vegetable plaiting materials, vegetable products, nes	0.50	0.00%	X			X	
15 Animal, vegetable fats and oils, cleavage products, etc	6,940.90	3.59%			XX		
16 Meat, fish and seafood food preparations, nes	820.25	0.42%		X	XXX	X	XXX
17 Sugars and sugar confectionery	2,087.90	1.08%			X	X	
18 Cocoa and cocoa preparations	53.63	0.03%			X	X	
19 Cereal, flour, starch, milk preparations and products	1,648.60	0.85%			X		
20 Vegetable, fruit, nut, etc. Food preparations	499.70	0.26%			XX		XX
21 Miscellaneous edible preparations	1,407.20	0.73%			X		
22 Beverages, spirits and vinegar	6,089.90	3.15%			X		
23 Residues, wastes of food industry, animal fodder	2,748.00	1.42%	XX	XX		X	
24 Tobacco and manufactured tobacco substitutes	154.00	0.08%			X		
41 Raw hides and skins (other than furskins) and leather	8,630.10	4.47%		XX		X	
44 Wood and articles of wood, wood charcoal	259.20	0.13%	X				X
46 Manufactures of plaiting material, basketwork, etc.	299.00	0.15%	X				
47 Pulp of wood, fibrous cellulosic material, waste, etc.	16.20	0.01%			X	XX	X
48 Paper & paperboard, articles of pulp, paper and board	1,168.80	0.61%			X	XX	
50 Silk	3.50	0.00%		X			

51 Wool, animal hair, horsehair yarn and fabric thereof	15.00	0.01%	X		
52 Cotton	221.30	0.11%		X	X
53 Vegetable textile fibres nes, paper yarn, woven fabric	5.13	0.00%			
TOTAL	193,166.40				

Source: Trademap.org

Annex 2: 2012 Versus 2020 Capacity Building Options (CBOs)

2012 CBOs	2020 CBOs
Training in field crop good agricultural practices to agronomists / post harvest extension persons and extension to farmers (maize, groundnuts, wheat, rice, cassava for flour) with an additional variant which includes the development and registration of aflatoxin biocontrol remedies	Capacity Building in GAPs, Pre & Post-Harvest Management, GHPs, & GMPs for Horticulture Crops
Develop a national registered pesticide list and update it according to requirements for the international markets in terms of permitted agrochemicals and maximum residue limits (MRL's)	Pesticides Residues Monitoring Plan for Horticulture Products
Development and provision of certified mycotoxin testing services in Rwanda	Develop Food Safety Policy and Legislation on Plants and Livestock Products
Provision of drying facilities and accompanying systems and equipment for reducing crop moisture (pulses, cereals, groundnuts, coffee)	Develop Pest Control Mechanism for Pest and Diseases Surveillance
Development and provision of certified pesticide residue testing services in Rwanda	Accreditation of Pesticide Testing Lab at RSB
Developing a Hazard Analysis and Critical Control Points (HACCP) based systems approach to the production and/or procurement of cassava, wheat and maize flour for a private sector company	Aflatoxin Control and Management in Cereals
Development of a simple field method for the detection of potato flavor coffee beans at the green or blue bean stages	Aflatoxin Control and Management in Dairy Products
Meat exports compliance to importing country standards including disease diagnosis and surveillance as well as good management and hygiene practices through the development of human capacity at export abattoirs (Congo-Brazzaville)	Establish a Structured Animal Disease Surveillance System
Certified testing of mineral water and juices to required standards for export markets	Capacity Building in Traceability System for Livestock and Livestock Products
Developing capacity in Rwanda for third party certification (e.g. organic, fair trade, Rainforest Alliance,)	Establish and Operationalise Residue Monitoring Plans for Animal and Animal Products
	Upgrade and Strengthen the Slaughter Chain
	Capacity Building in Apiculture
	HACCP Certification for Honey Cooperatives/Honey Processing
	Capacity Building in GHPs, GVPs, and GMPs for the Dairy Sector

Annex 3: Capacity Building Options (CBOs) Information Cards

1. Capacity Building in GAPs, Pre & Post-Harvest Management, GHPs, & GMPs for Horticulture Crops

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$750,000	Training TOT for 10 inspectors and 10 stakeholders on GAPs, Pre & Post-harvest Management, GHPs, & GMPs for Horticulture crops $150,000($500 per district for 30 districts)	low
On-going cost	$300,000	M&E (5per region for regions at $250 per Month for 5 years)	Medium
Difficulty of Implementation	1	Easy - Involves only training	High
Trade Impacts			
Change in absolute value of exports	$12.5 million	Export of selected horticulture products [French beans, chilies, avocado, passion fruit, banana, flowers, macadamia, eggplant, pineapple] in 2018 stand at $6.7 million. This intervention is expected to improve the quality of produce for export and increase volume of export by 20% worth $2.5 million per year. Thus in 5 years we can realise $12.5 million export value.	High
Export Diversification	1	Yes - Access to new markets, develop new products	High
International Reputation	1	Yes - Complying with SPS and other market requirements	High
Domestic Spillovers			
Agricultural productivity	2	reduced post-harvest loses	High
Public health & environment	2	Comply food safety requirements	High
Impact on poverty	2	Boosting small farmer incomes	High

Vulnerable Groups[8]	2	Increased employment, income and nutrition	High

2. Pesticides Residues Monitoring Plan for Horticulture Products

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$45,000	Consultancy - $30,000 (assessment of the gaps and drafting the monitoring plan) Consultative process $15,000	Medium
On-going cost	$40,000	On-going survey and collection of samples =$20,000; Testing of samples (10 commodities [French beans, chilies, avocado, passion fruit, banana, flowers, macadamia, eggplant, pineapple] @ $197 per sample, 2 times a year for 5 years) = $20,000	Medium
Difficulty of Implementation	-1	Requires heavy investment and time and accreditation	Low
Trade Impacts			
Change in absolute value of exports	11.5 million	This is a compliance requirement of the EU market for French beans, chilies/pepper and avocado. The current export level of these products stands at $4 million. We expect 8% annual growth in output of these products which is worth $2.3 million yearly. We can therefore save an export loss of $11.5 million in 5 years.	Medium
Export Diversification	1	Yes - Maintain existing and access to new EU markets	High
International Reputation	1	Yes - Comply food safety requirements	High
Domestic Spillovers			
Agricultural productivity	1	This would increase productivity and hence 8% growth in output	Medium
Public health & environment	2	Consumers' protection improved	High
Impact on poverty	0	No impact	High
Vulnerable Groups	1	Safe food	Medium

[8] Definition of vulnerable groups: women, Youth, underage, people with disability, the elderly, the sick, etc.

3. Develop Food Safety Policy and Legislation on Plants and Livestock Products

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$50,000	Consultancy - $30,000 (assessment of the gaps and review existing drafted policy) Consultative process $15,000 Validation process $5,000	Medium
On-going cost	$0	No on-going cost	
Difficulty of Implementation	-2	It involves the corporation of multiple stakeholders	
Trade Impacts			
Change in absolute value of exports	$0	It might take about 3 years to develop and rollout a Food Safety Policy and thereby limiting any impact in 5 years. Additionally, a mere development of a food safety policy would not have any direct impact on output unless implemented	medium
Export Diversification	1	Diversified export commodities and markets	High
International Reputation	2	Compliance with food safety issues	High
Domestic Spillovers			
Agricultural productivity	1	Safe use of agri-inputs and best practices	Medium
Public health & environment	2	Compliance with food safety requirement	High
Impact on poverty	1	Ensures access to safe food	Medium
Vulnerable Groups	1	Ensures access to safe food	Medium

4. Develop Pest Control Mechanism for Pest and Diseases Surveillance in Horticulture

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$310,000	Training and awareness creation in pests identification, pest management for farmers, inspectors extension, exporters, PSF and Researchers $150,000 (Develop training materials, manuals, brochure posters, radio spots, workshops); Pest Surveillance (pest detection & monitoring) twice a year (for identified exporting areas) $50,000; Publish up dated national pest list to trade partners $10,000 for validating workshops; pest detecting equipment at exit/entry points $100,000	High
On-going cost	$64,000	-Consultancy and surveillance	High
Difficulty of Implementation	1	Not difficult - Human resource available, only budget limitation may be an issue	High
Trade Impacts			
Change in absolute value of exports	$14.5 million	Export of selected horticulture products [French beans, chillies, avocado, passion fruit, banana, flowers, macadamia, eggplant, pineapple] in 2018 stand at $6.7 million. This intervention is expected to improve the quality of produce for export and increase volume of export by 20% worth $2.5 million per year. Thus in 5 years we can realise $12.5 million export value. Also, 17 Interceptions at EU Market 11140kgs of chilli/Capsicum worth 21,166,000 RWF = $23,000 average per year due to pests can be saved, i.e. $2 million ($23,000x17x5). So we can expect a total impact for this intervention to be $14.5 million	
Export Diversification	1	Access to new markets ,expand horticulture products range	
International Reputation	1	???	
Domestic Spillovers			

Agricultural productivity	2	Boosting agricultural Production with high quality	High
Public health & environment	2	Conservation of biodiversity community	High
Impact on poverty	2	Boosting small farmer and exporters' income	High
Vulnerable Groups	1	Increased employment and income	Medium

5. Accreditation of Pesticide Testing Lab at RSB

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$1.2 million	$880,851.06 Equipment (at NAEB), $150,000 accreditation, training and coaching (at NAEB/RSB), $15,000 Proficiency Test scheme,	High
On-going cost	$161,000	Coaching, reagents	High
Difficulty of Implementation	-1	Difficult – skills, cost, training, etc.	Medium
Trade Impacts			
Change in absolute value of exports	$0	No direct impact. Tests already happen elsewhere and accreditation would only save testing costs and turnaround time	High
Export Diversification	1	Yes - Access to new markets	High
International Reputation	1	Yes - Improved competitiveness	High
Domestic Spillovers			
Agricultural productivity	0	Not applicable	Low
Public health & environment	1	Increase in consumers' confidence	Medium
Impact on poverty	0	Not applicable	Medium
Vulnerable Groups	0	Not applicable	Low

6. Aflatoxin Control and Management in Cereals

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$1.5 million	Training and awareness creation on aflatoxin control and storage best practices for government and Private sector $150,000 (Develop training materials, manuals, brochures, posters, radio and TV spots and workshops); Aflatoxin testing kits, Moisture meters and strips and reagents $150,000	High
On-going cost	$0	No on-going cost	
Difficulty of Implementation	-1	a bit difficult to do due to the number and complexity of stakeholders involved	High
Trade Impacts			
Change in absolute value of exports	$14.6 million	Rwanda exported about $73 million worth of Cereals mainly rice (99.7%), and primary cereal products (wheat flour 70% and cereal flour (23%) in 2018, of which over 97% went to the DRC. Aflatoxin is less prevalent in rice and wheat. Also, the DRC market is less stringent on compliance. Maize and sorghum, which shows some export potential have underlying food security and production challenges. Therefore, this intervention may not unleash so much export change in 5 years. Although, export of cereals has been growing at 23% p.a. from 2014-2018, this may have nothing to do with aflatoxin. We however project a conservative overall 20% increase in 5 years, which stands at $14.6 million	Medium
Export Diversification	1	Composite flours, maize seed, dairy products	High
International Reputation	1	Compliance for Food Safety Standards	High

Domestic Spillovers			
Agricultural productivity	2	GAPs usually ensures better yield, backward linkage with better market access	High
Public health & environment	2	Consumers' protection improved	High
Impact on poverty	1	Access to better prices e.g. with Africa Improved Foods and hence better income. Reduced Post-harvest losses.	High
Vulnerable Groups	2	Reduced transfer to underage & breastfeeding mothers	High

7. Aflatoxin Control and Management in Dairy Products

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$1.5 Million	- Training and awareness creation on aflatoxin control and storage best practices for government and Private sector $150,000 (Develop training materials, manuals, brochures, posters, radio and TV spots and workshops) -Aflatoxin testing kits, Moisture meters and strips and reagents $150,000	High
On-going cost	$0	No on-going cost	
Difficulty of Implementation	-1	Difficult	High
Trade Impacts			
Change in absolute value of exports	$5 million	ITC export potential map estimated untapped export potential for dairy at about $1 million year.	Medium
Export Diversification	1	Yes - Composite flours, maize seed, dairy products	High
International Reputation	1	Yes - Compliance for Food Safety Standards	High
Domestic Spillovers			
Agricultural productivity	2	GAPs usually ensures better yield, backward linkage with better market access	High

Public health & environment	2	Consumers' protection improved	High
Impact on poverty	1	Access to better prices e.g. with Africa Improved Foods and hence better income. Reduced Post-harvest losses.	High
Vulnerable Groups	2	Reduced transfer to underage & breastfeeding mothers	High

8. Establish a Structured Animal Disease Surveillance System

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$230,000	Design of system (consultant - $30,000 & consultative meetings $20,000) - $50,000 Training (farmers, Vets) - $150,000 (based on Dairy estimates) Test the system [Active animal disease Surveillance (sampling and testing, data collection)] - $30,000	High
On-going cost	$125,000	Monitoring of the system - $25,000/year for 5 years)	High
Difficulty of Implementation	1	Not difficult - There are already the personnel, one budget is available, the system is established and implemented	High
Trade Impacts			
Change in absolute value of exports	$27.2 million	ITC estimates untapped export potential of hides and skins as $20.7 million and live animals excluding poultry as $1.5 million. Rwanda exports virtually no live poultry and poultry meat and meat from other animals in the past except about approximately $1 million in 2018. So we can assume that the impact of this intervention would be $22.2 million plus safeguarding the current $1 million yearly.	High
Export Diversification	1	Yes - Diversification and Value addition	Medium
International Reputation	1	Yes - Compliance to market requirements	High
Domestic Spillovers			

Agricultural productivity	2	The strengthened surveillance system will reduce losses on the farmers	High
Public health & environment	2	A Strong surveillance system will eliminate some zoonotic diseases	Medium
Impact on poverty	1	Impact on the communities in livestock production due to more trade openness	Medium
Vulnerable Groups	1	Improvement in social economic status, nutrition, etc	Medium

9. Capacity Building in Traceability System for Livestock and Livestock Products

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$170,000*	Training – $150,000 Provision of identification and tracking system (labelling and record keeping) – $20,000 (take care of consultative process to agree on the system) Equipment =$* Assumption: a strong legal framework is in place for this requirement	Medium
On-going cost	$25,000	Monitoring of the system - $5000/year for 5 years	High
Difficulty of Implementation	-2	Gap skills among of operators, logistics, tools	High
Trade Impacts			
Change in absolute value of exports	$27.2 million	ITC estimates untapped export potential of hides and skins as $20.7 million and live animals excluding poultry as $1.5 million. Rwanda exports virtually no live poultry and poultry meat and meat from other animals in the past except about approximately $1 million in 2018. So we can assume that the impact of this intervention would be $22.2 million plus safeguarding the current $1 million yearly.	High
Export Diversification	1	Yes – due to???	
International Reputation	1	Increase in confidence to trading partners entailing increased trade openness	High

Domestic Spillovers			
Agricultural productivity	1	Not clear/ but indirectly as the market demand increases	Low
Public health & environment	2	Identification and product recall, increase of consumers' confidence	High
Impact on poverty	1	Some people will be hired/ engaged to implement the systems	Low
Vulnerable Groups	1	Not clear	Low

10. Establish and Operationalize Residue Monitoring Plans for Animal and Animal Products

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$135,000	3 Consultancies (Dairy, Poultry, & meat) = $90,000 Consultative process (15,000/per plan) = $45000	High
On-going cost	$60,000	On-going survey and collection of samples =$20,000 Testing of samples (3 VC [Meat, Dairy & Poultry] @$10,000 per VC twice a year) = $60,000	Medium
Difficulty of Implementation	1	Not difficult - once budget is available, human resources are available	High
Trade Impacts			
Change in absolute value of exports	$27.2 million	ITC estimates untapped export potential of hides and skins as $20.7 million and live animals excluding poultry as $1.5 million. Rwanda exports virtually no live poultry and poultry meat and meat from other animals in the past except about approximately $1 million in 2018. So we can assume that the impact of this intervention would be $22.2 million plus safeguarding the current $1 million yearly.	High
Export Diversification	1	Products and markets will be diversified since this is one of the most important requirements for many markets and consumers	High
International Reputation	1	Local, regional and international	High

Domestic Spillovers			
Agricultural productivity	2	It will reduce losses related to bad practices	Medium
Public health & environment	2	Regular inspection, sample collection and testing will increase consumer's confidence	High
Impact on poverty	1	Good practices will reduce losses	Medium
Vulnerable Groups	1	A long plant and livestock value chains there may be a number of such people who will benefit from the implementation of these plans	Medium

11. Upgrade and Strengthen the Slaughter Chain

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$770,000	MSU - $250,000 Upgrade existing 4 Abattoirs for export purpose (8 cold chains) = $160,000; Training $90,000*4 = $360,000	High
On-going cost	$100,000	Maintenance of machines and equipment, regular training of personnel	High
Difficulty of Implementation	-1	-There is need of the private sector involvement with high investment and modern equipment such as mobile abattoir -The public private partnership in incising productivity	High
Trade Impacts			
Change in absolute value of exports	$12.8 million	Rwanda exports virtually no live poultry and poultry meat and meat from other animals in the past except about approximately $1 million in 2018. So we can assume that the impact of this intervention would be safeguarding the current $1 million yearly plus a 20% growth.	Medium
Export Diversification	1	With well-equipped abattoirs, processed meat products will be diversified	High

International Reputation	1	Local, regional and international	High
Domestic Spillovers			
Agricultural productivity	2	Some meat by-products were lost due to lack of well equipped and functioning abattoirs will be recuperated and thus increase productivity	Medium
Public health & environment	2	Well equipped and functioning abattoirs, safe meat will be produced and this will safeguard consumer's health	High
Impact on poverty	1	Abattoirs will hire/ engage a number of personnel	Medium
Vulnerable Groups	1	A long slaughter chain there may be a number of such people who will benefit	Medium

12. Capacity Building in Apiculture

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$365,000	ToT - $15,000, Bee equipment (hives & misc.) – (50 cooperatives 50 hives each @ $100/hive & Misc.) = $250,000 Harvesting & storage equipment ($2000 x 50 cooperatives) =$100,000	High
On-going cost	$300,000	Master bee keepers' monitoring & refresher (5 per region for 4 regions @ $250 per month for 5 years)	Medium
Difficulty of Implementation	1	Easy – involves just training	High
Trade Impacts			
Change in absolute value of exports	$56 million	Increase in technology skills which will increase also production of honey companies by 20% [annually???]. On average 13 metric tons are exported annually with $56 million generated.	High
Export Diversification	1	Yes - Diversification and Value addition	Medium
International Reputation	1	Yes - Improved quality and quantity	High
Domestic Spillovers			

Agricultural productivity	2	The increase skills in production and post-harvest will reduce losses on the farmers and increase honey on markets	Medium
Public health & environment	2	Improved skills will increase quality of honey with less impurity and chemical residues	Medium
Impact on poverty	2	Impact on the communities in beekeeping production due to more honey sells	Medium
Vulnerable Groups	2	Improvement in social economic of women and youth and in nutrition as well	Medium

13. HACCP Certification for Honey Cooperatives/Honey Processing

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$92,000	Training of 2 Reps per Cooperatives for 30 Coop. (consultancy – $5,000/training; Conference package $9,000; Accommodation & Transport ($300x60) = $18000) = $32,000 HACCP Certification ($2000/per coop x 30) = $60,000	High
On-going cost	$15,000	Monitoring & inspection annually	High
Difficulty of Implementation	1	Not difficult – due to???	
Trade Impacts			
Change in absolute value of exports	$42 million	Increase in confidence and credibility of honey companies to the trading partners. On average 13 metric tons are exported annually with $56 million generated. Honey Export revenues will be increased by 15% and $8.4 million will be generated [annually???]	high
Export Diversification	1	Yes - Diversification and Value addition	Medium
International Reputation	1	Yes - Confidence and credibility increased	High

Domestic Spillovers			
Apiculture productivity	2	The HACCP trainings increase quality in production and in post-harvest which reduce also the losses on the farmers	Medium
Public health & environment	2	Improved skills will increase quality of honey with less impurity and chemical residues	Medium
Impact on poverty	2	Impact on the communities in beekeeping production due to more honey sells	Medium
Vulnerable Groups	2	Improvement in social economic of women and youth and in nutrition as well	Medium

14. Capacity Building in GHP, GVP, and GMP for the Dairy Sector

Decision Criterion	Estimated Value	Details	Level of Confidence
Cost			
Up-front investment	$600,000	Training Public & Private Vets & Cooperatives/MCCs = $150,000 ($5,000 per district for 30 districts) Equipment (coolers) = $400,000 ($4000 per cooler for 100 MCCs); Lactoscan ($500 x 100 MCC) = $50,000	High
On-going cost	$100,000	It includes regular inspections to monitor the implementation	High
Difficulty of Implementation	1	Not difficult – there are other stakeholders in the sector that initiated such programs, thus actors are familiar	High
Trade Impacts			
Change in absolute value of exports	$5 million	ITC export potential map estimated untapped export potential for diary at about $1 million	Medium
Export Diversification	1	Yes - e.g. cheese, yoghurt, powdered milk, etc.	Medium
International Reputation	1	Yes - Local, regional and international	High

Domestic Spillovers			
Agricultural productivity	2	Good practices will reduce losses	High
Public health & environment	2	Safe products on the market will increase consumer's confidence	High
Impact on poverty	1	With one cow per family program, these programs will bring in value addition	High
Vulnerable Groups	2	A long dairy value chain there may be a number of such people who will be involved.	Medium

Annex 4: Workshops Participants' List

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28.10.2019 HORTICULTURE

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Annex 5: Information Dossier

EU Rapid Alert System for Food and Feed (RASFF)

ITC Export Potential Map: https://exportpotential.intracen.org/

ITC Trade Map: https://trademap.org/

Ministry of Agriculture and Animal Resources of Rwanda. (2018). Strategic Plan for Agriculture Transformation (2018-2024)

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U.S. Import Refusal Report: https://www.accessdata.fda.gov/scripts/ImportRefusals/index.cfm

World Trade Organization. (2019). Trade Policy Review: East African Community

WTO (2019); Rwanda Trade Policy Review

Cassidy, D. (2012); Establishing Priorities for Sanitary and Phytosanitary Capacity-Building in Rwanda Using a Multi-Criteria Decision-Making Framework;

Presentations

SPS constraints and trade in livestock/ livestock products (beef, poultry, honey) by Dr. Gaspard SIMBARIKURE (DVM), MINAGRI/Inspection

Rwanda Horticulture Exports by Beatrice Uwumukiza

Rwanda Export Development

Mycotoxin and Trade in Maize and Maize Products by Egidia Nkezabera

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