Establishing Priorities for Export-Oriented SPS Capacity-Building in Zambia Using the P-IMA Framework

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1. Introduction

Sanitary and phytosanitary (SPS) measures are applied by governments to control food safety, plant health and animal health risks, and to prevent incursions of exotic pests and diseases. In turn, such measures act to protect human health, promote agricultural productivity and facilitate the international marketability of agricultural and food products.[1] Increasingly, private standards are being applied in parallel as a mechanism for firms to manage food safety risks and to differentiate their products. Whilst the illegitimate use of SPS measures undoubtedly remains a problem, despite the obligations and rights laid down in the WTO's Agreement on Sanitary and Phytosanitary Measures, arguably the biggest challenge for developing countries is achieving and maintaining the required compliance capacity, both within the public sector and in exporting firms.[2]

In making efforts to expand their agri-food exports and to reposition themselves towards higher-value markets, developing countries face an often daunting need for export-oriented SPS capacity-building investments that outstrip available resources, whether from national public or private budgets and/or donors. Inevitably, therefore, hard decisions have to be made to prioritise some capacity-building investments over others. At the same time, the drive towards greater aid effectiveness requires that beneficiary governments are able to present coherent and sustainable plans for capacity-building. Whilst decisions have to be made between competing needs on an on-going basis, such decisions often lack coherence and transparency, and there are various accusations of inefficiencies in the allocation of resources[3], whether by developing country governments or by donors.

As part of efforts to establish more coherent and accountable decisions in the allocation of scarce resources towards competing export-oriented SPS capacity-building investments, various economic analysis techniques have been proposed. Approaches such as cost-benefit and cost-effectiveness analysis are seen as providing structured frameworks for making the costs and benefits of alternative capacity-building investments explicit and for identifying options that offer the greatest return.[4] The quantity and/or quality of data in many developing countries, however, can seriously impede such analyses. Further, establishing priorities amongst export-oriented SPS capacity-building investments is often made on the basis of multiple criteria measured in disparate ways, pointing to the potential use of multi-criteria decision analysis (MCDA).

The Standards and Trade Development Facility (STDF) has supported the development of a framework for the establishment of priorities amongst competing export-oriented SPS capacity-building investments that might be funded by the government or the private sector in developing countries

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[1] Henson, S.J. and Humphrey, J. (2010). Understanding the Complexities of Private Standards in Global Agri-Food Chains as They Impact Developing Countries. Jou*rnal of Development Studies*, 46 (9), 1628-1646.

[2] World Bank (2005). *Food Safety and Agricultural Health Standards: Challenges and Opportunities for Developing Country Exports.* Poverty Reduction and Economic Management Trade Unit. World Bank, Washington DC.

[3] Henson, S.J. and Masakure, O. (2009). *Guidelines on the Use of Economic Analysis to Inform SPS-Related Decision-Making*. Standards and Trade Development Facility, Geneva.

[4] See Henson and Masakure (2009).

and/or donors. Through the use of MCDA, the so-called P-IMA framework[5] enables export-oriented SPS capacity-building investments to be prioritised on the basis of a wide range of decision criteria (for example value of exports, impacts on small-scale producers, improvements in domestic public health and/or agricultural productivity and consequences for vulnerable groups) that are not necessarily measured or even measurable using the same metrics.

This document reports on the application of the P-IMA framework in Zambia. Despite the fact that various assessments of SPS capacity-building needs in Zambia have been undertaken[6], including a detailed assessment by the World Bank in 2006, there remains a lack of coherence in the establishment of priorities. Indeed, whilst existing assessments identify numerous weaknesses in capacity, they tend to generate a long list of needs that outstrip available resources. Furthermore, many of these needs are rather general in their focus, with insufficient attention given to the benefits that will flow from specific investments in SPS capacity relative to the costs involved. As a result, Zambia lacks a coherent and prioritised plan for the enhancement of SPS capacity that guides government, donor and/or private sector investments. The analysis presented below aims to inform the development of such a plan.

This report starts by providing an overview of the SPS situation and related challenges in Zambia. The P-IMA framework and related methods of data collection and analysis are then briefly described. The report proceeds to lay out the SPS capacity-building needs identified in the analysis and that enter the priority-setting exercise. The results of the analysis are then reported, followed by an assessment of the implications for SPS capacity-building in Zambia in the medium term.

2. Zambia's exports of SPS sensitive agri-food products

2.2. Background

Historically, Zambia has had a significant trade deficit with respect to food and agricultural products, with a predominant focus on meeting domestic demand and few competitive exports. The sector has also been heavily dependent on imports of agricultural inputs, notably fertilizer and agro-chemicals. In 1990, Zambia's agri-food exports totalled only US$30 million, whilst imports were US$62 million. Exports were dominated by cotton and sugar, processed and marketed through parastatal agencies, with limited additional sales of tobacco and horticultural products.

With the liberalisation of the economy in the mid-1990s, including the privatisation of several parastatals, realignment of commodity prices and the advent of low-interest loan programs by several international banks and donor agencies, there was substantial growth and diversification of Zambia's agri-food exports. Agri-food exports have since expanded substantially, reaching a peak of US$1.35 billion in 2012, although with significant year-on-year variation. Whilst much of this growth is

[5] Henson, S.J. (2016). *Prioritizing SPS Investments for Market Access (P-IMA).* Standards and Trade Development Facility, Geneva.

[6] These are listed in Appendix 1 and were included in the information dossier provided to participants in the stakeholder workshop (see below).

attributable to increased sales of traditional products, especially sugar, cotton, maize and tobacco, fresh vegetable exports also grew and a cut flower industry emerged.

Zambia's market access and trade performance has largely been conditioned by international price trends and preferential market access terms, although political developments in South Africa in the 1990s, the economic collapse of Zimbabwe and the overall macroeconomic situation in Zambia have also influenced levels of investment in the agri-food sector. For many of Zambia's non-traditional agri-food exports, in particular, market access and trade performance have also been affected by the ability to comply with either official or private requirements related to food safety, plant health and/or animal health, on which this report focuses.

A comprehensive review of SPS capacity requirements in Zambia was conducted by the World Bank in June 2007[7], which identified a number of areas of weakness. Whilst this is now rather dated, it remains the most comprehensive assessment of the SPS capacity of Zambia, whilst there is little evidence that the situation has changed appreciably since that time. Whilst efforts have been made to address these needs, many broad-based weaknesses in capacity remain. First, there is an overall low level of social awareness on SPS issues in Zambia. Second, there are weaknesses in the legislative framework. For example, the new Plant Health Law remains to be enacted. Additionally, the underlying capacities required to monitor and enforce food safety, plant health and animal health regulations are generally inadequate. Thirdly, coordinative structures tend to be weak, with the fragmentation of responsibilities within and across the areas of food safety, plant health and animal health. Whilst there have been efforts to enhance coordination, these have been hampered by lack of funds, staff or poor communications.

2.3. Trade in SPS sensitive agri-food products

Table 1 provides an overview of the key SPS requirements associated with Zambia's traditional and non-traditional agri-food exports. It can be seen that SPS requirements are particularly an issue for trade in fish, live animals, meat and other animal products, fruits and vegetables and planting materials. It is important to recognise, however, that there are wide differences in the application and enforcement of SPS requirements across markets and segments within markets. Zambia's agri-food trade is directed predominantly to Europe, neighbouring countries (especially the Democratic Republic of Congo) and South Africa. Whilst SPS requirements tend to be strictest in Europe, where in some cases official requirements have been supplemented by private standards, exports to South Africa and to some extent other COMESA and SADC countries have experienced periodic SPS-related problems.

[7] Steven J., Sergeant, A., Cassidy, D., Abegaz, M., Deeb, T., and Sewadeh, M., (2007). *Zambia: SPS Management, Recommendations of a Joint World Bank/USAID Assessment Team.* World Bank, Washington DC.

Table 1. Zambian agri-food exports and attendant SPS requirements

Category	Average Annual Exports 2010-2014 (US$000)	Proportion of Total SPS Sensitive Exports (%)	Sensitivity			
			Plant Health	Animal Health	Food Safety	Private Standards
01 Live animals	1,792	0.2		XXX		
02 Meat and edible meat offal	1,042	0.1		XXX		
03 Fish, crustaceans, molluscs, aquatic invertebrates, nes	596	0.1		XXX		XXX
04 Dairy products, eggs, honey, edible animal product, nes	7,242	0.8		XX	XXX	XXX
05 Products of animal origin, nes	36	0.0		X		
06 Live trees, plants, bulbs, roots, cut flowers etc	22,651	2.4	XXX			
07 Edible vegetables and certain roots and tubers	15,858	1.7	XX			XXX
08 Edible fruit, nuts, peel of citrus fruit, melons	727	0.1	XX			XXX
09 Coffee, tea, mate and spices	4,913	0.5	X		X	XX
10 Cereals	178,527	18.8	XX		XX	
11 Milling products, malt, starches, inulin, wheat gluten	48,827	5.1	X		XX	
12 Oil seed, oleagic fruits, grain, seed, fruit, etc, nes	24,732	2.6	XX		XX	
13 Lac, gums, resins, vegetable saps and extracts ne	19	0.0			XXX	XXX
14 Vegetable plaiting materials, vegetable products, nes	9,523	1.0	X			
15 Animal, vegetable fats and oils, cleavage products, etc	28,088	3.0			XX	
16 Meat, fish and seafood food preparations, nes	456	0.0		X	XXX	XXX
17 Sugars and sugar confectionery	173,666	18.2			X	
18 Cocoa and cocoa preparations	4,956	0.5			X	
19 Cereal, flour, starch, milk preparations and products	19,980	2.1			X	
20 Vegetable, fruit, nut, etc. food preparations	5,199	0.5			XX	XX
21 Miscellaneous edible preparations	7,727	0.8			X	
22 Beverages, spirits and vinegar	51,733	5.4			X	
23 Residues, wastes of food industry, animal fodder	66,686	7.0	XX	XX		
24 Tobacco and manufactured tobacco substitutes	147,348	15.5			X	
44 Wood and articles of wood, wood charcoal	30,001	3.2	X			X
46 Manufactures of plaiting material, basketwork, etc.	3	0.0	X			
47 Pulp of wood, fibrous cellulosic material, waste, etc.	1,131	0.1			X	X
48 Paper & paperboard, articles of pulp, paper and board	8,061	0.8			X	
50 Silk	1	0.0		X		
51 Wool, animal hair, horsehair yarn and fabric thereof	0	0.0		X		
52 Cotton	90,505	9.5			X	
53 Vegetable textile fibres nes, paper yarn, woven fabric	64	0.0				
TOTAL	952,093	100.0				

Source: COMTRADE

Given the overall composition of Zambia's agri-food exports and experiences to date, SPS requirements do not appear to be a particularly major issue. Indeed, it is noteworthy that the World Bank review of Zambia's SPS capacity in 2007 highlighted that SPS requirements had generally not been an appreciable constraint on agri-food export performance. Other competitiveness factors, such as primary producer and processor productivity, continuity/reliability of supply, logistical costs, macroeconomic factors and international commodity price trends have arguably have played a more leading role in explaining Zambia's agri-food trade performance to date.

Although Zambia's recent shift towards non-traditional and more SPS sensitive agri-food exports, notably fresh vegetables, cut flowers, animal products and spices, might suggest that SPS requirements are becoming of greater importance, supply chain problems, logistics and seasonality remain the predominant concerns. Indeed, Zambia's exports of agri-food products to countries with stricter SPS requirements are relatively small, and have not expanded appreciably. These exports consist predominantly of a limited basket of fresh vegetable to the UK, Netherlands, Australia and South Africa, and sales of honey and paprika to a few countries. Whilst some SPS-related challenges have and are being faced, these are not the predominant cause of Zambia's declining trade performance for these products.

Zambia imports a broad range of foods, although a large part of these imports is generally considered of low to moderate risk from an SPS standpoint. The imports of foods for which there might be greater SPS (and especially food safety) risks, such as meat and dairy products, fish and canned foods, tend to come from countries where relatively higher standards of SPS controls apply. Indeed, the greatest SPS risks faced domestically undoubtedly relate to domestic production and distribution rather than trade.

3. Aims and methods

The foregoing discussion highlights the most prominent SPS-related problems faced by agri-food exports from Zambia. Such a discourse, however, represents only the starting point in defining an action plan towards export-oriented SPS capacity-building. For example, there may be other SPS-related problems, both existing and latent, that have significant but undefined impacts on exports, and in turn on the livelihoods of the poor and vulnerable groups, domestic public health, etc. Even amongst the issues that are discussed, there is a lack of analysis of the costs of rectifying the problem, nor the flow of economic and social benefits that might flow should the problem be solved.

The P-IMA framework employed here aims to present a more comprehensive analysis of options for export-oriented SPS capacity-building investments that can feed into the development of a prioritised action plan for the enhancement of SPS capacity. Thus, its ultimate objective is to *generate a prioritised schedule of options for export-oriented SPS-related capacity-building in Zambia on the basis of the multiple economic and/or social criteria*. The rationale behind the P-IMA 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 export-oriented 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 pursuit of this objective, the framework aims to:

- Identify the range of export-oriented SPS capacity-building investments needed in Zambia given the current status of SPS capacity and requirements in current and/or potential export markets. Below this is termed the *choice set*.
- Determine the *decision criteria* that should drive the establishment of priorities between this set of potential export-oriented SPS capacity-building investments and the relative importance (*decision weights*) to be attached to each.
- Prioritize the identified export-oriented SPS capacity-building investments 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 P-IMA framework employs a highly structured process that aims to be applied in a wide variety of context and to provide various diagrammatic and numerical outputs. The framework and its practical implementation are described in detail in a user's guide.[8] Thus, here a relatively brief outline of the seven stages of the framework (Figure 1) is provided, with a particular focus on how these were implemented in Zambia.

Stage 1: Compilation of information dossier

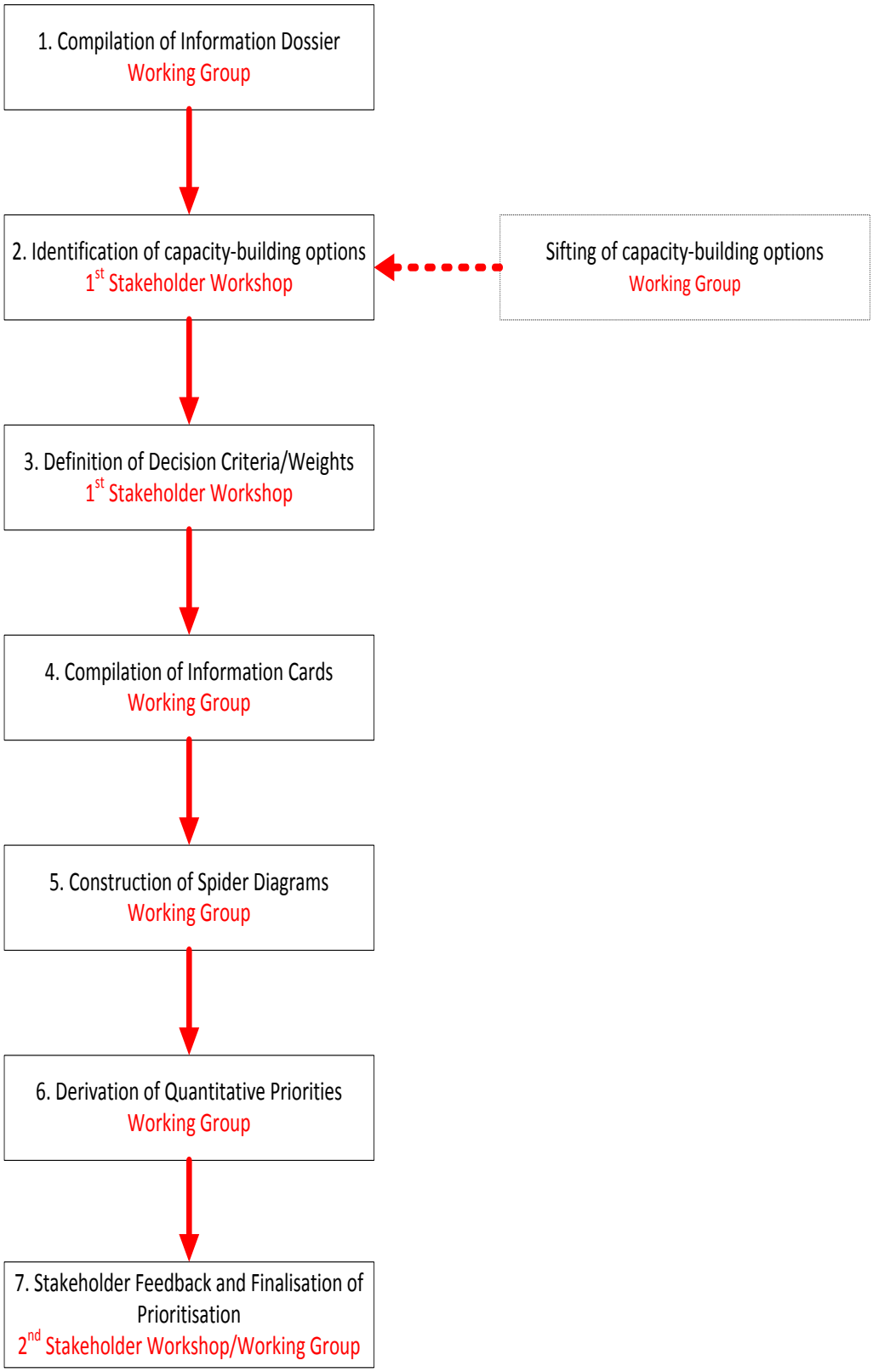
The first stage of the analysis involved the compilation of a comprehensive dossier of existing information on the SPS challenges facing agri-food exports from Zambia and the associated capacity-building needs. In so doing, the aim was to ascertain what work had already been undertaken to identify capacity-building options and the definition of priorities for related investments. The documents/information in the dossier are itemised in Appendix 1.

Stage 2: Definition of choice set

In order to identify the potential export-oriented SPS capacity-building investments to be considered in the priority-setting framework, a one-day stakeholder workshop was held on Monday 31st August 2015. Stakeholders from government, private sector and donors participated (see Appendix 2). Participants were presented with a series of cards and asked to identify the export-oriented SPS capacity-building needs of Zambia. Critically, respondents were asked to define a series of mutually-exclusive needs consisting of four key elements. First, the products affected. Second, the specific SPS issue faced by exports of these products. Third, the markets where these SPS needs were an issue. Fourth, the capacity-building option(s) that would solve the SPS issue being faced. The combination of these three elements defined a distinct capacity-building option. Respondents were free to define as many specific SPS capacity-building options as they wished.

[8] See Henson (2016)

Figure 1 Stages of the P-IMA framework



The cards of all respondents were collected, shuffled and then reported back to the workshop as a whole through listings on flip charts. The collection of items was then discussed in order to remove any ambiguities and to ensure that each represented a mutually-exclusive capacity-building option. A total of 23 export-oriented SPS capacity-building Investments were defined through the above process, of which 13 were selected for further analysis as described in Table 2.

Table 2. Choice set of SPS capacity-building options

Number	Option	Description
1	Animal health controls for pork exports to the DRC	Implementation of controls on African Swine Fever to facilitate and enhance pork exports to the DRC.
2	Plant pest controls for cut flower exports to the EU	On-farm inspection to reduce interceptions of pests on cut flowers for export to the EU.
3	Testing capacity for aflatoxins in groundnuts and maize for exports to regional and EU markets	Enhanced aflatoxin testing capacity for groundnuts and maize to demonstrate compliance with EU and/or regional standards.
4	Pesticide residue testing for regional sugar exports	Enhanced pesticide testing capacity for testing of sugar to demonstrate compliance with regional standards
5	Plant pest controls for table grape exports to South Africa	Surveillance and monitoring of pests on table grapes and implementation of management options to facilitate access to South African markets.
6	Plant pest controls for regional maize exports	Implementation of controls on lethal necrosis viral disease in maize to prevent restrictions on access to regional markets.
7	Measures to control for aflatoxins in groundnuts for export to regional and EU markets	Design and implementation of management practices along the groundnut value chain to reduce levels of contamination with aflatoxins in order to comply with regional and /or EU standards.
8	Measures to control for aflatoxins in maize to regional markets	Design and implementation of management practices along the maize value chain to reduce levels of contamination with aflatoxins in order to comply with regional standards.
9	Plant pest controls for seed exports to regional markets	Implementation of effective plant pest controls for disease pathogens impacting seed exports to regional markets.
10	Measures to control aflatoxins in soya beans for export to regional and EU markets	Design and implementation of management practices along the soya bean value chain to reduce levels of contamination with aflatoxins in order to comply with regional and /or EU standards.
11	Animal health controls for goat exports to the DRC	Implementation of controls on Peste des Petits Ruminants (PPR) to maintain and enhance goat exports to the DRC.
12	HACCP-based controls for honey exports to EU markets	Implementation of enhanced HACCP in honey value chain for exports to EU markets.
13	Animal health controls for breeding cattle exports to regional markets	Implementation of controls on Contagious Bovine Pleuropneumonia Pneumonia (CBPP) to maintain and enhance regional live cattle exports, predominantly to the DRC.

A total of 10 export-oriented SPS capacity-building investments identified through the workshop were excluded from the analysis, using the sifting criteria outlined in the framework handbook.[9] These are

[9] See Henson (2016)

summarised in Table 3 with the reasons for each having been excluded. In the analysis below, only the 13 final capacity-building options detailed in Table 2 are considered.

Table 3. Excluded SPS capacity-building options

Number	Option	Rationale
1	Pest controls for honey exports to South Africa	A protocol has been negotiated with South Africa for exports of honey from Zambia that permits importation without irradiation provided tests do not detect the presence of American Fowl Brood (AFB).
2	Food and Mouth Disease (FMD) controls for beef exports to regional and EU markets	Practicality and cost of effective FMD controls without vaccination considered prohibitive in Zambia. Recent animal disease ranking exercise ranked FMD 16 out of 42 diseases.
3	Plant pest controls for granadilla exports to the EU	No evidence of commercial production in Zambia
4	Plant pest controls for fresh vegetables	Relates to controls on imports of potatoes from South Africa – a compliance issue for importers into Zambia
5	Animal health controls for aquaculture	Currently not substantive productive capacity in Zambia.
6	Plant pest controls for planting materials (e.g. cassava)	A compliance issue for importers into Zambia
7	Compliance with food safety standards for milk and milk products	A compliance issue for importers into Zambia
8	Decentralised certification for maize exports	Issue largely solved due to move to online/ single window system.
9	Compliance with packaging standards for milk	A compliance issue for importers into Zambia
10	Compliance with hygiene standards by processed food manufacturers	Mainly an issue for domestic market

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 organised into four categories and asked which (if any) should be excluded and whether any potentially important criteria should be added. The final agreed set of decision criteria consisted of 11 items as set out in Table 4.

To define the decision weights, the workshop participants were each asked to assign 100 points amongst the eight decision criteria. The scores of participants were then collated and an average weighting calculated. This average weighting was reported back to the workshop participants to identify any discrepancies. The final agreed weightings are reported in Table 4.

Stage 4: Construction of information cards

Having identified the choice set of export-oriented SPS capacity-building options and the decision criteria and weights to be applied in the priority-setting exercise, this 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 export-oriented SPS capacity-building options was described in some detail on the basis of existing documentation, consultation with stakeholders, etc. Descriptions of each of the 13 final export-oriented capacity-building options are provided in Section 4 below.

Table 4. Decision criteria and weights for setting priorities of SPS capacity-building options

Criterion	Weight
Cost, sustainability and difficulty of implementation	
Up-front investment	8%
On-going costs	6%
Difficulty of implementation	5%
Sustainability of capacity	5%
Trade impact	
Change in annual value of exports 2020	22%
Impact on ability to deal with future SPS problems impacting trade	5%
Impact on international reputation for SPS capacity	5%
Domestic spill-overs	
Agricultural productivity	9%
Domestic public health	5%
Environmental protection	7%
Social impacts	
Impacts on poverty, especially of small-scale producers	23%

The metrics to be employed for each of the 11 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 5 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. However, it is important to recognise that the aim of the framework is not to provide a final and definitive prioritisation 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.

Table 5. Decision criteria metrics

Decision Criterion	Details	Measure
Cost		
Up-front investment	Monetary costs of investments to upgrade SPS capacity	Monetary amount ($)
On-going cost	Direct costs of maintaining and operating the upgraded SPS capacity	Annual monetary amount ($)
Difficulty of implementation	Degree of difficulty expected to be faced in establishing the enhanced SPS capacity	'Very easy' (1) to 'Very difficult' (5)
Sustainability of capacity	Degree of difficulty expected to be faced in maintaining the enhanced SPS capacity both technically and economically	'Very low' (1) to 'Very high' (5)
Trade impacts		
Change in absolute value of exports	Change in absolute value of annual exports 2020 due directly to the capacity-building option	Monetary amount ($)
Impact on ability to deal with future SPS problems impacting trade	Impact on ability to deal with future SPS problems impacting trade	'No impact' (0) to 'Very great' (5)
Impact on international reputation for SPS capacity	Impact on international reputation for SPS capacity	'No impact' (0) to 'Very great' (5)
Domestic agri-food or impacts		
Change in agricultural productivity	Changes in productivity of agricultural production of commodities to export and/or domestic markets	'Large negative' (-5) to 'Large positive' (+5)
Change in domestic public health	Changes in domestic public health, through food safety, occupational exposure to hazards, etc.	'Large negative' (-5) to 'Large positive' (+5)
Change in local environmental protection	Changes in protection of natural environment	'Large negative' (-5) to 'Large positive' (+5)
Social impacts		
Poverty impact	Change in incidence of poverty, especially amongst small-scale producers	'Large negative' (-5) to 'Large positive' (+5)

Information cards for each of the 13 export-oriented SPS capacity-building options were then compiled. These are reported in Appendix 3. Each card presents data for the 11 decision criteria, measured according to the scales outlined in Table 4. 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.

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 eight capacity-building options. Thus, a spider diagram was derived that plotted the 13 export-oriented SPS capacity-building options against the 11 decision criteria. Scrutiny of this diagram illustrated the decision criteria against which each of the capacity-building options performed relatively well/badly, relative to the other capacity-building options in the choice set.

Stage 6: Derivation of quantitative priorities

The formal priority-setting analysis involves 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.[10] 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 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 to examine the extent to which the derived priorities are sensitive to changes in the decision weights; if the broad ranking of the 13 export-oriented SPS capacity-building options remains broadly the same under the three scenarios presented by these models, we can be reasonably confident that the results of the

[10] See Henson (2016).

framework are robust. The sensitivity of the derived rankings to changes in decision criteria measures for which there are low levels of confidence was also explored.

Stage 7: Validation

The final stage of the priority-setting analysis is on-going. The aim of the validation process is to ensure that the results of the priority-setting framework are 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 preliminary results will be presented to selected donors and national stakeholders at a second workshop. Subsequently, this report will be being distributed amongst stakeholders in Zambia for comments. If this process results in revised and more robust data for any of the SPS capacity-building options, the rankings will be re-estimated.

4. SPS Capacity-Building Options

This section provides a more detailed description and rationale for each of the eight SPS capacity-building options considered in the priority-setting analysis.

4.1. Animal health controls for pork exports to the DRC

African Swine Fever is prevalent in the main pig production areas in Zambia, namely Lusaka and Southern Province. Currently, pigs are allowed to move from these areas to other parts of the country and for export. Outbreaks of African Swine Fever have impacted pig production in Zambia to the extent that it is now a net importer of pigs and pork. Furthermore, exports to the DRC have declined as a result of the disease. There is a need to implement enhance animal health controls directed at African Swine Fever, including surveillance and monitoring, controls on animal movements, etc. Given that there is significant transhipment of work from South Africa to the DRC through Zambia, it is expected that such measures could result in appreciable growth in pork exports from Zambia to the DRC. Indeed, there has been significant investment in pork production in Zambia, especially by South African companies, partly with a view to pork exports.

4.2. Plant pest controls for cut flower exports to the EU

Whilst Zambia has an established trade in cut flowers to the EU, the value of exports is impacted by relatively low levels but persistent interceptions of quarantine pests at the port of entry, numbering 15 over the period 2013 to 2015. Where an interception occurs, these flowers are generally destroyed at the expense of the exporter. Furthermore, sometimes the required additional declaration on the phytosanitary certificate is not completed, in which case the consignments is rejected. Often exporters do not inform the National Plant Protection Office (NPPO) when interceptions occur and, as a consequence, corrective actions are not taken. Official notifications from the importing country can take a long time to arrive, although Zambia has received warnings from the Dutch NPPO.

The needed corrective actions include enhanced and more effective on-farm inspection by farmers and surveillance by the NPPO, including more effective sampling. This will require the training of farmers and NPPO inspectors, implementation of enhanced surveillance protocols and investment in more diagnostic tools.

4.3. Testing capacity for aflatoxins in groundnuts and maize for exports to regional and EU markets

The major SPS issue impacting exports of groundnut to both regional and EU markets is contamination with aflatoxins. Whilst there has only been one EU rejection of groundnuts from Zambia, for example, this reflects the fact that trade volumes are low rather than the lack of a problem. Indeed, surveillance has identified high levels of contamination of groundnuts with aflatoxins. Likewise testing by buyers trading in groundnuts across regional markets where testing is mandatory has identified aflatoxins to be a significant problem.

Maize production has expanded appreciably in recent years, for example growing 20 per cent over the period 2010 to 2014. Exports, however, have not exhibited such spectacular growth, in part reflecting a lack of attention to quality, including compliance with COMESA/SADC standards. The COMESA standard for maize includes a limit on total aflatoxin of 20ppb and specifies methods of methods of sampling and testing. A draft standard proposes to halve this limit to 10ppb and to include a limit on fumonisins. Meeting these standards is not currently a problem, since there is little or no routine testing of maize consignments for aflatoxins. However, as testing becomes more the norm into the future, aflatoxin contamination of maize is expected to be an increasing issue impacted exports from Zambia.

Currently, Zambia lacks testing facilities for aflatoxins that are internationally accredited. Whilst some capacity does exist to undertake quantitative testing, management systems need to be upgraded and accreditation achieved. Other facilities need to be upgraded, including investment in new equipment and staff training. Testing of groundnuts (in particular) and maize for aflatoxins is currently undertaken in the country of destination and/or by the buyer, with the cost imposed on the exporter. As a result, exports tend to be subject to a price discount, whilst exporters face the risk that their consignment will be rejected at the port of entry.

4.4. Pesticide residue testing for regional sugar exports

The sugar sector accounts for around six percent of merchandise exports from Zambia and four per cent of GDP. The sector is dominated by one firm which contributes over 90 per cent total production. Sugar is exported to the EU as well as regional markets.

Compliance with limits on pesticide residues is critical to the maintenance and expansion of sugar exports from Zambia, most notably to the EU which currently accounts for 50 per cent of exports. Laboratory testing for pesticide residues remains a challenge in Zambia, with few facilities with the capacity required to undertake testing. Where capacity does exist, for example the Zambia Bureau of Standards (ZABS) and Zambia Agricultural Research Institute, (ZARI), there is need to upgrade equipment and implement monitoring activities. Furthermore, none of these laboratories is accredited to international standards, namely ISO IEC 17025. As a result, testing is undertaken in the destination market with the cost charged to the exporter. Where consignments are found to be in violation of EU limits, the exporter has to pay for the re-export or the costs of destruction.

4.5. Plant pest controls for table grape exports to South Africa

For some time, Zambia has been trying to obtain market access for table grapes into South Africa. A pest risk analysis has been completed by the South African and import conditions drafted, which have

been sent to the Zambian government. One of these import conditions is that the production area must be free from fruit flies.

Surveillance and monitoring for fruit flies has been started in table grape production areas. Preliminary results indicate that fruit flies are present in the production areas and that control measures are required in order to secure market access. This includes regular surveillance and the design and implementation of effective pest management options. These might include use of traps and biological control options. Farmers will need to be trained in integrated pest management (IPM) and inspectors trained and equipped with diagnostic tools.

4.6. Plant pest controls for regional maize exports

The outbreak of Maize Lethal Necrosis Virus (MLNV) in the region has the potential to seriously disrupt exports of maize from Zambia to regional markets. South Africa and Rwanda, for example have already notified the WTO of emergency measures involving the testing of grain and seed maize. In 2014, a consignment of seed maize was intercepted in Rwanda after preliminary tests indicated that one of the viruses that causes the disease was present.

Currently, Zambia is unable to test for this disease. Whilst the technical know-how exists, the necessary diagnostic laboratory equipment and primers, antibodies and other laboratory consumables are not available. Currently, any samples for testing have to be sent to another country for testing. Furthermore, there is a need to undertake surveillance in order to establish whether Zambia has the disease, and in which areas, so disease-free areas can be defined. This will entail the training of inspectors and of farmers.

4.7. Measures to control for aflatoxins in groundnuts to regional markets

In spite of low and declining groundnut production in Zambia, there is significant potential for exports to the EU, as well as regional markets such as South Africa. However, this potential is hampered by a significant problem with aflatoxin contamination related to inappropriate production and post-harvest practice on-farm and the lack of coordination and organisational capacity along the groundnut value chain. There is a need for wide-scale efforts to improve practices by producers and traders through knowledge dissemination and the provision of field testing equipment that will enable qualitative assessments to be undertaken of aflatoxin contamination. It is anticipated that, once producers see the higher returns that can be achieved with better quality groundnuts, and especially lower levels of aflatoxin contamination, there will be sufficient incentives for improved practices to be employed on an ongoing basis.

4.8. Measures to control aflatoxins in maize to regional markets

Most maize production in Zambia is by smallholder farmers, whether destined for local markets or for export. At the same time, production by commercial farmers is significant. Contamination of maize with aflatoxins is known to be a problem, especially in the case of smallholder production. Whilst, to date, this has not been a significant impediment to exporters to regional markets, efforts to establish and enforce regional standards are expected to draw attention to this issue. Thus, a key part of efforts to maintain and enhanced maize exports to regional markets is the more effective control of aflatoxins.

This will require the promotion of good agricultural practices by farmers and the use of better practices post-harvest. Furthermore, there is a need for field kits that will enable qualitative assessments of aflatoxin contamination to be undertaken.

4.9. Plant pest controls for seed exports to regional markets

Zambia lacks the capacity to undertake surveillance and diagnose a range of potential plant pests, including viruses, bacteria and fungi, which are of relevance to exports of seeds, predominantly to regional markets. Thus, at the current time, Zambia is unable to certify that seed exports are pest-free, in some cases prohibiting exports altogether or exporters send sample to another country for testing, at high cost. The needed investment includes training in disease diagnostics, upgrading of laboratory equipment (for example PCR machines and other equipment for DNA finger printing), purchase of reference materials, etc.

4.10. Measures to control aflatoxins in soya beans for export to regional and EU markets

Soya beans are one of the most important commercial agricultural crops grown in Zambia, whilst smallholder production is increasing rapidly as a potentially lucrative cash crop. Smallholder farmers, in particular, lack the knowledge and resources required to implement good agricultural practices that will mitigate against aflatoxin contamination. There is a need to provide training to farmers and to invest in field kits that will enable qualitative assessments of aflatoxin contamination to be undertaken.

4.11. Animal health controls for goat exports to the DRC

Peste des Petits Ruminants (PPR) is a deadly disease of small ruminants, in particular sheep and goats. In 2015, the virus causing this disease was confirmed as present in Zambia. If preventive measures are not implemented, up to 90 per cent of the goat population in the country could be lost due to mortalities. Much of the goat production in Zambia is exported, predominantly through undocumented trade with the DRC. Investment in surveillance and control of the disease, including training of inspectors, the purchase and maintenance of diagnostic tools and establishment and maintenance of disease-free areas is critical to the preservation and enhancement of this trade.

4.12. HACCP-based controls for honey exports to EU markets

Zambia has established exports of honey to the EU, and indeed was the first country in sub-Saharan Africa to put in place an approved residue monitor plan to enable compliance with EU requirement. Much of this honey is produced by small scale farmers, especially in North-Western Province. Most exports are in the form of bulk honey, although a few processors have been able to add value by exporting table honey. It is recognised that the more widespread application of HACCP-based hygiene controls along the homey value chain is necessary in order to improve product quality and add value. This will require investment in training, upgrading of processing and storage facilities, implementation of documentation systems, etc.

4.13. Animal health controls for breeding cattle exports to regional markets

Live cattle from the Western and North Western Provinces of Zambia cannot be moved to other parts of the country or be exported in the region due to the presence of Contagious Bovine pleuropneumonia Pneumonia (CBPP). CBPP is a chronic disease of cattle that kills animals that are not vaccinated. The DRC is seen as a potentially major export market for live cattle from Zambia if this disease can be controlled, especially in Western Province which is one of the main cattle-rearing regions in the country; in 2014, DRC imported US$6.96 million of live cattle, but none from Zambia. Controlling and eradicating CBPP would require investment in staff training, investment in diagnostic capacity, implementation of control measures, maintenance of disease-free areas, etc.

5. Results

The descriptions presented above, and the results of the stakeholder workshop, suggest all 13 of these export-oriented SPS capacity-building investments are credible. However, the associated costs and resulting benefits may differ substantially, such that it is possible to define clear priorities amongst the options on the basis of the defined decision criteria and weights. Below are presented the results of the prioritisation exercise at Stage 6 of the P-IMA framework and using outranking through the software package D-Sight.

To provide a first scan of the relative strengths and weaknesses of the 13 capacity-building options, spider diagrams were constructed (Figures 2 to 12). Because of the relatively large number of options, a separate diagram is presented for each of the 11 decision criteria. Although this depiction only permits comparison of the capacity-building options according to the decision criteria on a one-by-one basis, it does enable the key dimensions along which each of the options performs relatively well/badly to be identified. As such, the spider diagrams are a useful way in which to present information on the SPS capacity-building options to more senior decision-makers.

Figure 2 presents the up-front investment profile of the 13 capacity-building options. The options with the highest up-front investment are plant pest controls for regional maize exports and plant pest controls for cut flower exports to the EU, at around US$1.3 million. At the other extreme, pesticide residue testing for regional sugar exports has an up-front investment of only US$10,000. The option with the highest on-going maintenance and operating costs (Figure 3) by far is animal health controls for goat exports to the DRC. Options with the lowest on-going costs are pesticide residue testing for regional sugar exports and include of maintaining and measures to control for aflatoxins in groundnuts for export to regional and EU markets at US$8,000 per annum.

The capacity-building option judged to be most sustainable over time is animal health controls for breeding cattle exports to regional markets (Figure 4). Other options with high levels of sustainability are animal health controls for pork exports to the DRC and pesticide residue testing for regional sugar exports. The option with the lowest level of sustainability is animal health controls for goat exports to the DRC.

Of the 13 capacity-building options, plant pest controls for regional maize exports is judged to be most difficult to implement (Figure 5), followed by measures to control for aflatoxins in maize to regional markets and measures to control aflatoxins in soya beans for export to regional and EU markets. Plant

pest controls for cut flower exports to the EU, plant pest controls for fresh fruit and vegetable exports to South Africa, plant pest controls for seed exports to regional markets and pesticide residue testing for regional sugar exports are judged to be least difficult to implement.

Figure 2. Decision criteria measures for up-front investment ($ '000)

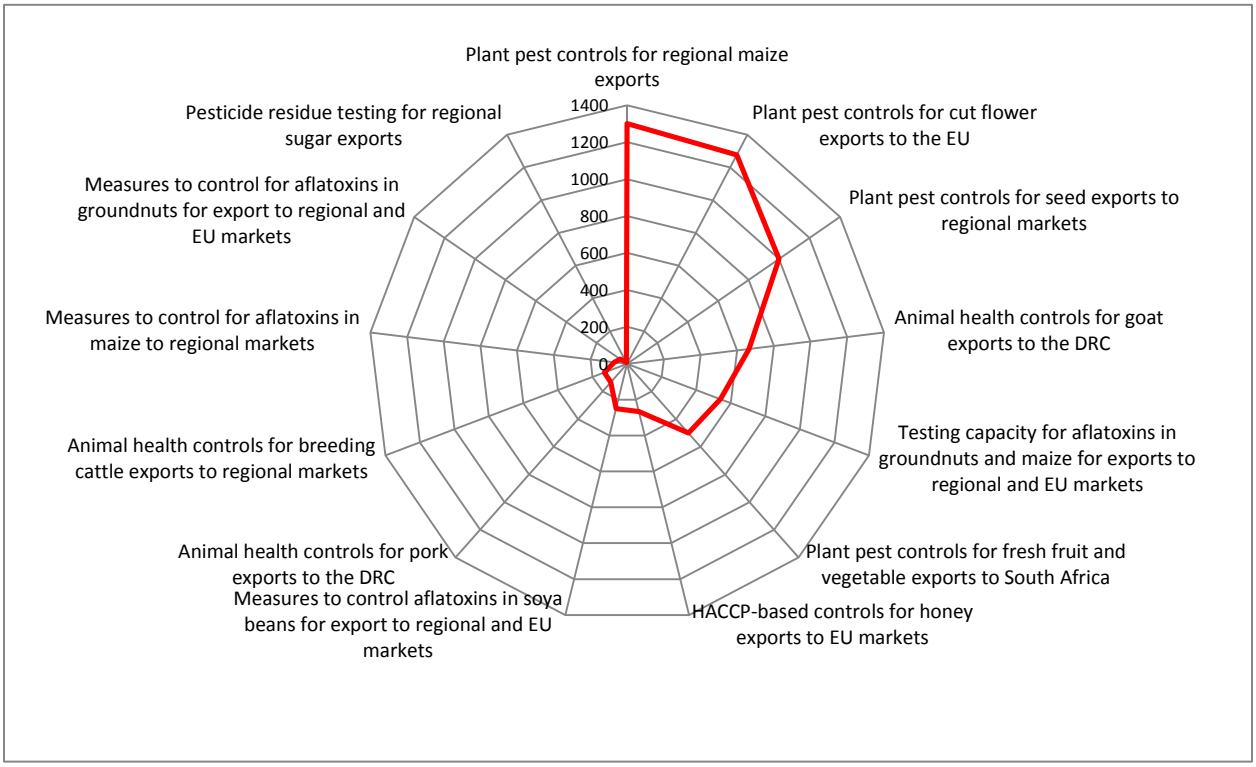


Figure 3. Decision criteria measures for on-going costs ('000)

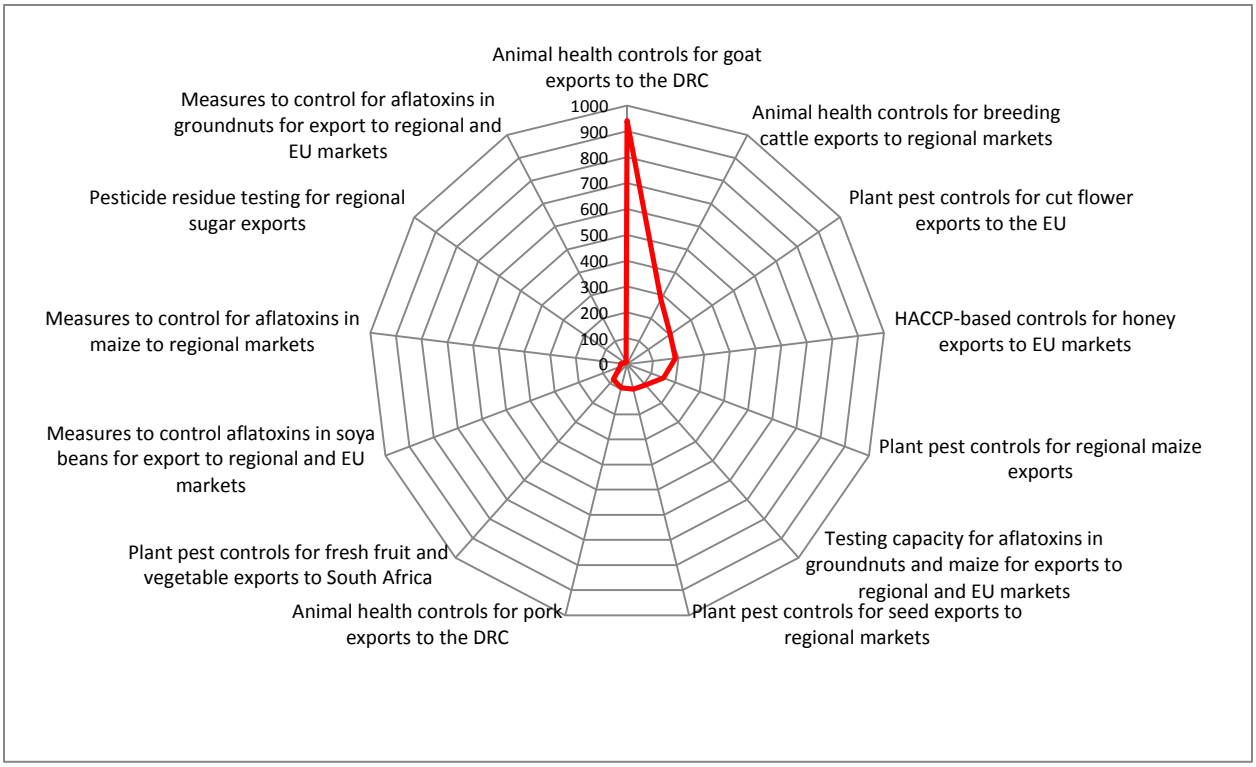


Figure 4. Decision criteria measures for difficulty of implementation

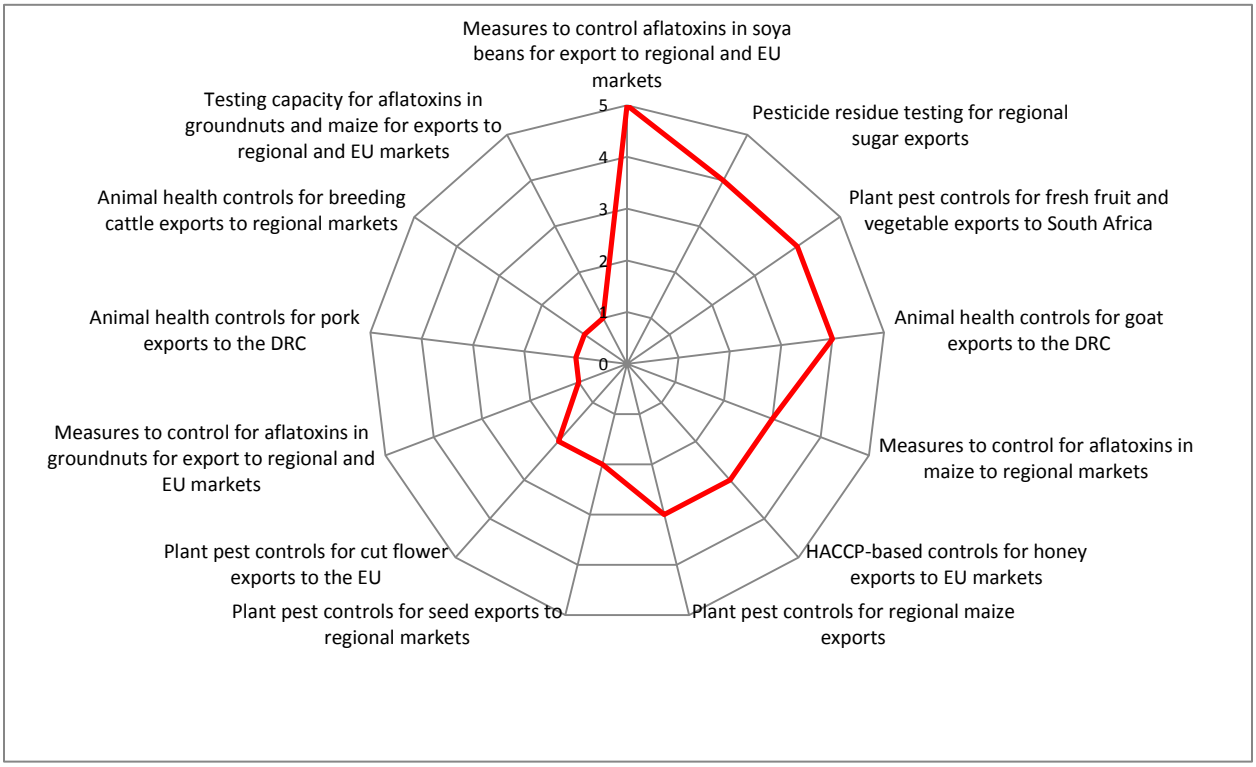
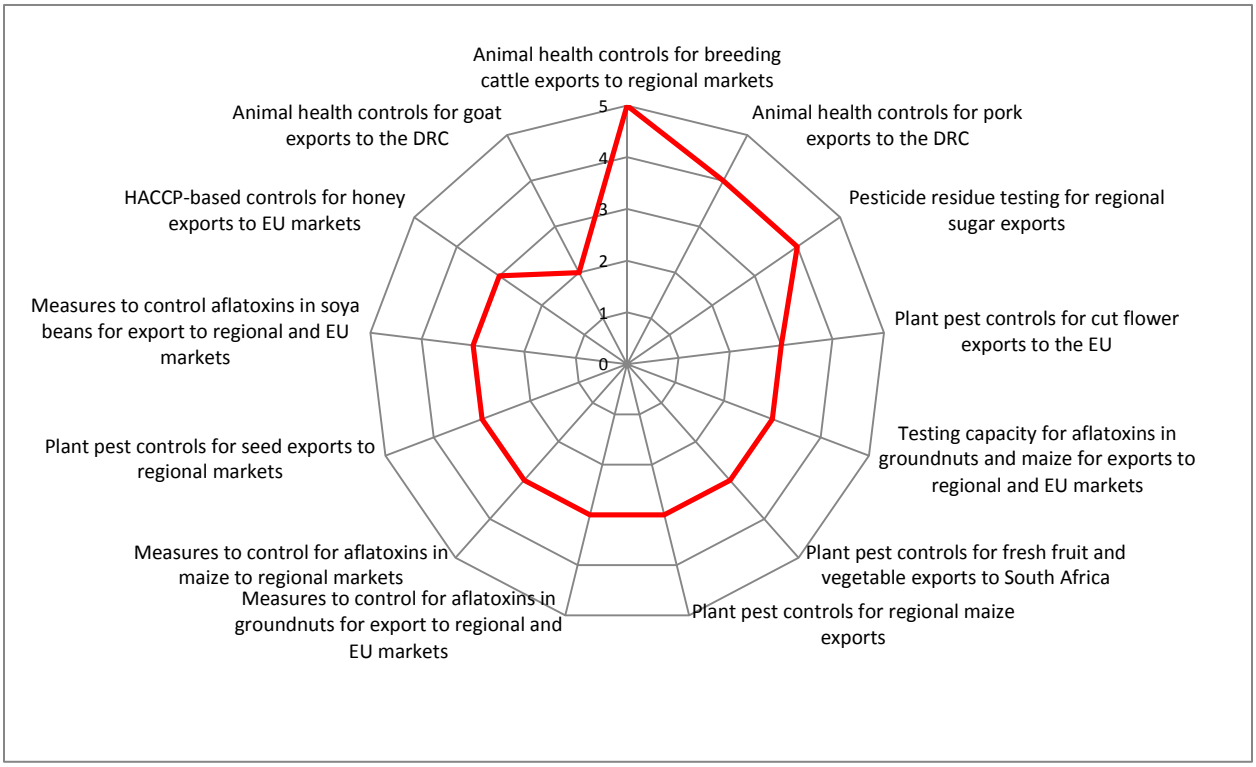


Figure 5. Decision criteria measures for sustainability



The predicted trade impact of the 13 capacity-building options in terms of changes in the aggregate value of exports is reported in Figure 6. Options expected to have the most significant positive trade impacts are measures to control for aflatoxins in maize to regional markets (US$35.7 million), plant pest controls for regional maize exports (US$33.4 million) and testing capacity for aflatoxins in groundnuts and maize for exports to regional and EU markets (US$26.2 million). HACCP-based controls for honey exports to EU markets and measures to control for aflatoxins in groundnuts for export to regional and EU markets are expected to have a minimal trade impact.

Figure 6. Decision criteria measures for trade impact ($ million)

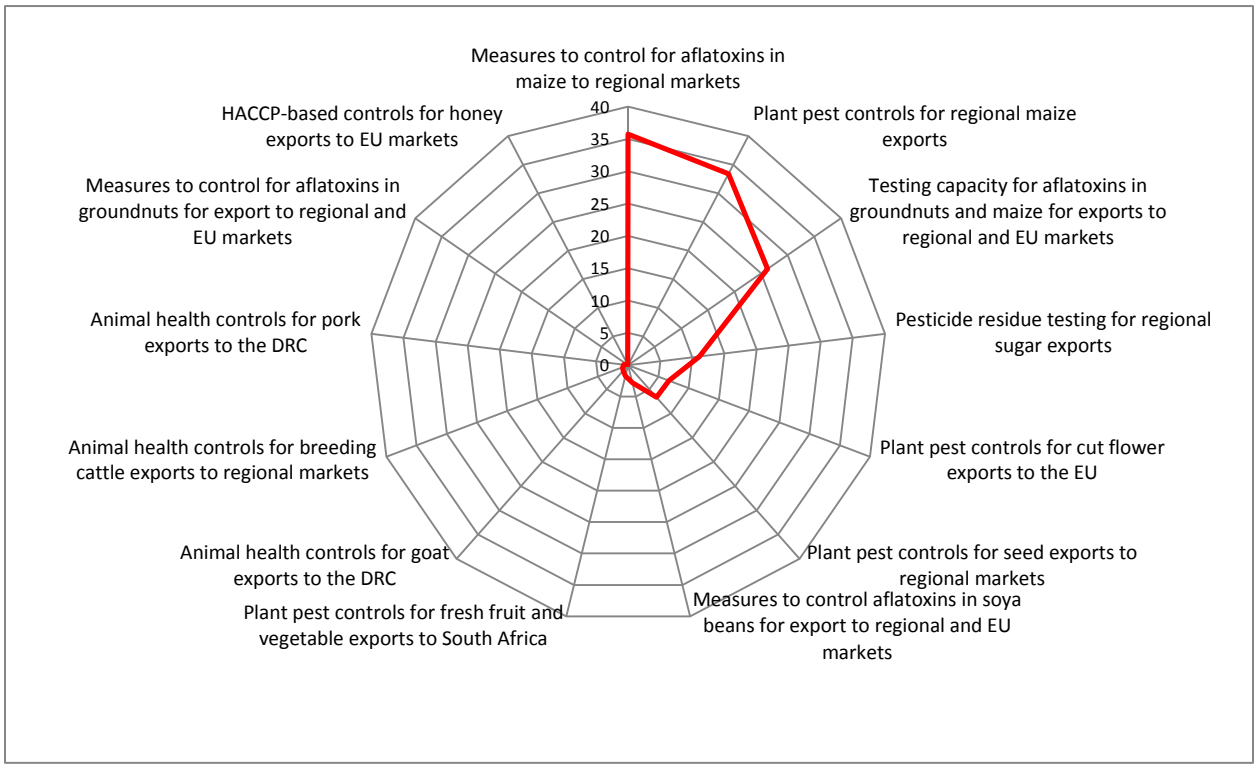


Figure 7 reports the predicted impact of each capacity-building option on Zambia's ability to deal with future SPS problems impacting trade. Most of the options is HACCP-based controls for honey exports to EU markets, for which the capacity developed is highly specific. Likewise, most of the options are judged to have a positive and appreciable impact on Zambia's international reputation for SPS capacity. HACCP-based controls for honey exports to EU markets is again an exception, as is plant pest controls for fresh fruit and vegetable exports to South Africa.

The impact of each capacity-building option on Zambia's international reputation with respect to SPS capacity is reported in Figure 8. Most of the options are predicated to appreciably improve Zambia's international reputation. Exceptions are plant pest controls for fresh fruit and vegetable exports to South Africa and HACCP-based controls for honey exports to EU markets, and to a lesser extent animal health controls for pork exports to the DRC and Animal health controls for breeding cattle exports to regional markets.

Figure 7. Decision criteria scores for impact on ability to deal with future SPS problems impacting trade

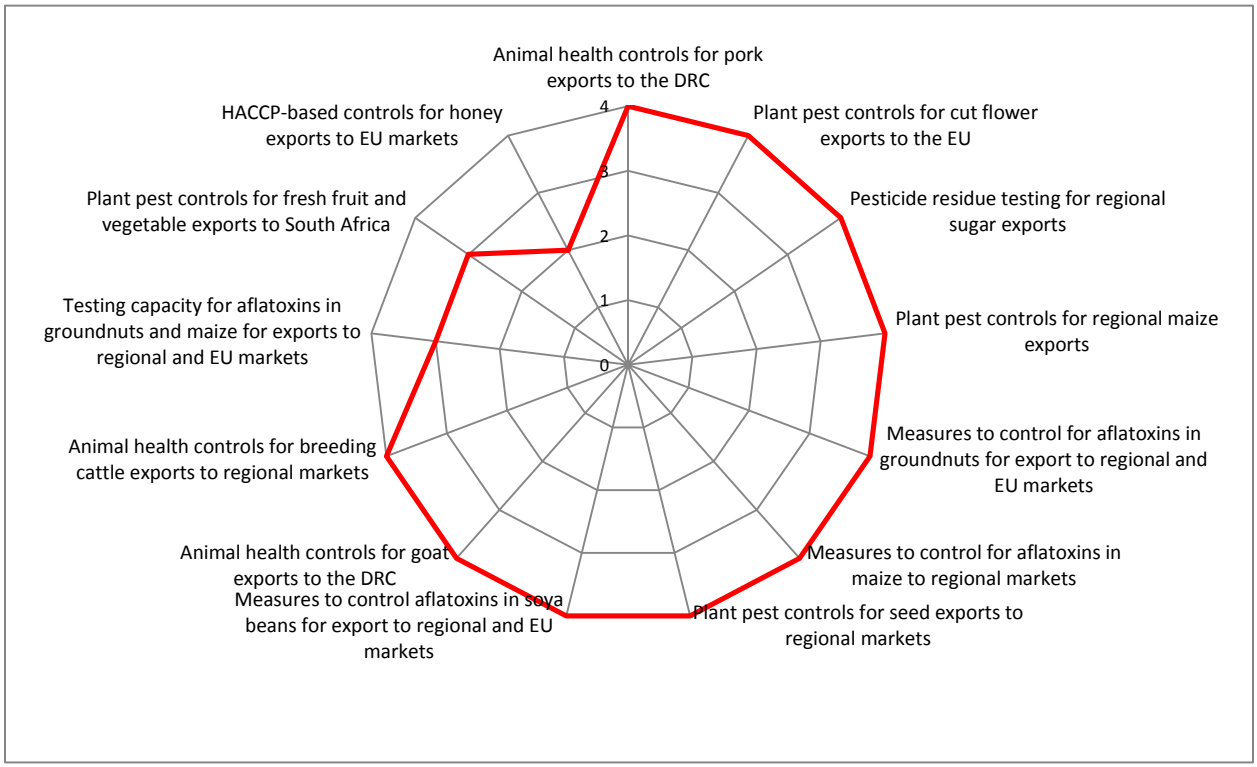
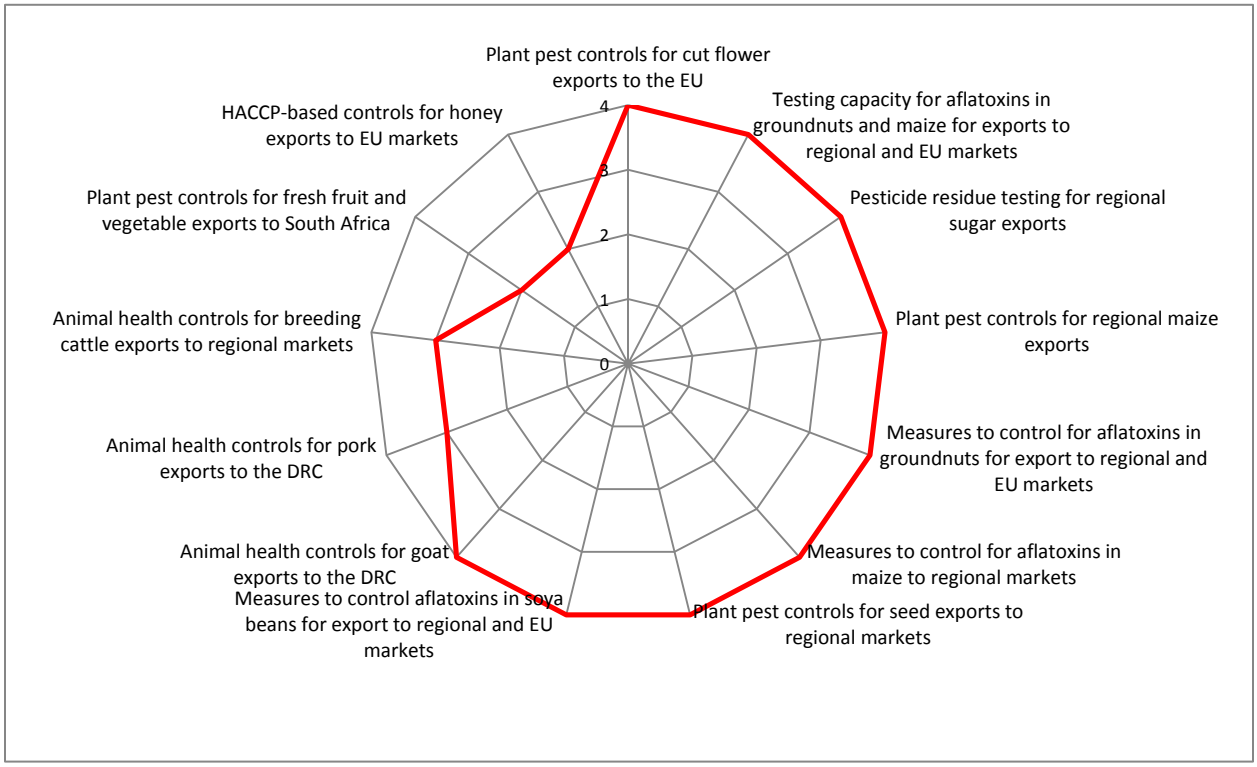
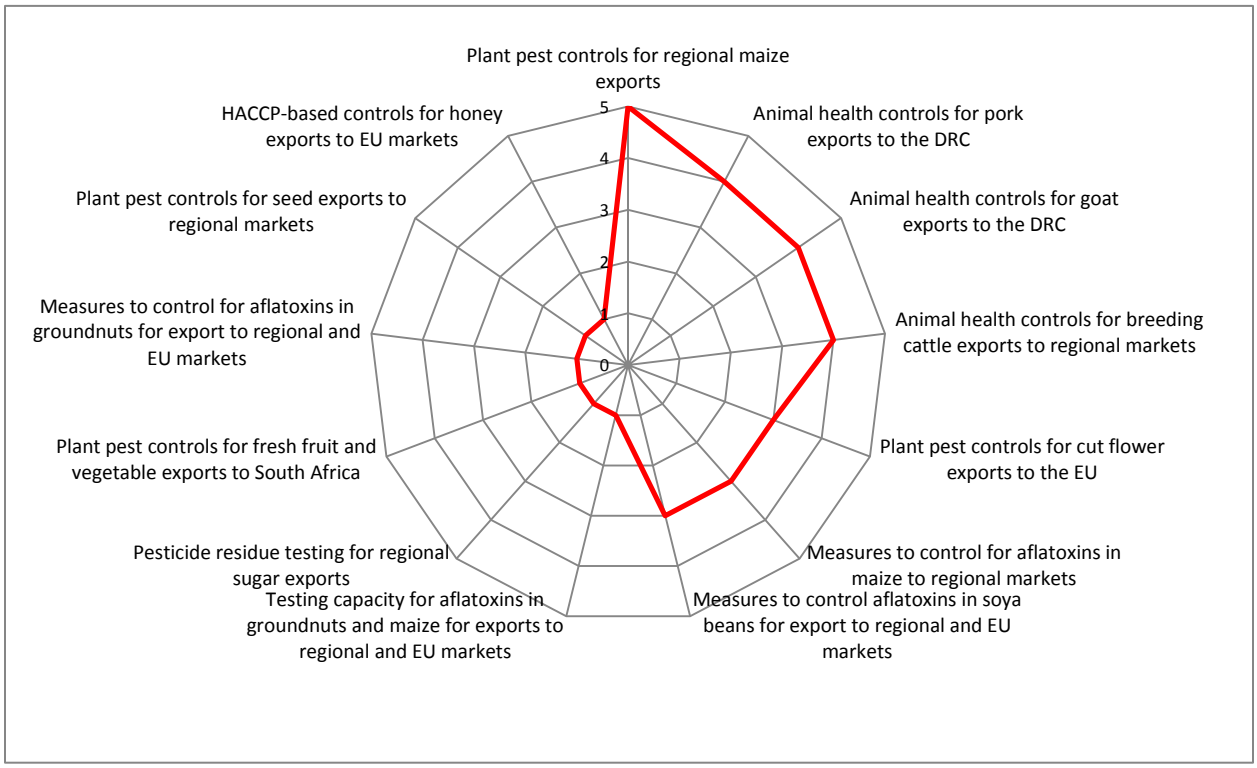


Figure 8. Decision criteria scores for impact on international reputation for SPS capacity



Figures 9 to 11 report the predicted domestic spill-overs associated with the 13 capacity-building options in terms of agricultural productivity, domestic public health and local environmental protection. The option predicted to have the most significant positive impacts on agricultural productivity is plant pest controls for regional maize exports, followed by animal health controls for pork exports to the DRC, animal health controls for goat exports to the DRC and animal health controls for breeding cattle exports to regional markets. Six of the 13 capacity-building options are judged to have little or no impact on domestic agricultural productivity.

Figure 9. Decision criteria scores for impact on agricultural productivity



Nine of the 13 capacity-building options are predicted to have no impact on domestic public health (figure 10), predominantly because they relate to animal or plant health rather than food safety issues. Of the options expected to impact domestic public health, measures to control for aflatoxins in maize to regional markets and measures to control aflatoxins in soya beans for export to regional and EU markets are judged to have the largest positive impact, reflecting the scale of aflatoxin contamination of these crops in Zambia and that significant spill-overs in terms of levels of contamination on domestic markets is expected.

Most of the capacity-building options are expected to have little or no impact on the domestic environment (Figure 11). The notable exception is plant pest controls for regional maize exports that is predicted to have a significant positive impact. The one option that is likely to have a negative environmental impact is plant pest controls for cut flower exports to the EU.

Figure 10. Decision criteria scores for impact on domestic public health

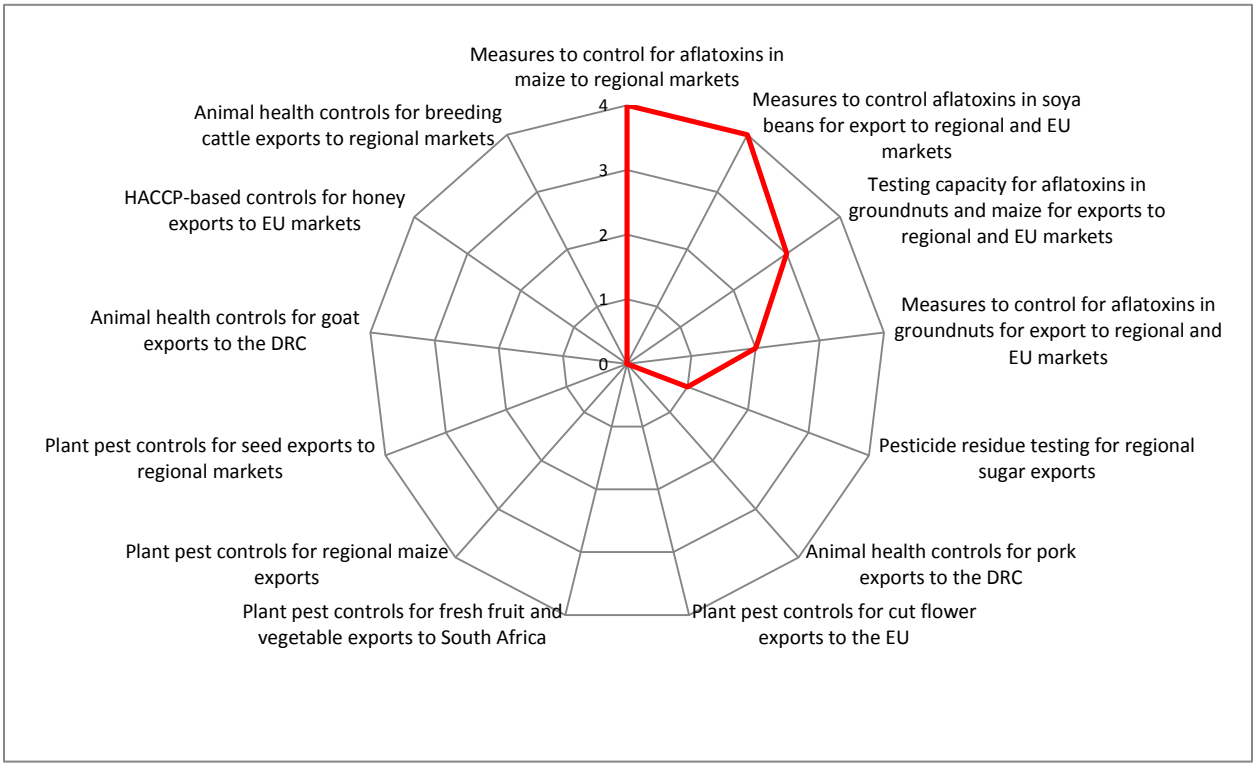
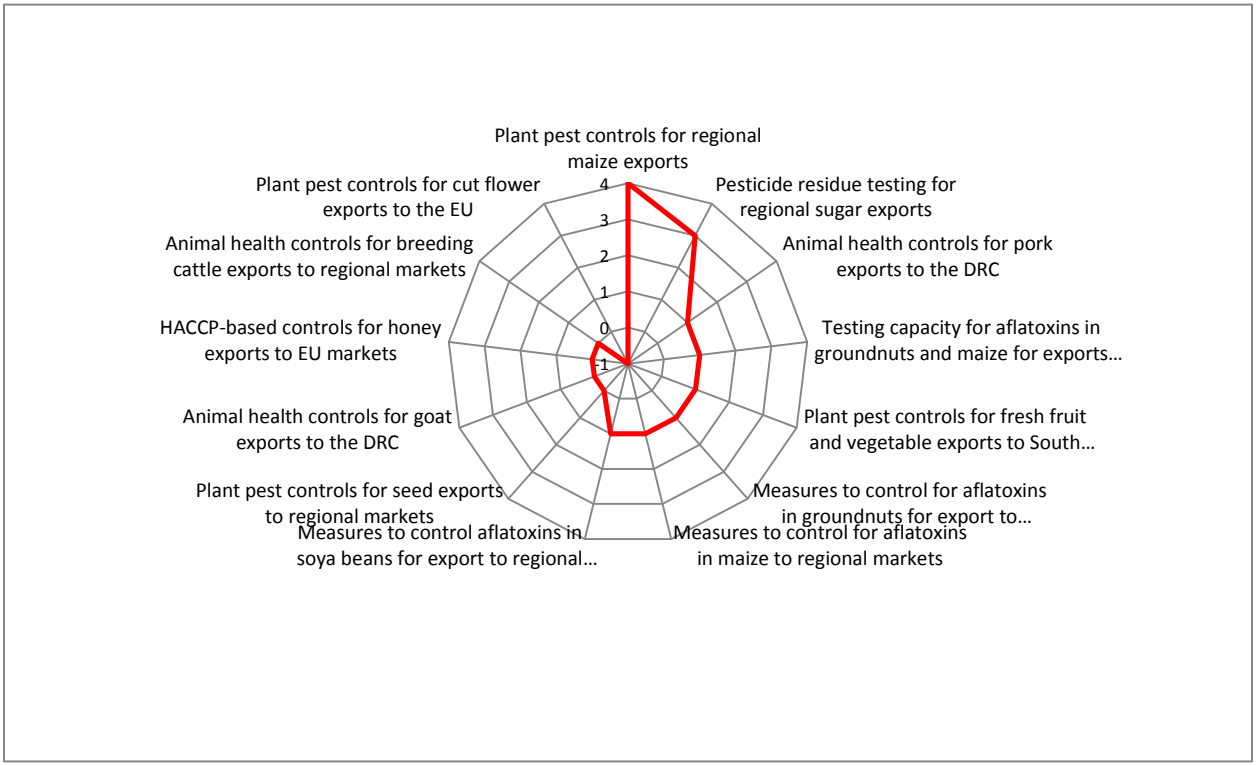
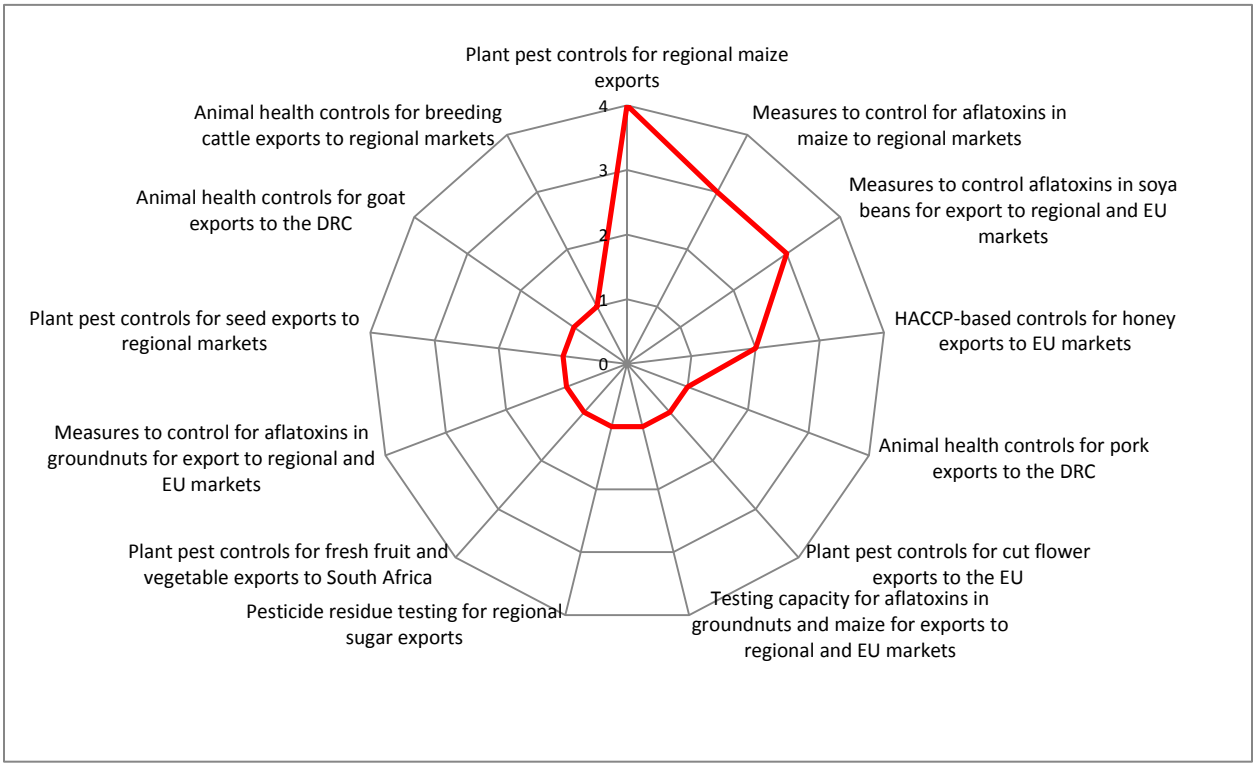


Figure 11. Decision criteria scores for impact on environmental protection



Finally, Figure 12 reports the predicated poverty impacts of the 13 capacity-building options, especially among smallholder producers. The one option that is expected to have a significant positive impact is plant pest controls for regional maize exports. It is anticipated that measures to control aflatoxins in soya beans for export to regional and EU markets and measures to control for aflatoxins in maize to regional markets will also have appreciable positive impacts on the poor. Most other options are expected to have minimal poverty impacts.

Figure 12. Decision criteria scores for impact on poverty

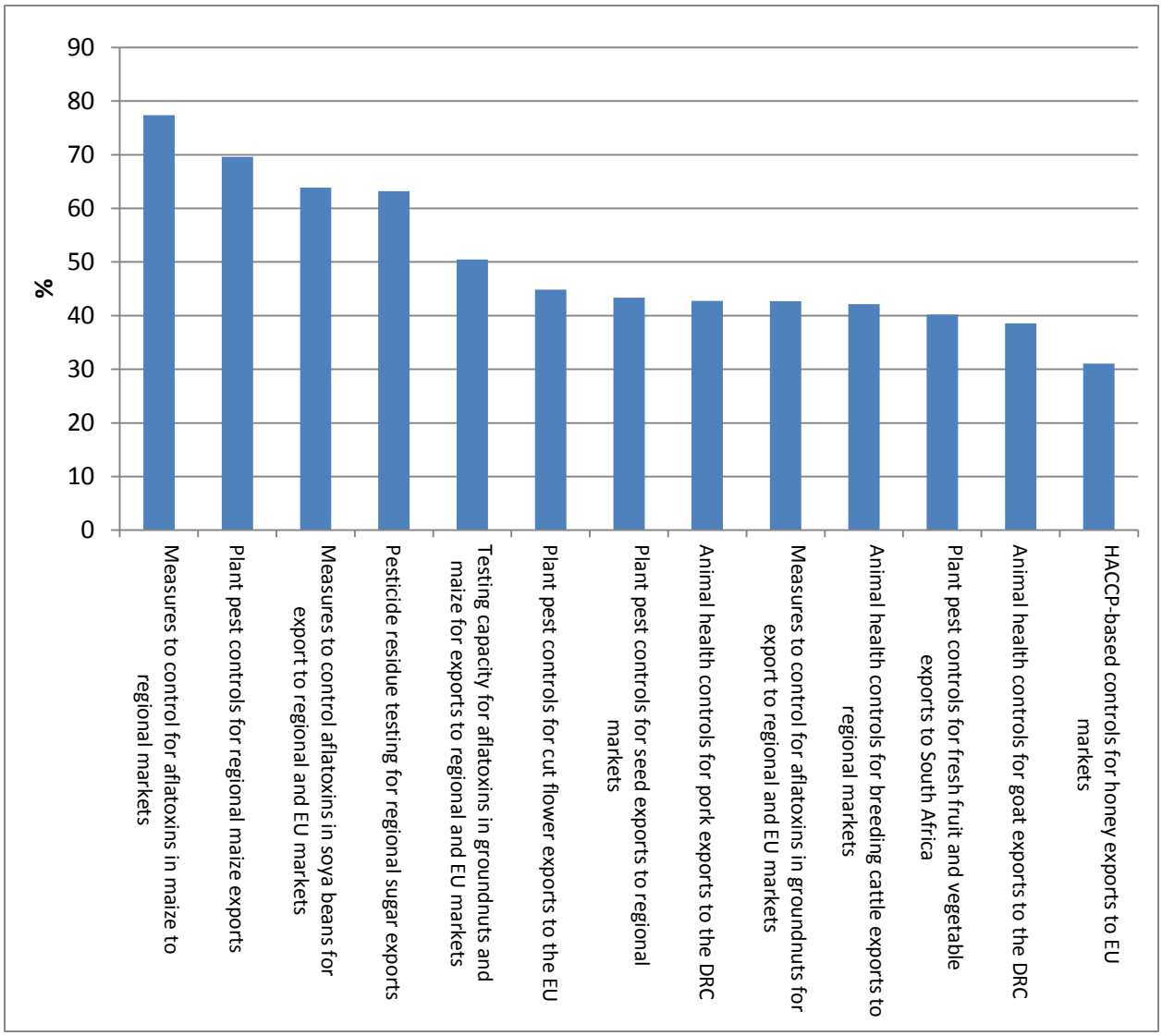


Evidently none of the 13 export-oriented SPS capacity-building options dominates across all of the 11 decision criteria, such that the prioritisation of these options is not immediately apparent. This is where the outranking analysis comes in; it compares each of the capacity-building options on a pair-wise basis with respect to each of the 11 decision criteria in turn. Each of these comparisons determines whether one option dominates (or is dominated) by another and by how much. The aggregate of all of these comparisons, taking account of the defined decision weights, gives an overall measure of preference, which is termed the net flow. The highest possible net flow any capacity-building option can achieve is 100 per cent; where that option outperforms all other options across all 11 of the decision criteria. The lowest possible net flow any capacity-building option can achieve is zero per cent; where that option is outperformed by all other options across all 11 of the decision criteria.

Figure 13 reports the net flows for the 13 capacity-building options for the baseline model that employs the decision weights defined in the stakeholder workshop. The options are prioritised from left to right. Thus, the analysis indicates that the option ranked as highest priority is measures to control for aflatoxins in maize to regional markets, with plant pest controls for regional maize exports ranked a somewhat distant second. The options Measures to control aflatoxins in soya beans for export to

regional and EU markets and pesticide residue testing for regional sugar exports are ranked third and fourth. The option ranked lowest is HACCP-based controls for honey exports to EU markets followed by animal health controls for goat exports.

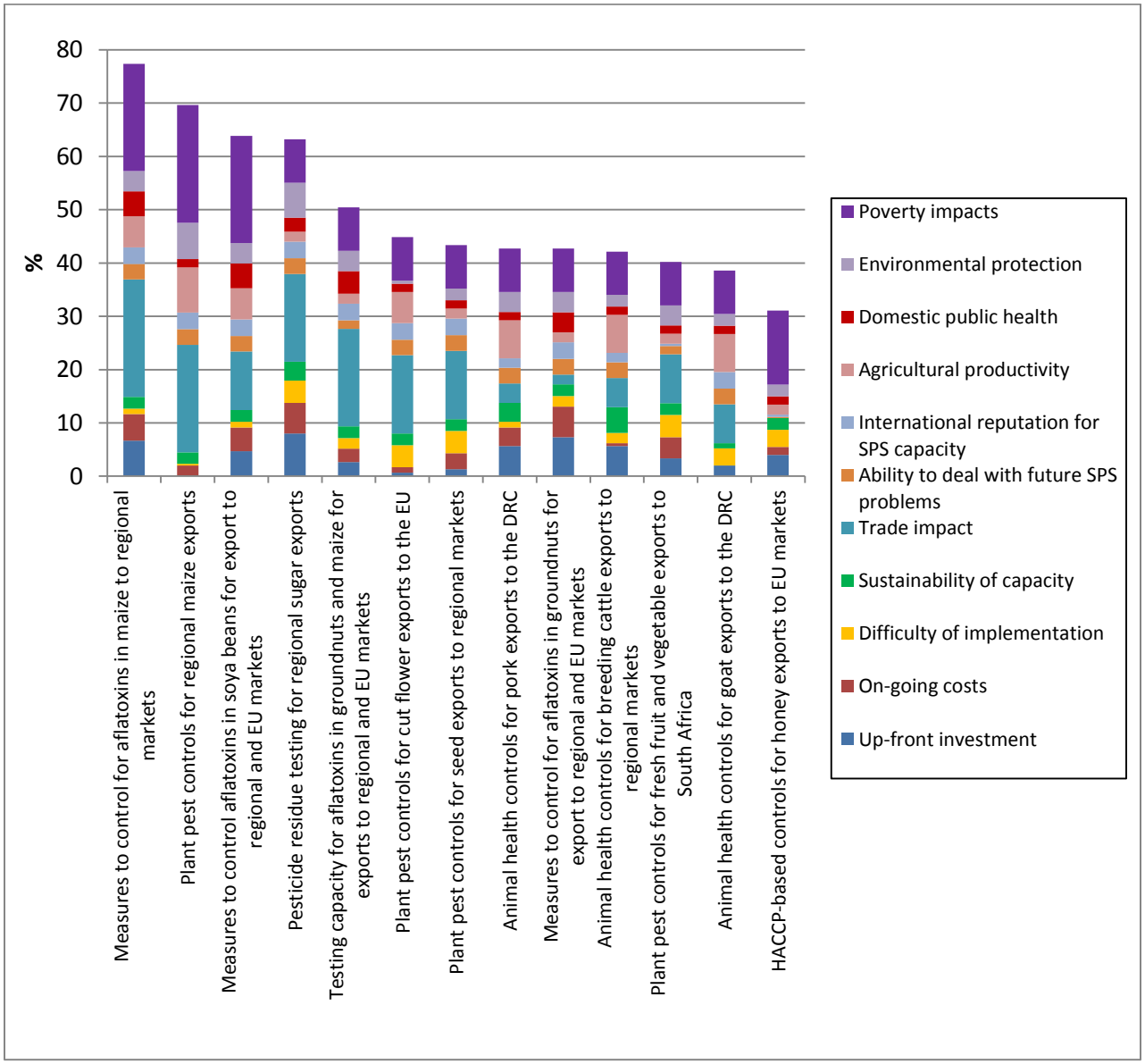
Figure 13. Net flows for baseline model



The prioritisation of the 13 export-oriented SPS capacity-building options reflects a trade-off or compromise between the 11 decision criteria. None of the options dominates all others with respect to all 11 the decision criteria, and thus has a net flow of 100 per cent. Thus, in choosing an option that is given a high priority, meaning it generally performs well with respect to the chosen decision criteria, there is an inevitable compromise in terms of under-performance with respect to certain other decision criteria. Thus, it is important to reflect on why particular capacity-building options have performed relative well or relatively badly in the prioritisation analysis by examining the contribution made by each decision criterion to the overall score that is achieved (Figure 14). Thus, measures to control for aflatoxins in maize to regional markets, the highest rank option, performs very well with respect to trade

impact and poverty impact; collectively these two decision criteria contribute 54 per cent of the score for this option. Measures to control for aflatoxins in maize to regional markets performs less well with respect to sustainability of capacity and difficulty of implementation, for example. Conversely, the lowest ranked option, HACCP-based controls for honey exports to EU markets, has a relatively high score for poverty impacts.

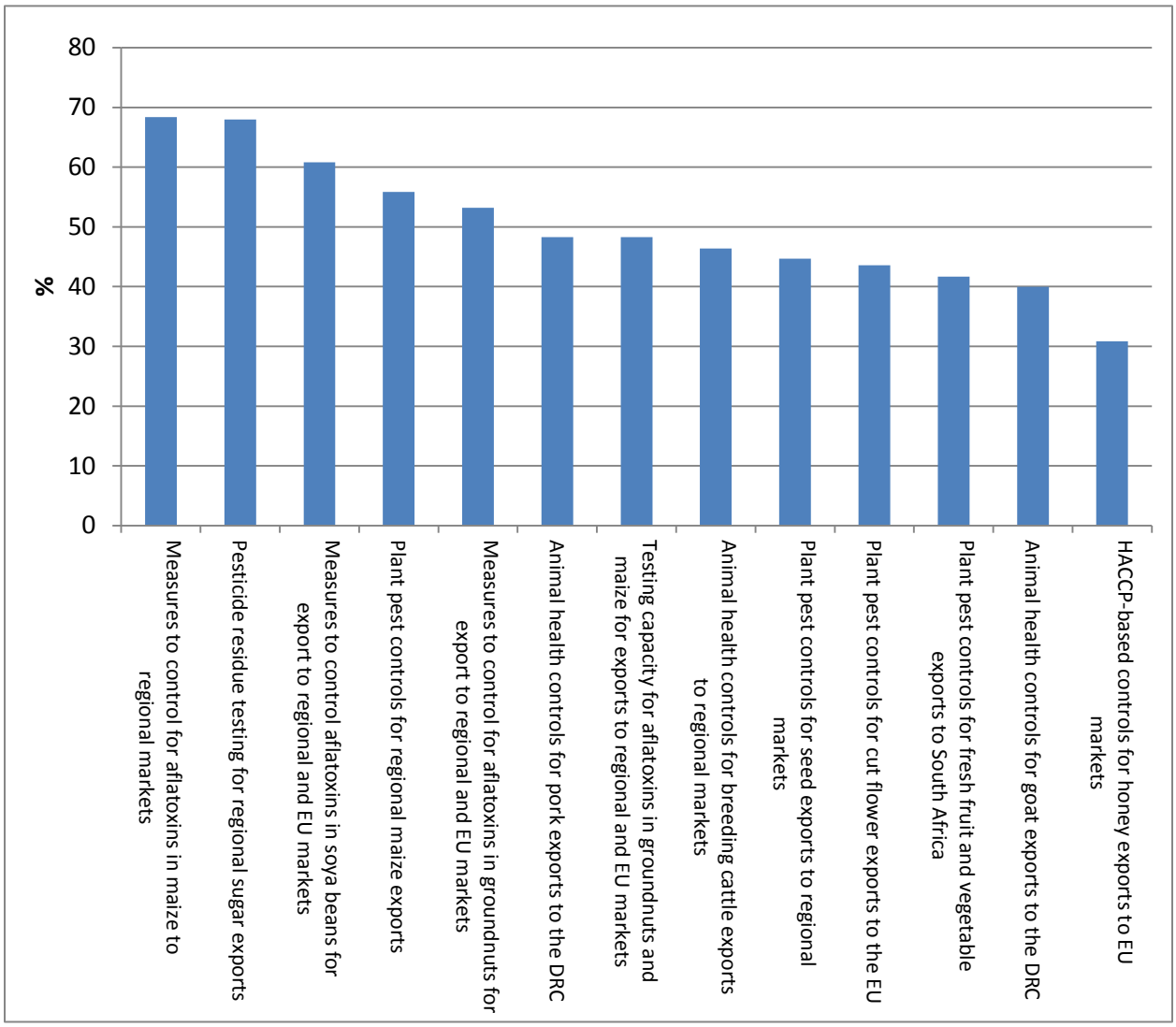
Figure 14. Contribution analysis for baseline model



The rankings in Figure 13 represent the key results of the analysis; they prioritise the 13 export-oriented SPS capacity-building options included in the analysis. I tis is important to recognise, however, that these priorities reflect the chosen decision criteria and the respective measures derived for each of the eight options, and the decision weights. The information sheets in Appendix 2 indicate that there is a

degree of uncertainty associated with some of the parameters in the outranking analysis.[11] Indeed, for some decision criteria the level of confidence in the respective measure is 'low'. This begs the question, how does the ranking of the capacity-building options change if any of these key parameters are adjusted? To answer this question, sensitivity analysis was applied to the baseline model, the results of which are reported below.

Figure 15. Net flows for equal weights model



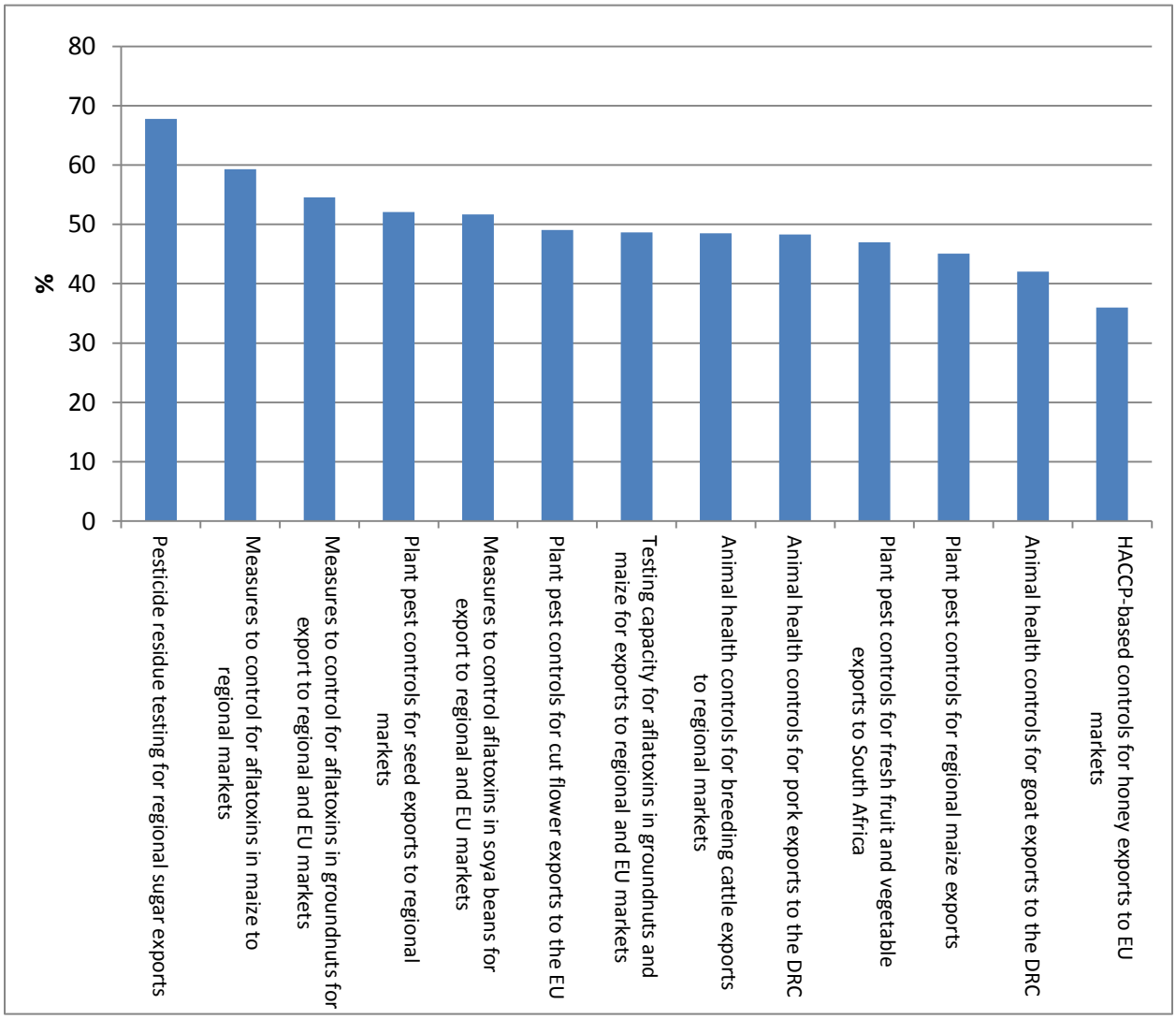
To explore the impact of changing the weights attached to the eight decision criteria, an alternative equal weights model was estimated. This model abandons the weights derived in the stakeholder workshop and assumes all criteria are weighted equally. The results of this model (Figure 15) do not differ appreciably from those of the baseline model. Thus, measures to control for aflatoxins in maize to

[11] The final column of the information sheets indicates the level of confidence in the measures for each decision criterion on a three-point scale: 'low', 'medium' and 'high'.

regional markets is still ranked top. Furthermore, the same options are ranked in the top four. The main difference between the two models is that plant pest controls for regional maize exports drops from second to fourth place in the ranking. HACCP-based controls for honey exports to EU markets and animal health controls for goat exports to the DRC remain the bottom ranked options.

To further explore the sensitivity of the prioritisation of SPS capacity-building options to changes in the decision weights, a cost and trade only model was estimated; this assumes that the only criteria driving the ranking of options are those related to cost, sustainability and difficulty of implementation and trade impact (see Table 3). Measures to control for aflatoxins in maize to regional markets is ranked second in this model. Testing capacity for aflatoxins in groundnuts and maize for exports to regional and EU markets and plant pest controls for seed exports to regional markets enter the top four ranked options. HACCP-based controls for honey exports to EU markets and animal health controls for goat exports to the DRC remain the options ranked bottom.

Figure 16. Net flows for cost and trade impact model



6. Conclusions

This report presents the initial results of a priority-setting exercise for export-oriented SPS capacity-building in Zambia employing the P-IMA framework, which provides a structured and transparent approach to ranking capacity-building options on the basis of predefined and agreed criteria. Through the framework, potential capacity-building options are identified through a process of stakeholder consultation that is informed by a review of prior assessments of SPS capacity in Zambia. In this case, 23 distinct SPS capacity-building options were identified, of which 13 were selected for inclusion in the formal priority-setting process. These 13 options are then prioritised on the basis of a series of 11 decision criteria to which weights are applied, that are again derived through a stakeholder workshop. The end result is a ranking of the 13 export-oriented SPS capacity-building options, which appears robust to changes in the decision weights.

Of the 13 export-oriented SPS capacity-building options identified, the following two are consistently ranked as amongst the top priorities:

- Measures to control for aflatoxins in maize to regional markets.
- Pesticide residue testing for regional sugar exports

Furthermore, two further options are ranked in the top four by the most defensible analysis:

- Plant pest controls for regional maize exports
- Measures to control aflatoxins in soya beans for export to regional and EU markets.

It is only when the analysis is 'stripped' down to exclude domestic spill-overs and poverty impacts that these options are excluded.

The prioritisation is based not only on the respective costs and predicted trade impacts (as in a traditional cost-benefit style analysis), but also on the basis of impacts on agricultural productivity, domestic public health, local environmental protection and. Given the robustness of the results, this basic ranking appears to present a coherent basis on which to start defining a national action plan for SPS capacity-building in Zambia.

It is important to recognise, however, that the results of the analysis represent only the starting point in the use of the P-IMA framework in the context of export-oriented SPS capacity-building in Zambia. It is critical that the results are scrutinised and revised in the light of improvements in the availability and/or quality of data, changes in policy priorities that imply shifts in the decision weights and/or the introduction of new decision criteria. Further, if new capacity-building needs arise, the analysis should be extended to incorporate these. Conversely, as investments are made in the prioritised capacity-building options that have been included in the analysis, these should be excluded and the priorities re-estimated.

It is possible that some stakeholders will be concerned about the priorities that emerge from the application of the framework in Zambia. It is important to recognise, however, that the aim of the framework is not to make decisions over investments in export-oriented SPS capacity-building *per se*, but to enhance the efficacy of established systems of decision-making. Indeed, the framework aims to facilitate a coherent and transparent debate over priorities between capacity-building options. Thus, if a

particular stakeholder is unhappy with the prioritisation, they would need to present new evidence in the form of revised data to support measures of particular decision criteria in the information cards. Alternatively, they might argue for changes to the decision criteria and/or weights employed. Such changes can then be incorporated into the model and the priorities re-estimated.

The aim is for the P-IMA framework to be used on an on-going basis to establish export-oriented SPS capacity-building priorities in Zambia. For this to happen, however, there needs to be broad acceptance of the utility of the framework and at least basic understanding of how the priorities are derived. It is important to recognise that the formal prioritisation processing using MCDA is but one component of the framework. The compilation of the information cards and simple depiction of data through spider diagrams can also be valuable in enhancing the coherence and transparency of decision-making processes.

Appendix 1. Contents of Information Dossier

World Bank/USAID (2006). Zambia: *SPS Management. Results of a Joint World Bank/USAID Assessment Team*. World Bank, Washington DC.

UNCTAD (2006). Zambia: Investment Policy Review. Available at http://unctad.org/en/docs/iteipczambia_en.pdf

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Appendix 3. Capacity-Building Option Information cards

Option 1: Animal health controls for pork exports to the DRC

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	US$133,000	Training of producers on better biosecurity. Investment in new biosecurity controls by producers (eg. foot baths, fencing, protocols etc.). Translation costs for protocols. Establishing local/regional testing capacity. Inspection staff training. Enhancement of surveillance capacity (eg. motorbikes and vehicles).	High
On-going cost	US$94,000	On-going surveillance costs. Little or no impact on production costs	High
Difficulty of implementation	4	Most production by small-scale farmers. Need for changes in knowledge and attitudes of farmers.	High
Sustainability of capacity	4	Capacity within government relatively easy to maintain based on past experience with similar initiatives. More difficult to maintain biosecurity controls by smallholders in some areas, for example Southern province, although likely to become established practice over time.	Medium
Trade impacts			
Change in absolute value of exports	$658,000	Assume achieve current value of annual South African exports to DRC by 2020, equal to $658,000.	Medium
Impact on ability to deal with future SPS problems impacting trade	4	Enhanced surveillance capacity within government and biosecurity controls by producers likely to increase ability to prevent/control future animal disease problems.	High
Impact on international reputation for SPS capacity	3	Enhanced capacity within government and experience controlling Swine Fever likely to enhanced reputation in region and internationally through OIE, SADC, AU-IBAR etc.	High
Domestic spill-overs			
Agricultural productivity	+4	Swine Fever causes death of animals and so controls will enhance productivity of pork production.	High

Domestic public health	0	Not a public health issue.	High
Environmental protection	+1	Diseased animals that are slaughtered are incinerated. No appreciable change in scale of production to achieve exports.	Medium
Social impacts			
Poverty impact, especially amongst small-scale producers	+1	Most production by small-scale farmers. Significant in number but only marginal impacts on returns to farmers of exports to the DRC.	Medium

Option 2: Plant pest controls for cut flower exports to the EU

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	$1,277,000	Purchase of diagnostic tools. Training of farmers. Training of NPPO inspectors. Infrastructure for inspection and surveillance.	High
On-going cost	$203,000	On-going training/awareness raising of farmers. On-going training/awareness raising of inspectors. On-going surveillance costs. On-going inspection costs.	High
Difficulty of implementation	1	Small number of large farms dominate exports (around 10). One point of exit for exports. Farmers generally well educated. Farmers near to Lusaka. Easy to implement	High
Sustainability of capacity	3	Once training and awareness-raising undertaken and capacity developed relatively easy to maintain provided value of exports is sustained. However, significant reduction in value of exports in 2014 raises some questions over this. Are issues over on-going funding of inspection and surveillance given inspection fees are remitted to the Ministry of Finance rather than staying with the NPPO.	Medium
Trade impacts			
Change in absolute value of exports	$6.77 million	Farmers are charged K15 000 ($2.90) per interception. The number of interceptions annually over the period 2013 to 2015 was four, estimated to involve 900Mt of cut flowers which were destroyed in 2014. The loss in trade is estimated at $3.36 million given an average unit value in 2014 of $3,737/tonne. Exports of flowers are expected to grow by 25% within five years as a result of these enhanced controls, valued at $3.41 million.	Medium
Impact on ability to deal with future SPS problems impacting trade	4	Significant. Enhanced surveillance and inspection capacity will significantly increase ability to detect future pest problems.	High
Impact on international reputation for SPS capacity	4	Reduced interceptions in export markets and increased inspection and surveillance capacity of NPPO will increase confidence in Zambian plant pest controls for exports across current and potential markets.	High

Domestic spill-overs			
Agricultural productivity	3	Pests have significant impact on productivity.	High
Domestic public health	0	None – not a food safety issue	High
Environmental protection	-1	Moderate impact on the environment. May be increased use of pesticides. Scale of production quite limited.	High
Social impacts			
Poverty impact, especially amongst small-scale producers	+1	Around 10 large-scale farms with estimated workforce of around 4,000.	High

Option 3: Testing capacity for aflatoxins in groundnuts and maize for exports to regional and EU markets

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	$540,000	Procurement of at three HPLCs and associated accessories to be initially placed in three provincial centres to provide the necessary testing services so as to support export of safe groundnuts and maize and their products. In addition fluorescence detectors, field testing kits (e.g. Acuscan) and the necessary accessories (including certified reference materials (CRMs)) to test for presence and to quantify aflatoxin will be required. Capacity-building/training of technicians on sample preparation and analysis on-site and/or externally. Capacity building for farmers in use of field kits to test for aflatoxin will also be required.	High
On-going cost	$108,000	This includes maintenance of equipment, procurement of reagents including staff and farmer refresher training.	Medium
Difficulty of implementation	3	There is capacity in the country on the use of the equipment which should facilitate the establishment of the new laboratories. However, equipment has to be procured which could be quite costly. In addition, laboratory space which could be renovated existing structures or new structures may be required.	Medium
Sustainability of capacity	3	Once established sustainability unlikely to be a major problem, although somewhat dependent on the demand for testing services.	Medium
Trade impacts			
Change in absolute value of exports	US$26.21 million	Combined maize and groundnut exports were US$174.73 million in 2014. Enhanced testing capacity for aflatoxins could potentially increase the value of exports, through greater volumes and reduced price discounts, by 15% within five years.	Medium
Impact on ability to deal with future SPS problems impacting trade	3	The impact is quite significant as aflatoxins are a major public health issue and negatively affect regional and international trade.	High
Impact on international reputation for SPS capacity	4	The impact on international and regional market will be significant as Zambia will be known to have systems to mitigate and test for aflatoxins.	High

Domestic spill-overs			
Agricultural productivity	+1	Though not directly linked to productivity, results obtained can cause mitigation measures to be implemented to reduce levels of aflatoxin contamination at the production and storage stages thereby increasing the value of the products.	Medium
Domestic public health	+3	Uncertain. Could enhance public health if leads to lower levels of aflatoxins in maize and groundnuts overall. Alternatively, could have minimal impact on domestic markets if tests are applied almost exclusively to exports.	Low
Environmental protection	+1	Minimal impact given the enhanced control measures in production are unlikely to have substantive environmental effects.	Low
Social impacts			
Poverty impact, especially amongst small-scale producers	+3	Maize and groundnut production is predominantly by smallholder/subsistence farmers thus, with increased exports, farmers would be encouraged to expand production for exports which will generate greater returns.	Medium

Option 4: Pesticide residue testing for regional sugar exports

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	$15,000	Procurement of field testing kits (e.g. Acuscan) and the necessary accessories including certified reference materials (CRMs) to test for presence of, identify and quantify. Capacity building/training of technicians on sample preparation and analysis both on-site and/or externally.	High
On-going cost	$8,000	On-going training for technicians. Awareness-raising on the availability and capacity to test targeted at potential users of the equipment. On-going equipment maintenance costs. On-going costs for procurement of CRMs and reagents. On-going costs for accreditation	High
Difficulty of implementation	1	The available staff are generally well trained and have the necessary background knowledge so that implementation will not be difficult. Production mainly undertaken on larger farms.	High
Sustainability of capacity	4	Once equipment is commissioned and training for technicians is conducted and awareness-raising undertaken, the capacity developed is relatively easy to maintain provided clients use the equipment and pay for services provided. Scale of exports suggests will be sufficient demand.	High
Trade impacts			
Change in absolute value of exports	$11.08 million	Compliance with pesticide residue requirements is increasingly important in regional trade. However, requirements for testing are likely to remain significantly less strict that for exports to international markets. Therefore, only expect a marginal increase, of around 5%, on the value of sugar exports to regional markets within five years.	Medium
Impact on ability to deal with future SPS problems impacting trade	4	Significant. The testing capacity will significantly increase ability to detect presence of pesticide residues and allow smooth export of sugar into the future. Testing capacity also applicable to pesticide residue testing for other commodities.	High
Impact on international reputation for SPS capacity	4	The ability to undertake accredited tests will enhance Zambia's reputation with respect to controls on pesticide residues.	High

Domestic spill-overs			
Agricultural productivity	+1	Though not directly linked to productivity, results obtained can cause mitigation measures to be implemented to reduce levels of pesticide contamination at the production stage.	Medium
Domestic public health	+1	May be some spillovers onto domestic market although primary focus of pesticide residue testing is likely to be on exports	Medium
Environmental protection	+3	Potentially significant impact considering the scale of sugar production and magnitude of pesticide use which could be reduced as a result.	Medium
Social impacts			
Poverty impact, especially amongst small-scale producers	+1	Moderate impact on poverty because sugar production is predominantly by large-scale capital intensive commercial farms with only a few medium-scale producers.	High

Option 5: Plant pest controls for table grapes exports to South Africa

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	$500,000	Purchase of diagnostic tools. Training of farmers. Training of NPPO inspectors. Infrastructure for inspection and surveillance.	High
On-going cost	$80,000	Awareness raising of farmers. On-going surveillance costs. On-going inspection costs.	High
Difficulty of implementation	1	At the moment, only one farmer has expressed interest in exporting grapes to South Africa. One point of exit for export. The Farmer is well educated and is located within Lusaka.	High
Sustainability of capacity	3	If enhanced surveillance, mass trapping of fruit flies and use of IPM techniques, relatively easy to maintain provided value of exports is sustained. So far the farmer has exported 100 tonnes to South Africa in the last season. Currently, insufficient funds to undertake surveillance because of lack of funds.	Medium
Trade impacts			
Change in absolute value of exports	$1,715,000	Exports to South Africa in 2014 valued at $343,000. Effective control of pests will enable exports to expand significantly over the next five years. Assuming growth of 400% the estimated trade impact is $1,715,000. Assumes key constraint to exports is current problem with controlling plant pests on table grapes.	Medium
Impact on ability to deal with future SPS problems impacting trade	3	Significant. Enhanced surveillance and mass trapping, IPM techniques will significantly increase ability to detect and control future pest problems across other crops.	High
Impact on international reputation for SPS capacity	2	IPM strategies by the farmer, increased inspection and surveillance capacity of NPPO will increase confidence in Zambian plant pest controls for exports across current and potential markets, despite limited scale of production for this specific problem.	High

Domestic spill-overs			
Agricultural productivity	+1	Pests have significant impact on productivity. However, limited scale of production.	High
Domestic public health	0	None – not a food safety issue.	High
Environmental protection	+1	Moderate impact on scale of production because fruit flies occur all over Zambia due to increased use of pesticides. Although the scale of production is quite limited unless IPM is used for pest control.	High
Social impacts			
Poverty impact, especially amongst small-scale producers	+1	Minimal impact because only 1 farmer with estimated workforce of around 300.	High

Option 6: Plant pest controls for regional maize exports

Decision Criterion	Value	Details	Confidence
Cost			
Up-front investment	$1.30 million	Purchase of diagnostic tools. Training of farmers. Training of NPPO inspectors. Infrastructure for inspection and surveillance	High
On-going cost	$150,000	Awareness raising of farmers. On-going surveillance costs. On-going inspection costs	High
Difficulty of implementation	5	Maize is one of the major export crops in Zambia and is widely grown by both commercial and small scale farmers. The bulk of exports through the Food Reserve Agency is from small-scale farmers. There are several exit points for exports. Not all farmers are well educated and they are widely spread throughout the country.	High
Sustainability of capacity	3	If surveillance is undertaken, and diagnostic tools are procured, inspectors are trained, accurate diagnosis will be achieved and trade will not be restricted. Thus, this is easy to maintain provided an adequate supply of primers and antibodies are available.	Medium
Trade impacts			
Change in absolute value of exports	$34.43 million	Over the period 2010 to 2014, the value of maize exports averaged $172.13 million, with significant year-to-year variation. Currently, most regional markets do not require testing for this disease. However, this is expected to change in the future, threatening market access. Thus, if this option is not pursued, could be loss of regional markets, only a proportion of which could be offset to exports elsewhere given transport costs, etc. Conservative estimate of the trade benefit is the avoidance of 20% of exports valued at	Medium
Impact on ability to deal with future SPS problems impacting trade	4	Significant. Surveillance, delineation of disease free-areas and disease control and identification will make control of future plant disease issues easier to identify and control.	High
Impact on international reputation for SPS capacity	4	Accurate identification of the disease will increase confidence in Zambian plant pest controls for exports in the region and potential wider international markets.	High

Domestic spill-overs			
Agricultural productivity	+5	Significant impact as the disease can potentially reduce production significantly. Affects up to 100% of production.	High
Domestic public health	0	None – not a food safety issue.	High
Environmental protection	+4	Significant given scale of production. Will lead to reduced use of pesticides.	High
Social impacts			
Poverty impact, especially amongst small-scale producers	+4	Maize is a stable crop for Zambia. Reducing crop losses likely to enhance livelihood of many smallholder farmers that number in the millions.	High

Option 7: Measures to control aflatoxins in groundnuts for export to regional and EU markets

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	$45,000	Training of farmers in good agricultural practices to mitigate against aflatoxin contamination. Establishing provincial testing capacity to check for presence of contamination. Training of agricultural extension service officers to assist local farmers. Enhancement of surveillance capacity for extension service officers (e.g. vehicles).	High
On-going cost	$8,000	On-going training for farmers including translation costs in local languages. On-going surveillance costs, including sampling and testing. On-going equipment maintenance costs.	High
Difficulty of implementation	3	Groundnut production is predominantly by small-scale farmers who will need to learn and appreciate new practices. May be additional costs for producers.	Medium
Sustainability of capacity	3	Capacity within the institution is relatively easy to maintain once developed based on past experience with similar initiatives. With the farmers, continuous and consistent surveillance by extension services will eventually result into them understanding and appreciating the new practices.	High
Trade impacts			
Change in absolute value of exports	$260,000	Marginal increase in the overall value of exports because production of groundnuts remains low due to poor commercialisation of the crop. Assuming a 10% increase in regional exports from the current value of $2.60 million per million gives $260,000. The high cost of transportation to the EU (versus value of groundnuts) makes it uncompetitive to export.	High
Impact on ability to deal with future SPS problems impacting trade	4	Significant. The measures implemented will lead to more effective controls in production and generate significant capacity in the implementation of effective SPS controls in production. Enhanced surveillance capacity will enable future problems to be identified more expeditiously.	High
Impact on international reputation for SPS capacity	4	Significant. The measures implemented will significantly increase the ability to control and detect aflatoxins in groundnuts. There will be greater confidence in export markets as to Zambia's ability to implement effective SPS controls in production.	High

Domestic spill-overs			
Agricultural productivity	+1	Reduced levels of aflatoxins in production should lead to lower levels of rejections, higher prices, etc.	High
Domestic public health	+2	A major domestic public health issue. If successfully could lead to overall lowers levels of aflatoxin contamination in groundnuts in Zambia.	Medium
Environmental protection	+1	Minimal impact given the enhanced control measures in production are unlikely to have substantive environmental effects. Furthermore, scale of production limited.	Low
Social impacts			
Poverty impact, especially amongst small-scale producers	+1	Enhanced controls on aflatoxins could ultimately enhance the returns to maize production, albeit marginally. However, scale of groundnut production limited.	High

Option 8: Measures to control for aflatoxins in maize to regional markets

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	$70,000	Training of farmers on good agricultural practices to mitigate against aflatoxin contamination. Establishing provincial testing capacity to check for presence of contamination. Training for Agricultural extension service officers to assist local farmers. Enhancement of surveillance capacity for extension service officers (e.g. vehicles).	High
On-going cost	$24,000	On-going training for farmers including translation costs in local languages. On-going surveillance costs including sampling and testing On-going equipment maintenance costs.	High
Difficulty of implementation	4	Maize production is predominantly by small-scale farmers who will need to learn and appreciate new practices from the traditional ones. Literacy will be an issue	High
Sustainability of capacity	3	Capacity within the institution is relatively easy to maintain once developed based on past experience with similar initiatives. With the farmers, continuous and consistent surveillance by extension services will eventually result in them understanding and appreciating the new practices.	High
Trade impacts			
Change in absolute value of exports	$35.70 million	The annual value of maize exports to the region averaged $178 million over the period 2010 to 2014. There is no clear trend towards growth in exports. Due to more effective controls on aflatoxins, giving reduced wastage and lower production costs, it is estimated that annual exports could expand by 20% within five years.	High
Impact on ability to deal with future SPS problems impacting trade	4	Significant. The measures implemented will assist prevent and/or reduce the levels of aflatoxin in maize and lead to easy acceptance/access of Zambian maize current and potential international/regional markets.	High
Impact on international reputation for SPS capacity	4	Significant. The measures implemented will lead to more effective controls in production and generate significant capacity in the implementation of effective SPS controls in production. Enhanced surveillance capacity will enable future problems to be identified more expeditiously.	High

Domestic spill-overs			
Agricultural productivity	+3	Reduced levels of aflatoxins in production should lead to lower levels of rejections, higher prices, etc.	High
Domestic public health	+4	A major domestic public health issue. If successfully could lead to overall lowers levels of aflatoxin contamination in maize in Zambia.	Medium
Environmental protection	+1	Minimal impact given the enhanced control measures in production are unlikely to have substantive environmental effects.	Low
Social impacts			
Poverty impact, especially amongst small-scale producers	+3	The maize sub-sector is one of Zambia's most important economic sub-sectors for the majority of Zambians in rural towns providing employment and a source of living for majority Zambian. Enhanced controls on aflatoxins could ultimately enhance the returns to maize production, albeit marginally.	Medium

Option 9: Plant disease controls for seed exports to regional markets

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	$1.0 million	Purchase of diagnostic tools. Training of farmers. Training of NPPO inspectors. Infrastructure for inspection and surveillance. Procurements of laboratory consumables for diseases testing	high
On-going cost	$100,000	On-going training/awareness raising of farmers. On-going surveillance costs. On-going inspection costs	High
Difficulty of implementation	1	Currently two laboratories are in place which only need refurbishment. Inspectors well generally well educated and are all in one place.	High
Sustainability of capacity	3	If laboratories are refurbished, tools procured and training of diagnosticians undertaken should be sufficient demand for services to maintain the capacity. However, fact that testing fees do not flow back to the NPPO is an issue.	Medium
Trade impacts			
Change in absolute value of exports	$6.60 million	Effective disease controls for seed could significantly expand exports, at least by 20% from current levels within five years. Given current exports valued at $33 million, estimated trade impact is $6.6 million	Medium
Impact on ability to deal with future SPS problems impacting trade	4	Significant. Surveillance, delineation of disease free-areas and disease control and identification will enable future plant disease problems to be identified and controlled.	High
Impact on international reputation for SPS capacity	4	Accurate testing and disease identification will increase confidence in Zambian plant pest controls for exports across current and potential international markets.	High
Domestic spill-overs			
Agricultural productivity	+1	May affect production if no disease control measures are put in place, although impact probably quite marginal, especially given scale of production.	High
Domestic public health	0	None – not a food safety issue.	High
Environmental protection	0	Not significant. No effect on the environment.	High

Social impacts			
Poverty impact, especially amongst small-scale producers	+1	There are over five seed companies in Zambia, each of which employs around 500 people.	Medium

Option 10: Measures to control aflatoxins in soya beans for export to regional and EU markets

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	$250,000	Training of farmers on good agricultural practices to mitigate against aflatoxin contamination. Establishing provincial testing capacity to check for presence of contamination. Training for agricultural extension service officers to assist local farmers. Enhancement of surveillance capacity for extension service officers (e.g. vehicles for mobility).	High
On-going cost	$30,000	On-going training for farmers including translation costs in local languages. On-going surveillance costs including sampling and testing On-going equipment maintenance costs.	Medium
Difficulty of implementation	4	Soya bean production is predominantly by small-scale farmers who will need to learn and appreciate new practices that are very different from traditional ones. Literacy will be an issue.	High
Sustainability of capacity	3	Capacity within the institution is relatively easy to maintain once developed based on past experience with similar initiatives. With the farmers, continuous and consistent surveillance by extension services will eventually result in them understanding and appreciating the new practices.	High
Trade impacts			
Change in absolute value of exports	US$2.82million	Effective control of aflatoxin contamination would increase both the ability and confidence to export. The value of exports was US$14.10 million in 2013 Assuming that Zambia attains significant soya beans surpluses in the next five years, compliance with aflatoxin control requirements could boost exports by 20% over current levels.	Low
Impact on ability to deal with future SPS problems impacting trade	4	Significant. The measures implemented will assist prevent and/or reduce the levels of aflatoxin in soya beans and lead to easy acceptance/access of Zambian soya beans products current and potential international/regional markets.	High

Impact on international reputation for SPS capacity	4	Significant. The measures implemented will lead to more effective controls in production and generate significant capacity in the implementation of effective mitigation measures to control aflatoxin contamination in production. Enhanced surveillance capacity by extension services will enable future problems to be identified more expeditiously.	High
Domestic spill-overs			
Agricultural productivity	+3	Reduced levels of aflatoxins in production should lead to lower levels of rejections, higher prices, etc.	High
Domestic public health	+4	A major domestic public health issue. If successfully implemented could lead to overall lower levels of aflatoxin contamination in maize in Zambia.	Medium
Environmental protection	+1	Minimal impact given the enhanced control measures in production are unlikely to have substantive environmental effects.	Low
Social impacts			
Poverty impact, especially amongst small-scale producers	+3	The soya beans sub-sector is one of Zambia's most important economic sub-sectors for the majority of Zambians in rural towns providing employment and a source of living for majority Zambian. Enhanced controls on aflatoxins could ultimately enhance the returns.	Medium

Option 11: Animal health controls for goat exports to the DRC

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	US$664,000	Disease awareness programmes for producers, traders and general public (e.g. TV, Radio, leaflets, meetings etc.). Translation costs. Training of field staff in disease identification. Enhancement of national and regional surveillance and diagnostic capacity (e.g. testing kits, motorbikes, vehicles etc.).	High
On-going cost	US$941,000	On-going surveillance costs. On-going vaccination costs. On-going training/awareness raising of farmers. Little or no impact on production costs	High
Difficulty of implementation	2	Most production by small-scale farmers. Need for changes in knowledge and attitudes of farmers, traders and general public.	High
Sustainability of capacity	2	Capacity within government relatively easy to maintain based on past experience with similar initiatives.	Medium
Trade impacts			
Change in absolute value of exports	US$1.17 million	It is estimated that Zambia exports 140,000 goats annually to the DRC through Kasumbalesa border at an average price of K400 per goat. Total exports were estimated at K58, 400,000 ($5,840,000) in 2014. Enhanced animal health controls will increase these exports by an estimated 20% through increased productivity and avoidance of mortality losses.	Medium
Impact on ability to deal with future SPS problems impacting trade	4	Enhanced vaccination and surveillance capacity within government likely to increase ability to prevent/control future animal disease problems.	High
Impact on international reputation for SPS capacity	4	Enhanced capacity within government and experience controlling PPR likely to enhanced reputation in region and internationally through OIE, SADC, AU-IBAR etc.	High
Domestic spill-overs			
Agricultural productivity	+4	PPR causes up to 90% mortality in naive animals and so controls will enhance productivity of goat and sheep production.	High
Domestic public health	0	Not a public health issue	High

Environmental protection	0	No environmental consequences due to the control methods.	High
Social impacts			
Poverty impact, especially amongst small-scale producers	+1	Most production by small-scale farmers. Significant in number but only marginal impacts on returns to farmers of exports to the DRC.	Medium

Option 12: HACCP-based controls for honey exports to EU markets

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	US$266,000	Development of baseline data/situation analysis to identify critical control points in the Zambian honey chain. Development of protocols for producers, processors, regulators and transporters. Translation costs of protocols	Medium
On-going cost	US$188,000	On-going costs for inspectors. On-going training costs for producers, processors and transporters	Medium
Difficulty of implementation	2	Relatively easy as producers are in associations so are easy to organise.	Medium
Sustainability of capacity	3	Capacity within government relatively easy to maintain based on past experiences with similar initiatives. Sustainability of capacity within the associations is relatively easy as they have a structured organisation.	High
Trade impacts			
Change in absolute value of exports	US$122,000	Honey exports to the EU in 2014 were worth US$407,000. HACCP-based controls would increase exports to the EU by an estimated 30% through reduction in rejections/interceptions or capturing of new markets.	Medium
Impact on ability to deal with future SPS problems impacting trade	2	Enhanced HACCP controls/monitoring by producers and processors likely to increase ability to deal with future SPS issues impacting trade. However, scale of production relatively small and so overall impact probably quite small.	High
Impact on international reputation for SPS capacity	2	Enhanced capacity within government and experience in implementing HACCP controls likely to enhanced reputation in region and internationally through increased honey sales. However, scale of production relatively small and so overall impact probably quite small.	High
Domestic spill-overs			
Agricultural productivity	+1	Implementing HACCP will not necessarily increase productivity. However HACCP will contribute to improved quality and subsequently improve market access. This in turn will attract more people into honey production	Medium
Domestic public health	0	Focus on exports and so impact on honey production for domestic markets likely to be minimal.	High

Environmental protection	0	No environmental consequences due to interventions	High
Social impacts			
Poverty impact, especially amongst small-scale producers	+2	Most production is by small-scale farmers. Better HACCP controls likely to increase EU market for the producers. However, numbers engaged in production for export quite small.	High

Option 13: Animal health controls for breeding cattle exports to regional markets

Decision Criterion	Value	Details	Confidence
Cost, sustainability and difficulty of implementation			
Up-front investment	US$133,000	Disease awareness programmes for producers, traders and general public (e.g. TV, Radio, leaflets, meetings etc). Translation costs. Enhancement of national and regional surveillance and diagnostic capacity (e.g. testing kits, motorbikes, vehicles etc.).	Medium
On-going cost	US$282,000	On-going sero-surveillance costs. On-going vaccination costs. On-going test and slaughter costs. On-going training/awareness raising of farmers	Medium
Difficulty of implementation	3	Most production is by small-scale farmers. Need for farmers, traders and general public to appreciate and understand their roles in the national CBPP control and eradication strategy.	Medium
Sustainability of capacity	5	Capacity within government relatively easy to maintain based on past experience with similar initiatives.	High
Trade impacts			
Change in absolute value of exports	US$927,000	Live cattle exports from Zambia are currently very low with a value of about US$73,000 in 2013. Enhanced animal disease control would firstly increase production such that Zambia would be able to export the surplus to the region. Within five years, it is estimated that Zambian exports could grow to around $1 million.	Medium
Impact on ability to deal with future SPS problems impacting trade	4	Enhanced vaccination and sero-surveillance capacity within government is likely to increase ability to prevent/control future animal disease problems.	High
Impact on international reputation for SPS capacity	3	Enhanced capacity within government and experience controlling PPR likely to enhanced reputation in region and internationally through OIE, SADC, AU-IBAR etc.	High
Domestic spill-overs			
Agricultural productivity	+4	CBPP causes mortalities in animals and so controls will enhance cattle productivity and production.	High
Domestic public health	0	Not a public health issue	High

Environmental protection	0	Minimal environmental consequences due to the control measures	High
Social impacts			
Poverty impact, especially amongst small-scale producers	+1	Most production by small-scale farmers. Significant in number but only marginal impacts on returns to farmers of exports to the DRC.	Medium