Using Multi Criteria Decision Analysis to Identify and Prioritise Key Sanitary and Phytosanitary Capacity Building Options and Needs for Armenia

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1 Abbreviations

AMD	Armenian dram
EEU	Eurasian Economic Union
EU	European Union
GDP	Gross Domestic Product
FAO	The Food and Agriculture Organization of the United Nations
HACCP	Hazard Analysis Critical Control Point
IPPC	International Plant Protection Convention
ITC	International Trade Centre
LACF	Low Acid Canned Foods
LMG	Metabo liteleucomalachite green
MCDA	Multi-criteria decision analysis
MG	Malachite Green
OIE	The World Organisation for Animal Health
PCE	Phytosanitary Capacity Evaluation tool
PVS	OIE tool for the evaluation of Performance of Veterinary Services
SPS	Sanitary and Phytosanitary
STDF	Standards and Trade Development Facility
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
U.S./US	United States of America
USAID	United States Agency for International Development
USD	United States Dollar
WTO	World Trade Organisation

2 Executive Summary

As part of efforts to establish more coherent and accountable decisions in the allocation of scarce resources towards competing Sanitary and Phytosanitary (SPS) capacity-building needs the use of multi-criteria decision analysis (MCDA) is advocated as a structured framework for making the costs and benefits of alternative capacity-building investments explicit and for identifying options that offer the greatest return. Because the lack of data can seriously impede such analyses the Standards and Trade Development Facility (STDF) has supported the development of an MCDA-based framework which enables SPS capacity-building options to be prioritised on the basis of a wide range of decision criteria.

This report presents the initial results of a priority-setting exercise for SPS capacity-building in Armenia which commenced with a three stakeholder workshops in January, February, and June 2022. A total of eight distinct SPS capacity-building options are identified which are judged to be substantive SPS issues. These eight (8) capacity-building options are prioritised on the basis of a series of twelve (12) decision criteria to which weights are applied. These criteria and weights are again derived through the stakeholder workshop and working group meetings established in the framework of the project. The result is a clear ranking of the eight (8) capacity-building options, which appear robust to changes in the weights attached to the decision criteria. Of the eight (8) options in the analysis the following four (4) are consistently ranked as high priority:

- Hygiene controls for egg product exports to the EU
- Pesticide residue controls for dried fruit and herb exports to the EU
- Compliance with HACCP and LACF requirements for canned food exports to the US
- Pesticide and antibiotic residue controls for honey exports to the EU.

Conversely, animal health controls for meat product exports to Russia and controls on phthalates for wine product exports to China are consistently ranked bottom of the eight (8) options under consideration.

It is important to recognize that the results of the analysis should represent the starting point in the use of MCDA in the context of SPS capacity-building in Armenia. Indeed, the results should be revisited and revised on an ongoing basis in the light of improvements in the availability and/or quality of data, changes in policy priorities and as new issues arise or investments are made in the identified options.

3 Using Multi Criteria Decision Analysis to Identify and Prioritise Export-Related Sanitary and Phytosanitary Capacity-Building Options in Armenia

3.1 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 World Trade Organization (WTO) 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 array of SPS capacity-building needs that outstrip available resources, whether from national budgets or donors. Inevitably, hard decisions have to be made to prioritise particular capacity-building needs 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 accusations of inefficiencies in the allocation of resources, whether by developing country governments or by donors[3].

As part of efforts to establish more coherent and accountable decisions in the allocation of scarce resources towards competing SPS capacity-building needs, various economic analysis techniques have been touted. 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 capacity-building needs 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 SPS capacity-building needs that might be funded by government or the private sector in developing countries, and/or donors[5]. Through the use of MCDA, the framework enables capacity-building options to be prioritised on the

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

[2] World Bank (2005), Food Safety and Agricultural Health Standards: Challenges and Opportunities for Developing Country Exports, Report 31207, 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] Henson and Masakure (2009). Op cit.

[5] Henson, S.J., and Masakure (2009). Op cit.
Henson, S.J., and Masakure, O., (2011). Establishing Priorities for SPS Capacity Building: A Guide to Multi-Criteria Decision-Making. Standards and Trade Development Facility, Geneva.

basis of a wide range of decision criteria that are not necessarily measured (or even measurable) using the same metrics.

This report provides an overview and the results of the application of the MCDA framework in Armenia. Despite the fact that some assessments of the SPS situation and capacity-building needs have been conducted in Armenia, there remains a lack of coherence in the establishment of priorities. Thus, many of the existing assessments, whilst identifying a plethora of weaknesses in capacity, generate a virtual 'shopping list' of needs that evidently outstrip available resources. Further, predominantly these assessments have focused on weaknesses in specific elements of capacity, for example plant and animal health, but with limited attention to the benefits that will flow from related capacity-building investments. Therefore, it is not surprising that Armenia lacks a coherent and prioritised plan for the enhancement of SPS capacity that might guide the Government, donors and/or private sector investments. The analysis presented below aims to inform the development of such a plan.

This report starts by providing a short overview of Armenia's nature of agri-food trade, highlighting the extent to which this trade is composed of products that might be considered 'SPS sensitive' and examining evidence that this trade is impeded by weaknesses in capacity in the areas of food safety, plant health and/or animal health. The report then proceeds to lay out the process by which SPS capacity-building needs are identified. The results of the analysis are then reported, followed by an assessment of the implications for SPS capacity-building in Armenia in the medium term.

3.2 SPS ISSUES FACING AGRI-FOOD EXPORTS FROM ARMENIA

The agricultural sector in Armenia is considered as one of the most important sectors of the economy with a contribution of about 15% to the country's GDP and 40% to employment in the country (FAO, 2020[6]). Despite of this importance and ability of the Armenian agriculture sector to grow thanks to several competitive advantages, it still is in low level of development with need in innovation, efficiency in production and clear legal environment. The farm structure in Armenia is dominated by a large number of small-scale farms with fragmented land holdings. The average farm size is about 1.48 hectares (ICARE and IFOAM, 2017). According to 2014 census data, the 317,346 family farms contribute to more than 97% of total agricultural output (FAO, 2020).

Export of agricultural products amounted USD 917,679.5 thousand in 2021, which is 20% more than in 2020 (USD 777,498.2 thousand), or almost 11% or the total export of Armenia in 2021. The most important agri-food export commodity are alcoholic beverages of an alcoholic strength by volume of less than 80% vol. valued at USD 245,716.0 thousand in 2021. Tobacco products are the second highest exported commodities with the value of USD 239,130.7 in 2021. Export of fresh fish totalled USD 55,742.3 thousand or almost five times more than in 2015. Tomatoes (USD 43,851.3 thousand) and apricots, cherries, peaches (including nectarines), plums (USD 39,943.3 thousand) exports were also amongst the top agri-food exports in 2021.

[6] FAO, 2020. Armenia at glance. http://www.fao.org/armenia/fao-in-armenia/armenia-at-aglance/en/

Table 1. Major exports of agricultural and food products from Armenia, 2015-2021 (USD thousand)

Product description	2021	2020	2019	2018	2017	2016	2015
Live bovine animals	12,678.6	4,742.6	4,169.2	1,041.6	4,926.7	558.3	1,114.5
Live sheep and goats	10,570.7	10,804.2	3,223.7	1,109.7	1,554.0	639.7	3,438.0
Fish, fresh	55,742.3	47,120.3	25,500.3	22,564.9	16,801.9	8,430.6	9,918.1
Cheese and curd	15,226.4	11,393.0	7,182.2	8,519.8	12,492.3	13,053.4	23,591.0
Potatoes	13,604.0	2,596.4	11.2	838.7	811.6	140.5	778.3
Tomatoes	43,851.3	30,459.7	22,228.6	23,194.9	13,576.0	22,898.4	1,547.0
Almonds, Hazelnuts, Walnuts, Chestnuts, Pistachios, Macadamia nut	13,216.1	5,917.5	657.1	1,563.1	482.4	4.4	26.4
Grapes (fresh, dried)	11,292.9	14,313.2	7,421.0	6,687.9	5,541.9	17,627.9	2,207.7
Apricots, cherries, peaches (including nectarines), plums and sloes	39,943.3	29,312.2	24,051.3	27,911.0	12,757.1	5,814.0	8,613.6
Strawberries, Raspberries, blackberries, mulberries and loganberries, Kiwifruit, Durians, Persimmons	17,558.8	13,865.7	10,633.5	3,471.0	5,039.3	3,132.2	181.5
Chocolate and other food preparations containing cocoa	16,822.2	13,367.3	18,397.6	16,146.2	10,620.9	3,295.7	1,897.6
Other vegetables prepared or preserved	14,923.3	11,466.9	8,911.5	9,200.3	7,367.5	4,537.3	4,818.3
Fruit, nuts and other edible parts of plants, otherwise prepared or preserved	11,871.5	10,710.1	10,462.5	10,577.8	10,046.3	7,907.0	8,690.6
Waters, including natural or artificial mineral waters and aerated waters, not containing added sugar	13,234.4	9,429.2	8,344.6	7,430.4	7,333.3	6,055.7	5,997.6
Wine of fresh grapes, including fortified wines	11,457.9	8,672.0	11,867.8	9,448.2	10,794.7	6,135.8	4,174.0
Other fermented beverages (for example, cider, perry, mead, saké)	13,003.8	10,578.7	14,908.1	8,704.2	7,824.5	4,231.2	3,169.8
Brandy, Rum, Gin, Vodka, Liqueurs	245,716.0	202,572.2	253,259.0	198,318.7	207,483.2	151,637.0	106,050.5
Cigars, cheroots, cigarillos and cigarettes	239,130.7	241,369.7	272,993.9	266,247.9	237,660.0	209,471.5	171,082.0
Other manufactured tobacco and manufactured tobacco substitutes	10,657.6	15,174.5	17,460.8	1,372.5	79.5	107.7	28.0

Source: Statistical Committee of Armenia and State Revenue Committee

Across most of its major agri-food product exports, Armenia has recorded a strong growth in recent years. Evidently, however, SPS capacity has not developed and evolved in line with the rapid evolution of these sectors. This is evidenced also by the main export markets of these products, where, according to traders, there are no strict SPS requirements. The main export market of Armenian agricultural products (HS 01-24) is Russia (and countries of the Eurasian Economic Union, EEU). Share of these products in export of commodities to Russian market continuously grows and

equals USD 534,329.5 in 2021 or 58% of the total export of agricultural products. Unlike Russia and member countries of the Eurasian Economic Union, export of agricultural products to the EU and U.S. markets accounted only 2,4% and 2,6% accordingly in 2021 (with the value of USD22,070.6 thousand and USD 23,544.6 thousand accordingly).

Though domestic regulations are generally in compliant with international norms, The weaknesses of SPS controls for many major agri-food products has been highlighted by a number of previous studies (see Annex 1). However, it is important to highlight, that no comprehensive and prioritised assessment of capacity-building needs have been done in Armenia previously.

Studies and expert assessments show that Armenian agricultural products have low competitiveness and, consequently, weak opportunities in export markets, especially in non-EEU markets. This is explained by non-compliance with the relevant safety requirements: high level of pesticide contamination, non-proper food safety protection measures, etc. The quality and safety of fruits and vegetables produced in Armenia suffer from improper pesticide and fertilizer use. In general, this is related to outdated methods and practices present in primary agriculture sector.

As a result, food safety controls implemented along value chains for many of Armenian major agri-food exports are not fully compliant with international regulatory requirements and/or the private standards applied by major buyers in the European or American markets. The fact that weaknesses in SPS capacity impact Armenia's trade performance is evidenced by data on official rejections of agri-food product consignments in a number of its major export markets (Table 2).

Due to the very small number of exports and type of products exported (mainly processed fruits and vegetables), no serious rejections were registered in the EU and U.S. markets. Number of U.S. rejections related to the residue level of pesticides (Table 3). Meat and meat products, fish and fishery products accounted for a large proportion of total rejections of Russia rejections. Armenian producers are not allowed to export live animal, meat and meat products to the EU and U.S. markets as well. Export of several types of meat products are forbidden to number of regions of Russia as well.

Table 2. Number of rejections of agri-food product imports from Armenia into the EU, U.S. and Russia, 2016 to 2021

Market	2016	2017	2018	2019	2020	2021
EU	-	-	-	-	-	-
U.S.	5	5	3	1	-	3
Russia	3	-	8	16	7	2

The rather piecemeal evidence that exists on the status of SPS capacity in Armenia suggests that there are potentially significant capacity-building needs, and that weaknesses in capacity are having significant adverse impacts on foreign trade of the country. Further, there are evidently appreciable weaknesses in capacity across food safety and plant and animal health controls. The analysis presented below sections identifies the specific capacity-building needs that exist currently, in the context of trade, and suggest how these might best be prioritised.

Table 3. Reasons for rejections of agri-food product imports from Armenia into U.S. and Russia, 2016 to 2021

Reason	U.S.	Russia
Labelling	10	
Food and/or feed additives	27	3
LACF	1	
Pesticide residues	1	
Antibiotics	1	
Contamination		6
Veterinary drugs residues		8
Hygienic condition/controls		17
Other contaminants	4	2

3.3 ESTABLISHING PRIORITIES USING A MULTI-CRITERIA DECISION-MAKING FRAMEWORK

The framework employed here aims to present a more comprehensive analysis of options for SPS capacity-building 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 SPS-related capacity-building in Armenia on the basis of the multiple economic and/or social criteria*. The rationale behind the framework, therefore, is that priorities need to be established on the basis of a range of economic and social considerations that may, at least on the face of it, be difficult to reconcile. In turn, this assumes that the rationale for investments in SPS capacity-building is not compliance with export market SPS requirements *per se*, but the economic and social benefits that might flow from such compliance, whether in terms of enhanced exports, incomes of small-scale producers and/or vulnerable groups, promotion of agricultural productivity and/or domestic public health, etc. The framework provides an approach for different decision criteria to be taken into account, even though they may be measured in quite different ways.

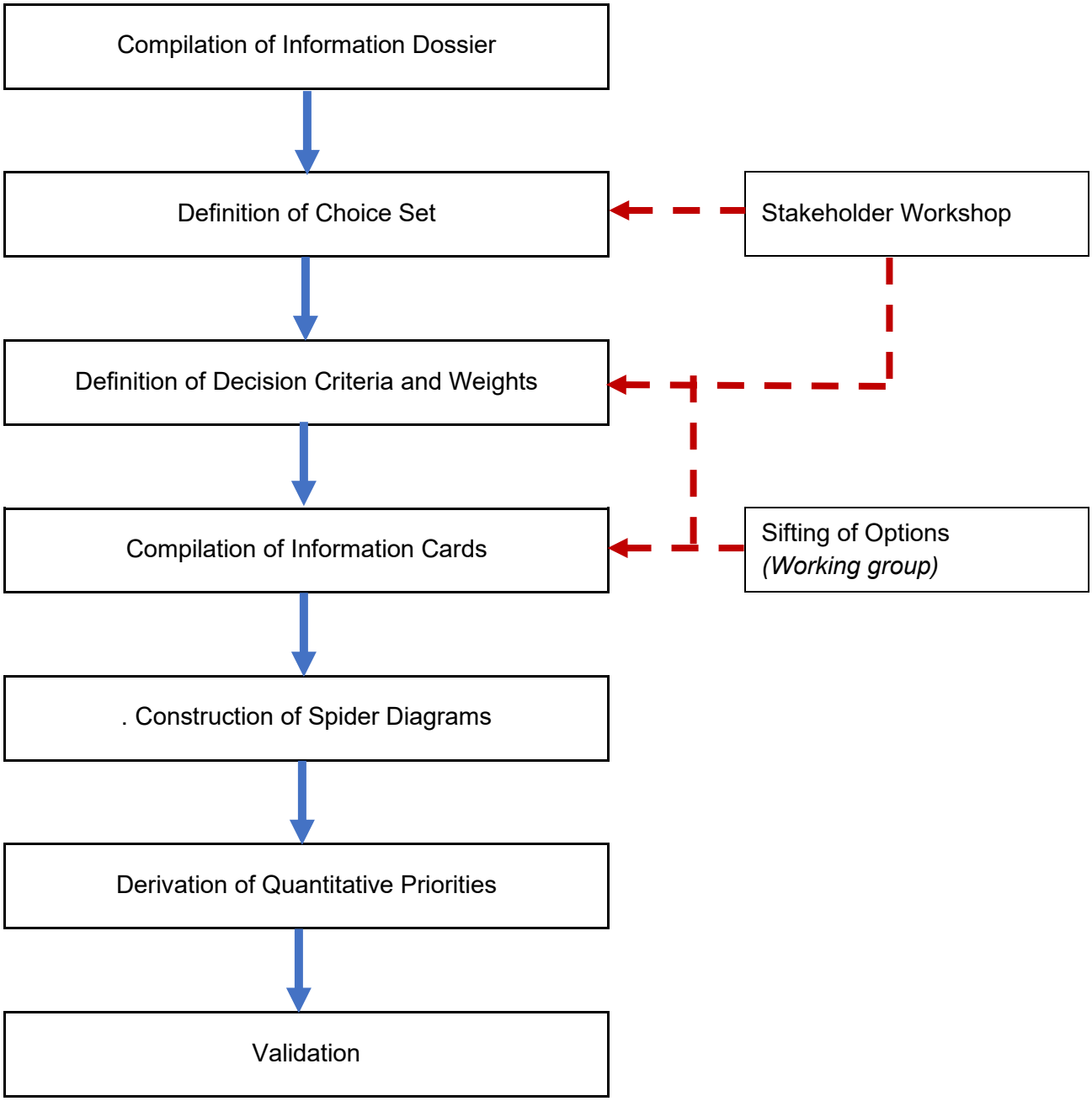
In pursuit of this objective, the framework aims to:

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

The framework employs a highly structured process that aims to be applied in a wide variety of contexts and to provide various diagrammatic and numerical outputs. The framework and its practical implementation are described in detail in a user's guide[7]. Thus, here a relatively brief outline of the seven stages of the framework (Figure 1) is provided, with a particular focus on how they were implemented in Armenia.

[7] P-IMA Guide (standardsfacility.org), see https://www.standardsfacility.org/sites/default/files/P-IMA_Guide_EN.pdf

Figure 1. Stages in multi-factorial prioritisation of SPS capacity building options



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 Armenia 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. This work included also meetings with international donor organisations that are implementing or have been implemented projects in agricultural or trade related sectors, to gather their analyses or reports. The documents/information in the dossier are itemised in Annex 1.

Stage 2: Definition of choice set

In order to identify the SPS capacity-building options to be considered in the priority-setting framework, two one-day on-line stakeholder workshops were held on 20 January and 11 February 2022. A total of 65 and 39 stakeholders (Annex 2 and 3) attended the workshops, drawn from

government, private sector and international organisations. Workshop participants were presented with the purpose of the project, foreseen activities, and were asked to participate a survey to identify the SPS capacity-building needs of Armenia:

1. the product(s) affected;
2. the specific SPS issue faced by exports of this product(s);
3. the market(s) where these SPS needs were an issue
4. the capacity-building option(s) that would solve the SPS issue being faced.

The combination of these four (4) elements defined a distinct capacity-building option. Respondents were free to define as many specific SPS capacity-building needs as they wished. Meanwhile a working group was created, which involved representatives of the Ministry of Economy, Food Safety Inspection Body, Scientific Centre for Risk Assessment and Analysis in Food Safety Area and Center for Ecological-Noosphere Studies of the National Academy of Sciences.

The views of all respondents were collected, analysed and then reported back to them during the second stakeholder workshop. The collection of items was then discussed within the working group in order to remove any ambiguities and to ensure that all SPS related issues are presented. Meanwhile meetings and discussions were organised with embassies and trade representatives of several countries, where Armenia has export of agricultural products, and state institutions and business associations, to identify export related SPS issues.

The eight (8) capacity-building options remaining after this process are outlined in Table 4. These options proceeded to the priority-setting stage of the analysis.

Table 4. SPS capacity-building options

Option		Brief Description
1	Animal health controls for meat product exports	Implementation of disease-free areas and related controls to meet safety status adopted by the OIE for a number of infectious diseases and to be able to export meat products to Russia and other countries.
2	Pesticide residue controls for dried fruit and herb exports	Implementation of good agricultural practice in fruit and herb production and related controls to meet requirements for pesticide residues in the EU.
3	Hygiene and residue controls for fish exports	Upgrading of hygiene controls in fish processing and related controls to meet requirements in the EU.
4	Pesticide and antibiotic residue controls for honey exports	Implementation of production controls and upgrading of testing capacity to meet EU requirements for honey.
5	HACCP and LACF requirements for canned food exports	Upgrading of processing and hygiene controls to meet US requirements for HACCP and low-acid canned foods.
6	Animal health controls for live animal exports	Implementation of disease-free areas and related controls to meet safety status adopted by the OIE for a number of infectious diseases and to be able to export meat products to Iran and other countries.
7	Hygiene controls for processed egg exports	Upgrading of hygiene controls in egg processing to meet EU requirements.
8	Controls on phthalates for wine product exports	Controls on phthalates in wine production to meet requirements in China.

Stage 3: Definition of decision criteria and weights

In the next stage of the project activity the Working group members were asked to define an appropriate set of criteria to drive the priority-setting process and to assign weights to these. First, working group members were presented with a series of potential decision criteria organised into four (4) categories and asked which (if any) should be excluded and whether any potentially important criteria were missing. The final agreed decision criteria are detailed in Table 5.

To define the decision weights, the working group members were each asked to assign 100 points amongst the 12 decision criteria. The scores of participants were then collated and an average weighting calculated. This average weighting was reported back to the members of the working group to identify any discrepancies. The final agreed weightings are reported in Table 5.

Table 5. Decision criteria and weights for setting priorities of SPS capacity-building options

No.	Decision Criterion	Weight
1	Up-Front Investments	10
2	On-Going Costs	11
3	Difficulty of Implementation	7
4	Sustainability of Capacity	9
5	Growth or Avoided Loss of Agri-Food Exports	9
6	Degree to which Agri-Food Exports Diversified	8
7	Impact on Public Health in Armenia	9
8	Impact on Environmental Protection in Armenia	6
9	Impact on Level of Poverty in Armenia	9
10	Impact on International Reputation of Armenian Agri-Food Products	9
11	Impact on agricultural SME development	7
12	Impact on stakeholder collaboration	6
Total		**100%**

Stage 4: Construction of information cards

Having identified the choice set of SPS capacity-building options and the decision criteria and weights to be applied in the priority-setting exercise, 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 SPS capacity-building options was described in some detail on the basis of existing documentation, consultation with stakeholders, etc. Descriptions of each of the 8 capacity-building options are provided in Section 3.4 below.

The metrics to be employed for each of the 12 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 6 sets out the final metrics. Note that the choice of metrics involves 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 6. Decision criteria measurement

Decision Criterion	Measurement
Cost and Challenges of implementation	
Up-Front Investments	Monetary cost (local currency)
On-Going Costs	Annual monetary cost (local currency)
Difficulty of Implementation	Seven-point scale: 'Very difficult' (7) to 'Very easy' (1)
Sustainability of Capacity	Seven-point scale: 'Very sustainable' (7) to 'Very unsustainable' (1)
Trade impacts	
Growth or Avoided Loss of Agri-Food Exports	10-point scale: 'Little or no increase' (1) to 'Very significant' (10)
Degree to which Agri-Food Exports Diversified	Significant increase (+2) Increase (+1) No change (0)
Impact on International Reputation of Armenian Agri-Food Products	Seven-point scale: 'Very significant' (7) to 'Very insignificant' (1)
Domestic agri-food impacts	
Impact on Public Health in Armenia	Seven-point scale: 'Very positive' (+3) to 'Very negative' (-3)
Impact on Environmental Protection in Armenia	Seven-point scale: 'Very positive' (+3) to 'Very negative' (-3)
Social impacts	
Impact on Level of Poverty in Armenia	Seven-point scale: 'Very positive' (+3) to 'Very negative' (-3)
Impact on agricultural SME development	Seven-point scale: 'Very significant' (7) to 'Very insignificant' (1)
Impact on stakeholder collaboration	Seven-point scale: 'Very significant' (7) to 'Very insignificant' (1)

Information cards for each of the eight (8) SPS capacity-building options were then compiled. These are reported in Annex 4. Each card presents data for the twelve (12) decision criteria, measured according to the scales outlined in Table 6. 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 on the information cards in a manner that permits easier comparison of the eight (8) capacity-building options. Thus, spider diagrams were derived that plotted the eight (8) SPS capacity-building options against each of the 12 decision criteria. Scrutiny of these diagrams identified the decision criteria against which each of the capacity-building options performed relatively well/badly compared to the other capacity-building options in the choice set.

Stage 6: Derivation of quantitative priorities

The formal priority-setting analysis involved the use of outranking through the D-Sight software package. The mechanics of the analysis are described in some detail in the user guide to the framework[8]. 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 (3) 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.

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 second models is estimated in order to examine the extent to which the derived priorities are sensitive to changes in the decision weights; if the broad ranking of the 8 SPS capacity-building options remains broadly the same under the two (2) scenarios presented by these models, we can be reasonably confident that the results of the 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 involved sensitivity analysis of the baseline prioritization, notably to changes in the decision weights, and a process of stakeholder feedback. The executive summary of the draft final report was circulated widely amongst stakeholder across the public and private sectors by email with a request to participate in a Validation Workshop and present their views. Further, a Validation workshop was held on July 07, 2022. The workshop had 25 participants from state institutions, international organisations and the private sector (Annex 6).

At the workshop, the preliminary results were presented and comments invited from participants. No substantive comments that challenged the substantive analysis were received. The recommendations/suggestions received from participants are addressed respectively.

[8] Henson and Masakure (2011). Op cit.

3.4 SANITARY AND PHYTOSANITARY CAPACITY-BUILDING OPTIONS

This section provides a more detailed description and rationale for each of the 8 SPS capacity-building options considered in the priority-setting analysis.

Animal health controls for meat product exports

According to the article 5.3.1 of the OIE Terrestrial Code, the WTO The SPS Agreement recognizes the OIE as the relevant international organisation responsible for the development and promotion of international animal health standards, guidelines, and recommendations affecting trade in live animals and animal products. The main problem Armenia faces with exports is that in order to export products of animal origin to other countries, the principle of equivalence must be maintained, according to which the exporting and importing countries must have the same degree of animal health status. In the case of Armenia, we do not have the safety status adopted by the OIE for a number of infectious diseases, which greatly hinders the export process.

Pesticide residue controls for dried fruit and herb exports

In many rural communities in Armenia, particularly in Ararat and Armavir provinces, which are the main agricultural centers of the country, farmers continue to make use pesticides banned in the country over 30 years ago. Moreover, sometimes they use pesticides with the advice of neighbour or the seller, without consulting with the relevant specialists. To study organochlorine pesticides and organophosphorus pesticides contents and assess pesticide induced health risk in Armenia, the contents of pesticides were determined in 252 soil samples taken from relatively large plots of agricultural land in 25 rural communities by the Center for Ecological-Noosphere Studies National Academy of Sciences in 2019. The study allowed to identify that among studied pesticides (Aldrin, PDDT (sum), Dieldrin, 1,2-Dichloroethane, Endrin, Captafol, Heptachlor, HCH (sum), Methyl parathion, Methamidophos, Mirex, Parathion, Pentachlorophenol (PCP), Toxaphene, Chlordane, Chlordecone, Phosphamidon) only PDDT contents have been identified. Particularly, PDDT detected in 39 agricultural soil samples located in 12 rural communities in Armenia's different regions. Among all detected contents the excesses versus national Maximum Acceptable Concentration (MAC) were observed for 26 out of 39 samples and ranged from 1.03 to 464.9 times. The mean PDDT value exceeded the MAC of 0.1 mg/kg stated in Armenia 8.4 times.

Hygiene and residue controls for fish exports

Metronidazole, Mycotoxin (Aflatoxin B1), Antibacterial compounds were detected by laboratory tests performed in the framework of the residue control program in fish in 2021. The reason for the detection of metronidazolazole is the use of nitromidazoles in fish farms to prevent infectious and parasitic diseases. The reasons for identification of high-level aflatoxin (Aflatoxin B1) are fungal diseases, which in this case are due to food storage conditions. The reason for the discovery of amoxacillin and benzylpenicillin is the use of fish feed containing antibiotics to prevent the possible occurrence of microbial diseases of fish.

In 2020, fish samples were collected under the frame of the Armenian residue monitoring program to analyze the presence of Malachite Green (MG) and its reduced metaboliteleucomalachite green (LMG). The fish species included Sevan trout (Salmo Ishkhan), rainbow trout (Oncorhynchus mykiss) and sturgeon (Acipenseridae) which are the main species farmed and consumed in Armenia. The samples were randomly collected from artificial ponds of the main fish farms in different regions of Armenia including Aragatsotn, Ararat, Armavir, Gegharkunik, Lori, Kotayk, Shirak, Syunik, Vayots Dzor, and Tavush. In the frame of this study, sampling was done from artificial ponds. In total, in 34.5% of the samples MG residue content exceeded the Minimum Required Performance Limit (MRPL) of 2 µg/kg for the sum of MG and LMG set by EU.

Pesticide and antibiotic residue controls for honey exports

Laboratory tests revealed the nitrofuran group: nitrofurantoin metabolite (AHD), the nitromidazole group: metronidazole, tetracycline, sulfadiazine, streptomycin, streptomycin, chemical elements and copper.

The reasons of identification of the nitrofurantoin metabolite and metronidazole is the usage of nitrofurans by beekeeping farms to prevent infectious parasitic diseases of bees. The reason for the discovery of antibacterial compounds is due to the use of drugs to prevent infectious and parasitic diseases of bees. The discovery of heavy metals, such as copper, is due to the fact that beekeeping farms are located near mining zones, not maintaining the set distance, as well as the use of pesticides, agrochemicals and other chemicals in the horticulture sector without observing agrarian rules.

In 2020 a study was conducted aiming to evaluate the concentrations of seven trace elements (Pb, Cd, As, Hg, Cu, Zn and Ni) and persistent organic pollutants (DDT, DDE, DDD and HCH) in honey samples from Shirak and Syunik regions of Armenia and carry out dietary risk assessment of these contaminants. Both regions are actively involved in honey production. The analyses have shown, that the concentrations of Cu ranged from 9.00E-02 to 1.86Eþ00 mg/kg. In one of the villages, the Cu content exceeded the maximum acceptable level suggested by EU almost twice. Among the POPs, DDT levels were detected in honey samples from only one site (Aygabats village of Shirak region), while DDE, DDD, and HCH levels were not detected at all. The detected content (9.70E-01 mg/kg) exceeded EU maximum residue limit of 5.00E-02 mg/kg (EC, 2005) around 20 times and was higher than the level reported in Europe (4.40E-01 mg/kg).

HACCP and LACF requirements for canned food exports

According to the Treaty on the Accession of the Republic of Armenia to the Eurasian Economic Union as of May 29, 2014, the requirements of the EEU technical regulations apply in the territory of the Republic of Armenia. In particular, the principles of the HACCP system in the field of food production are defined in Articles 10 and 11 of the EEU Technical Regulation on Food Safety TR CU 021/2011. The checklists developed on the basis of the requirements of this technical regulation are currently being approved. After approval the control will be done by these checklists.

The relevant specialists of state institutions don't have knowledge on LACF requirements.

Animal health controls for live animal exports

The Section 5 “TRADE MEASURES, IMPORT/EXPORT PROCEDURES AND VETERINARY CERTIFICATION” of the OIE Terrestrial Code defines all the requirements and norms that are needed for the export and transportation of live animals. As in the case of foods of animal origin, here also the principle of equivalence is applied. However, there are additional requirements, as live animals. Live animals are considered to be the most at risk for the spread of various infectious diseases.

Hygiene controls for processed egg exports

Armenia is self-sufficient with egg production. In 2020 the sector had a surplus, which was exported to Georgia. This brought to decrease of prices for eggs by 25% in 2021 compared to 2020. The main reason for the decline in prices is overproduction, which was formed when about two dozen new small production facilities appeared on the market in 2019-20. Only a few large factories have large refrigeration (warehouse) capacities, while small farms are ready to sell the goods at any price. Without refrigeration facilities there is a risk of egg quality deterioration. Similar to meat and meaty products, eggs, as products of animal origin cannot be exported several countries, such as EU member states, U.S., etc. These restrictions are also based on evidences of Salmonella in eggs, particularly in summer periods. Salmonella mainly disseminated by feed. The big producers have

own laboratory capacity to check feed, but small farmers have not such a system of control. If poultry is infected by Bronchitis and other infection diseases, it is not permitted to use products. In that case, the prevention of these diseases is the main subject for producers.

Controls on phthalates for wine product exports

Exceeding the permissible level of phthalates in wine products exported to China. The problem arises when the production processes are violated, particularly when non-proper equipment are used. Sometime wine product contain iron as well, again due to not-proper technological processes. In order to reduce the level of iron in wine products, different materials are used, which can be toxic to human health. Existence of pesticides in grape and usage of sulphur create additional market related issues for producers as well.

3.5 RESULTS

The descriptions presented above, and the results of the stakeholder workshops, suggest all eight (8) of these options are credible options for SPS capacity-building. 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 the results of the prioritisation exercise are presented. These are derived using outranking analysis through the software package D- Sight.

To provide a first scan of the relative strengths and weaknesses of the eight (8) capacity-building options, spider diagrams were constructed (Figures 2 to 13). Because of the relatively large number of options, a separate diagram is presented for each of the 12 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 general (less technical) decision-makers.

Figures 2 and 3 present the up-front investment and on-going costs profiles of the eight (8) SPS capacity- building options. It is immediately obvious that the most expensive capacity-building option in terms of up-front investment are animal health controls for live animal and for meat products exports (AMD 4.9 billion). With the exception of controls on phthalates for wine product exports, all of the other options have an up-front investment of less than AMD 2 billion.

Except of the animal health control, other capacity building options have on-going costs of less than AMD 400 million per annum. Options with the highest on-going costs are animal health control for meat product exports (AMD 975mln.) and animal health control for live animal exports (AMD 845mln.) Conversely, the option with very low on-going costs is the hygiene controls for processed egg exports to the EU and other countries.

Figure 2. Decision criteria measures scores for SPS capacity-building options – up-front investment (AMD million)

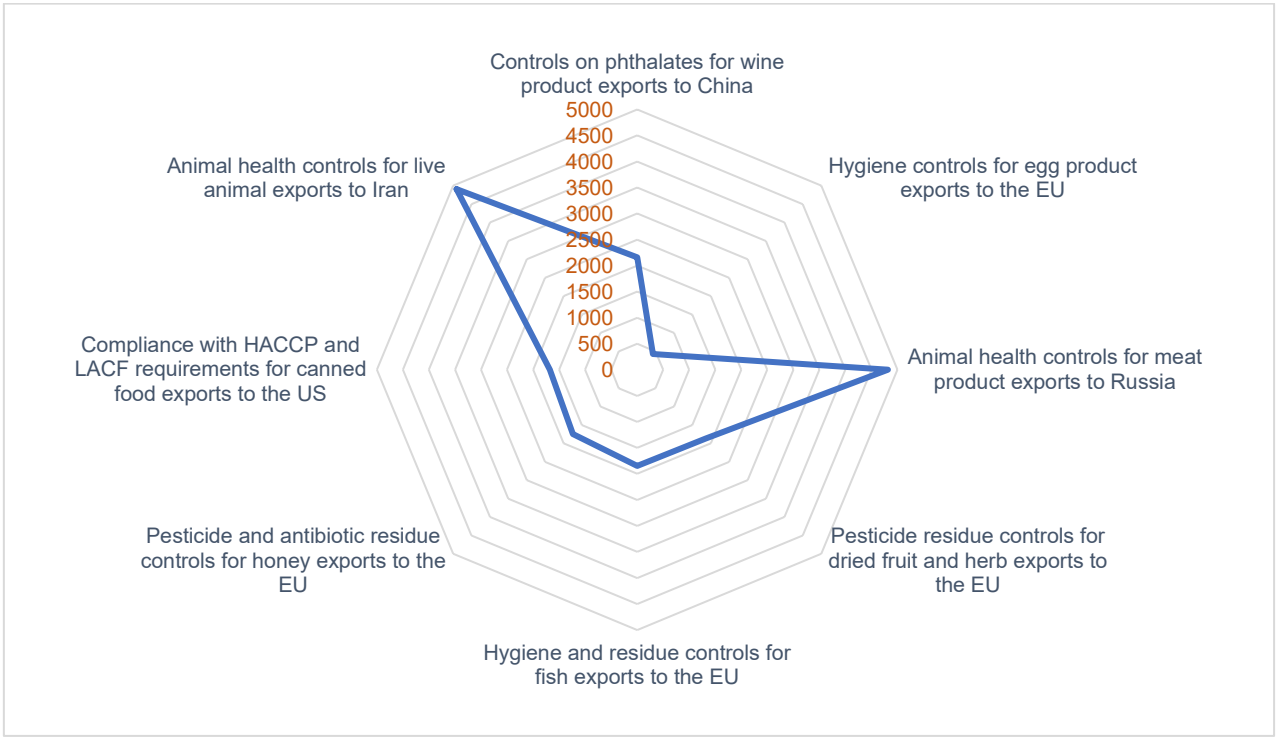
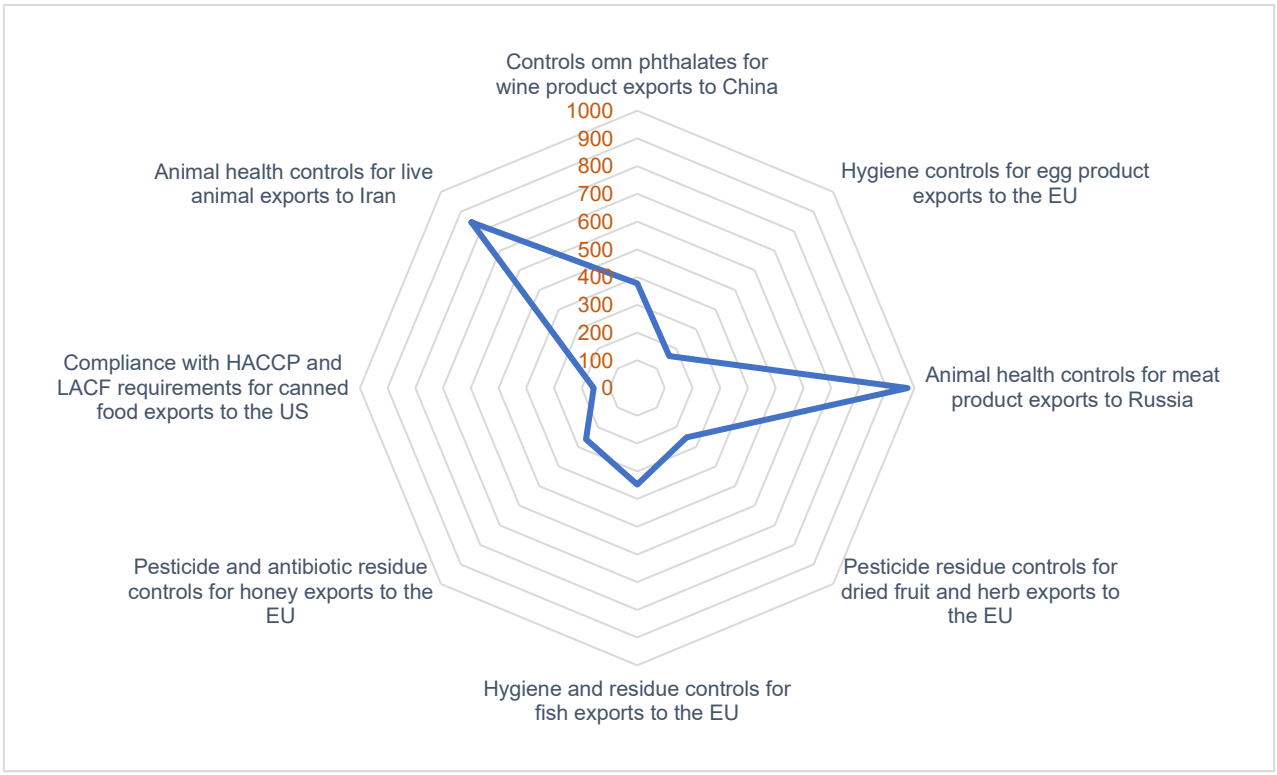
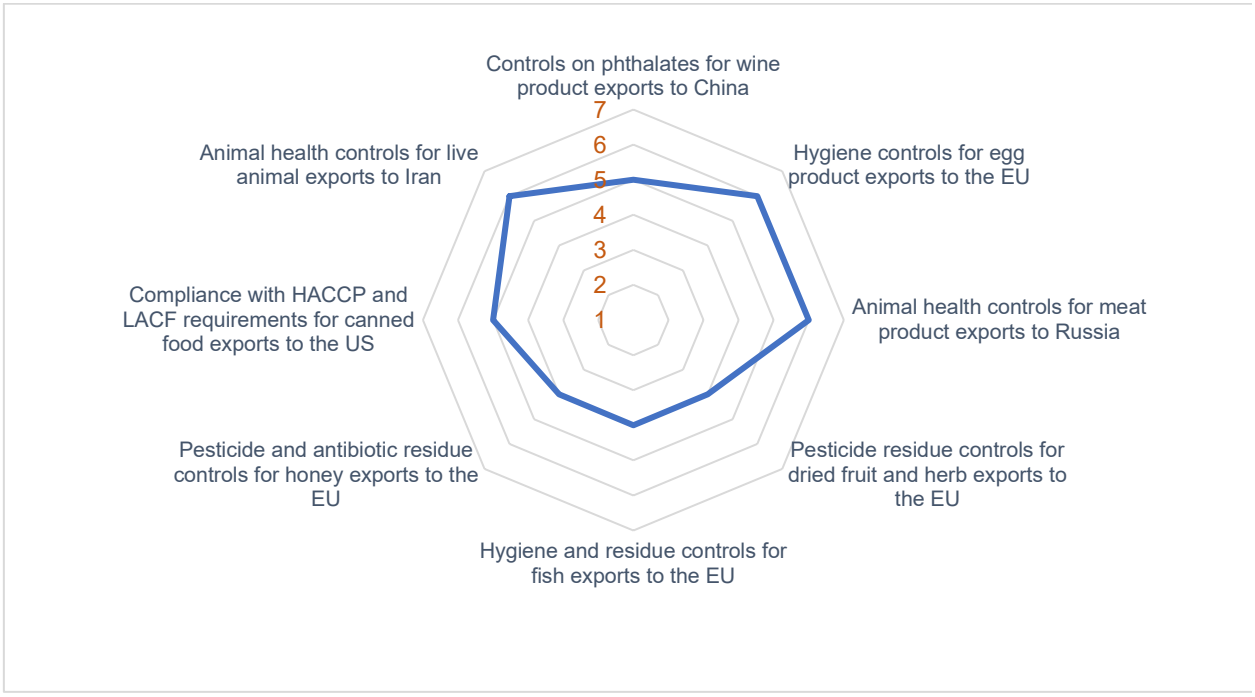


Figure 3. Decision criteria measures scores for SPS capacity-building options – on-going costs (AMD million)



The majority of the eight (8) capacity-building options are judged to be 'difficult' or 'somewhat difficult' easy to implement (Figure 4). 'Animal health control for live animal export', 'animal health control for meat product export' and 'hygiene controls for egg product exports' are considered as 'difficult' to implement while other options are judged to be 'somewhat difficult'. The major factor determining the difficult of implementation is the need of hard and consistent work as well as limited availability of relevant specialists.

Figure 4. Decision criteria measures scores for SPS capacity-building options - difficulty of implementation



Almost all capacity building options are predicted to be 'somewhat' sustainable, while the 'compliance with HACCP and LACF requirements for canned food exports' is judged as 'sustainable' (Table 5). This is explained by the fact, that relevant experience and knowledge will be created, which will contribute to the sustainability.

Figure 5. Decision criteria measures scores for SPS capacity-building options - Sustainability of Capacity

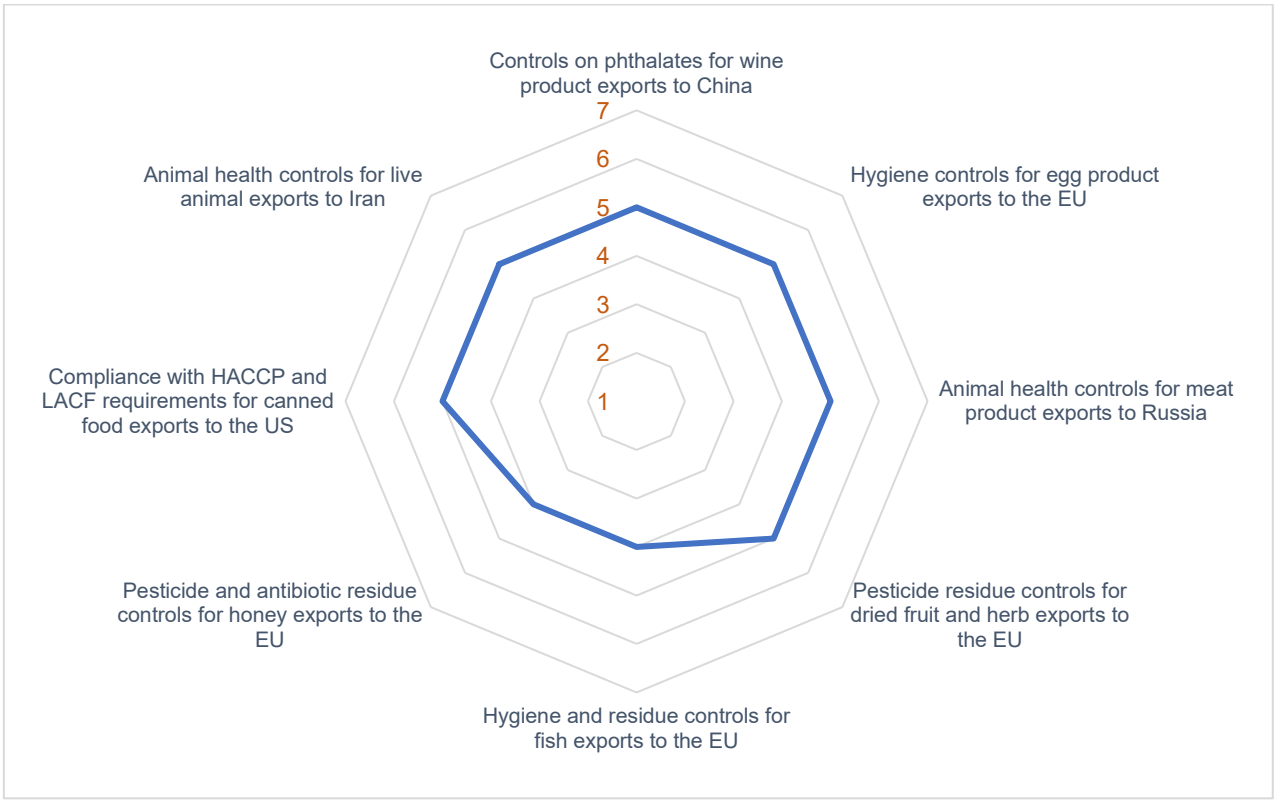
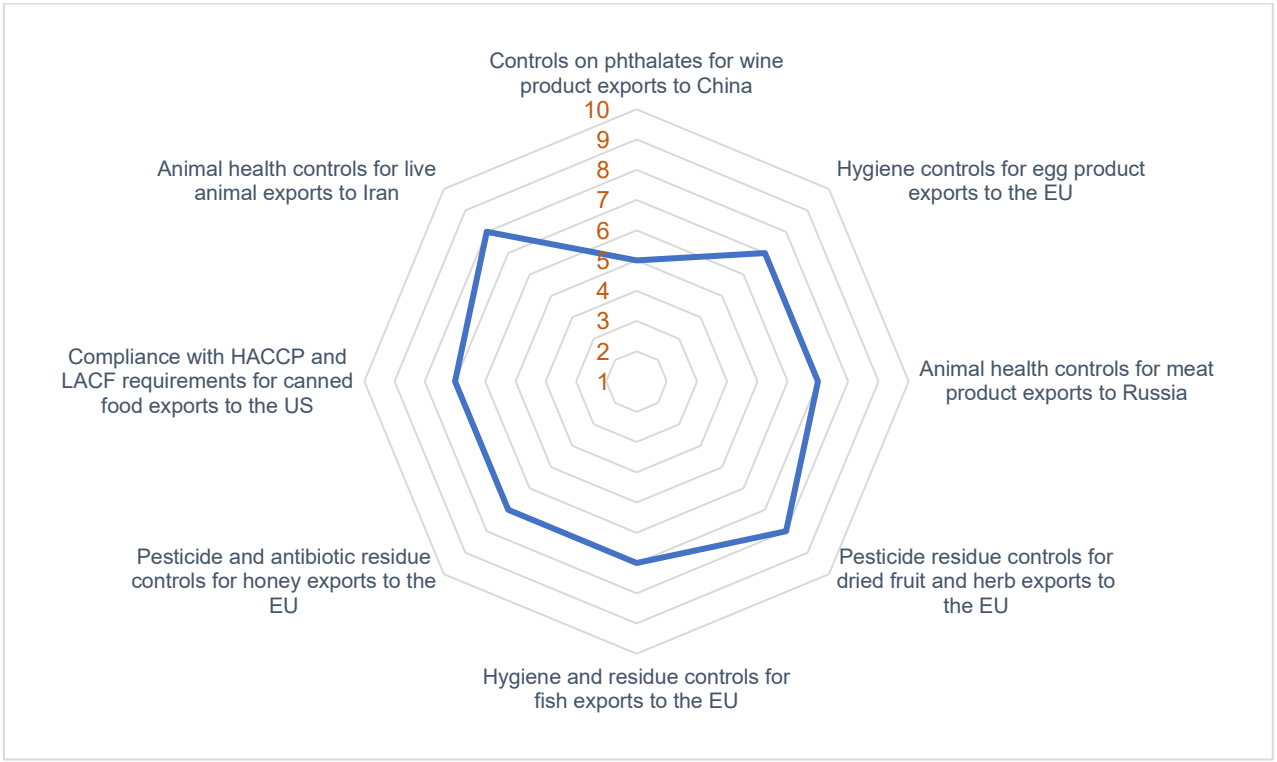


Figure 6. Decision criteria measures scores for SPS capacity-building options - Growth or Avoided Loss of Agri-Food Exports



Most of the eight (8) capacity-building options are predicted to have moderate impact in terms of growth in agri-food exports or avoided losses in exports (Figure 5). The notable exceptions are 'animal health controls for live animal exports' pesticide residue controls for dried fruit and herb export" which will have more positive impact on export growth.

All capacity-building options are predicted to enhance appreciably the diversity of exports across products and/or markets (Figure 7).

Figure 7. Decision criteria measures scores for SPS capacity-building options - Degree to Which Agri-Food Exports Diversified

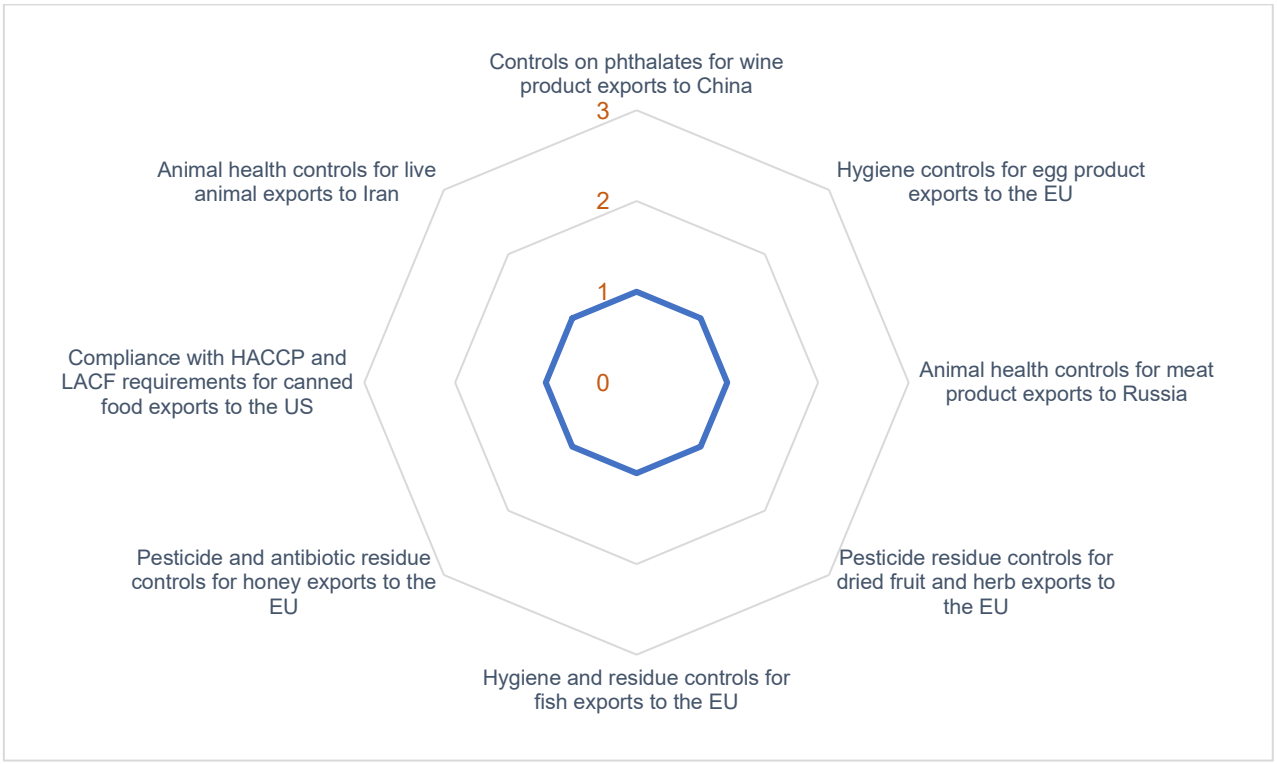
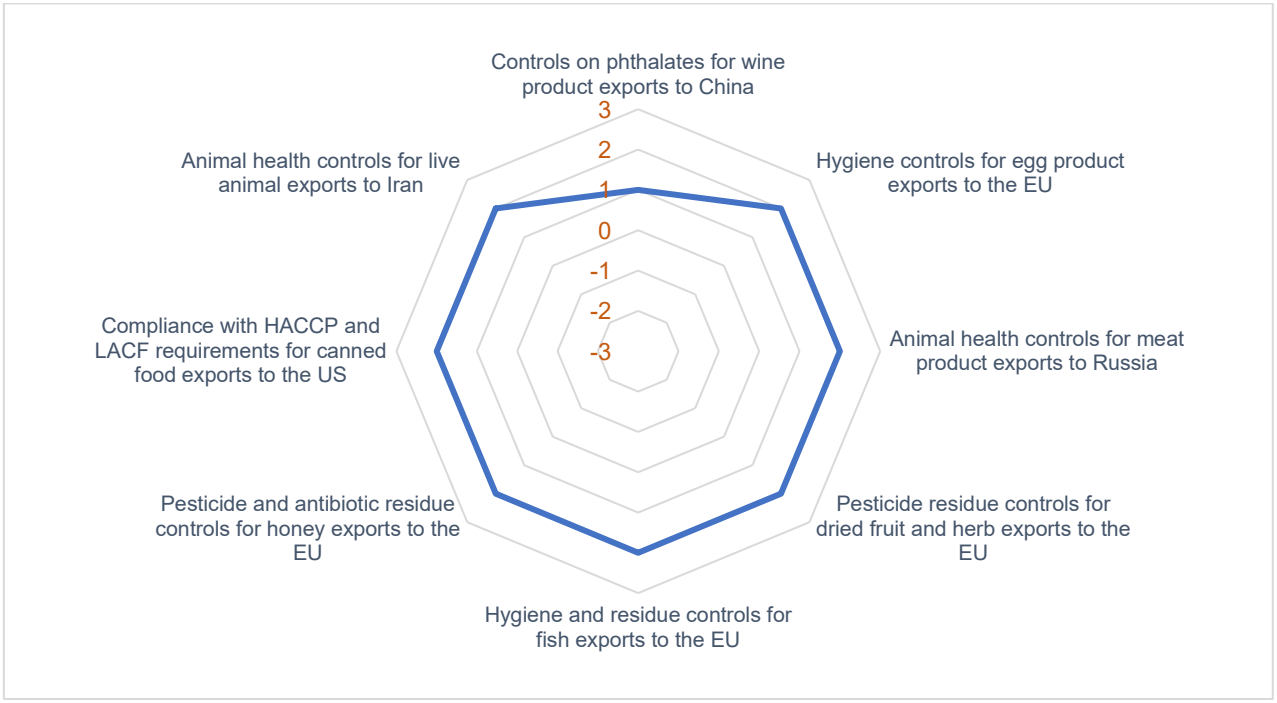


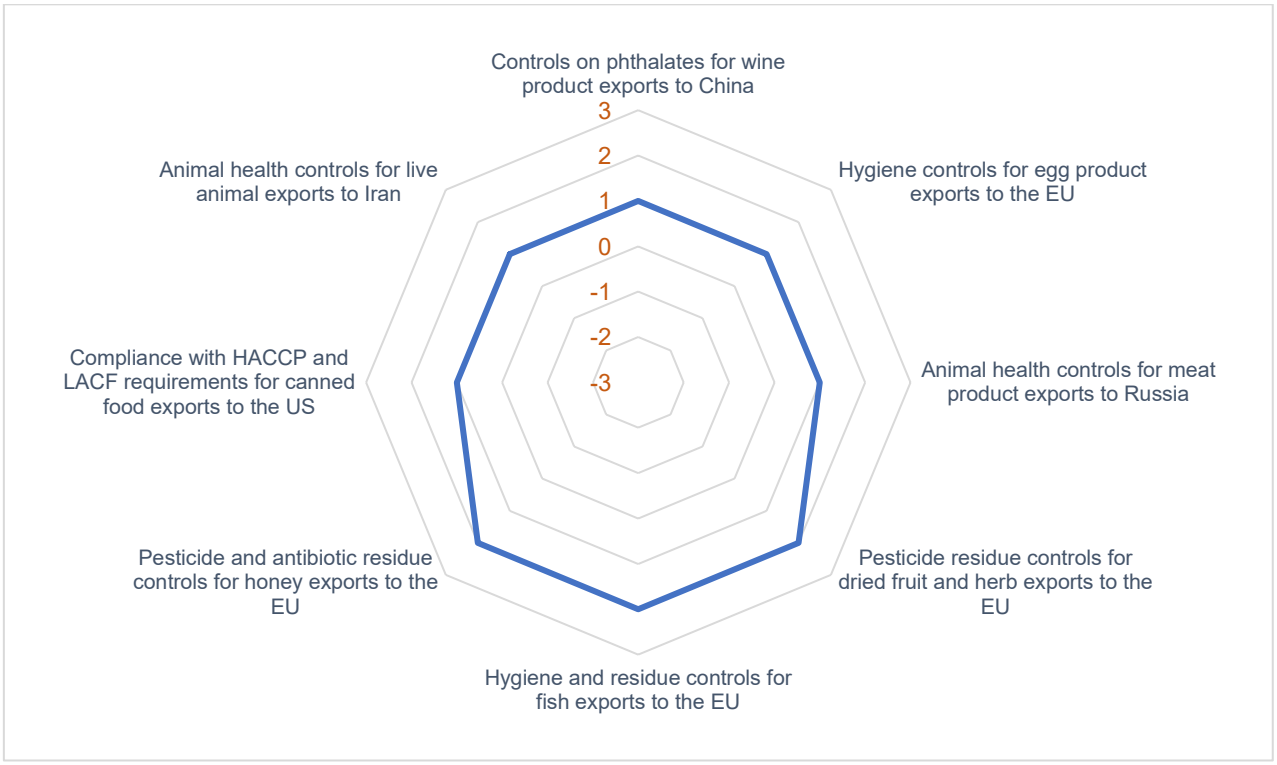
Figure 8. Decision criteria measures scores for SPS capacity-building options - Impact on Public Health in Armenia



Figures 8 and 9 report the impacts of the eight (8) capacity building options through the domestic agri-food sector. Seven (7) of eight (8) capacity-building options are judged to have positive impacts on domestic public health, while impact on public health of controls on phthalates for wine product exports is moderate (Figure 8).

It is anticipated that three (3) of the options will have positive impacts on environmental protection of Armenia (Figure 9), namely pesticide residue controls for dried fruit and herb exports, pesticide and antibiotic reside control for honey export and hygiene and residue controls for fish exports predominantly through reduced residues of pesticides and other harmful substances.

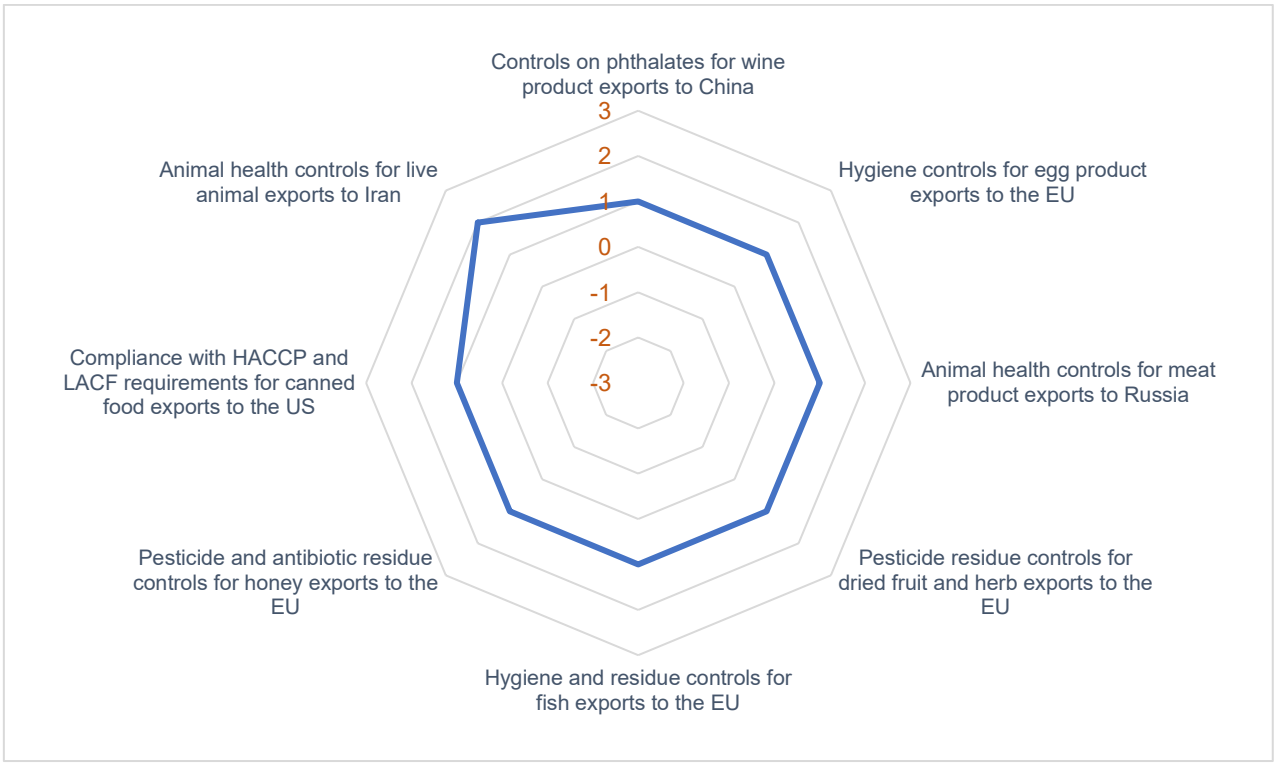
Figure 9. Decision criteria measures scores for SPS capacity-building options - Impact on Environmental Protection in Armenia



All capacity building option will have a positive impact on the poverty level of the country (Figure 10). Nevertheless, it is expected that the impact of animal health controls for live animal export will be higher. It is explained that there are huge number of small farmers located in rural areas involved in animal breeding and increase of health conditions and export of live animal will directly increase their revenues, thus having impact on their livelihood.

From the social perspective important is also impact on agricultural SME development (Figure 12). Five (5) of eight (8) capacity building options will have somewhat significant impact on SME development because of the huge number of SMEs involved in the sectors. The impact of controls on phthalates for wine product exports to the agricultural SME development is not obvious, though the option will contribute to introduction of modern technologies in the production.

Figure 10. Decision criteria measures scores for SPS capacity-building options - Impact on Poverty in Armenia



All capacity will have impact on international reputation of agri-food products from Armenia (Figure 11). If the impact of three (3) of eight (8) options is significant, the impact of controls on phthalates for wine products export will be moderate.

Figure 11. Decision criteria measures scores for SPS capacity-building options - Impact on International Reputation of Agri-Food Products from Armenia

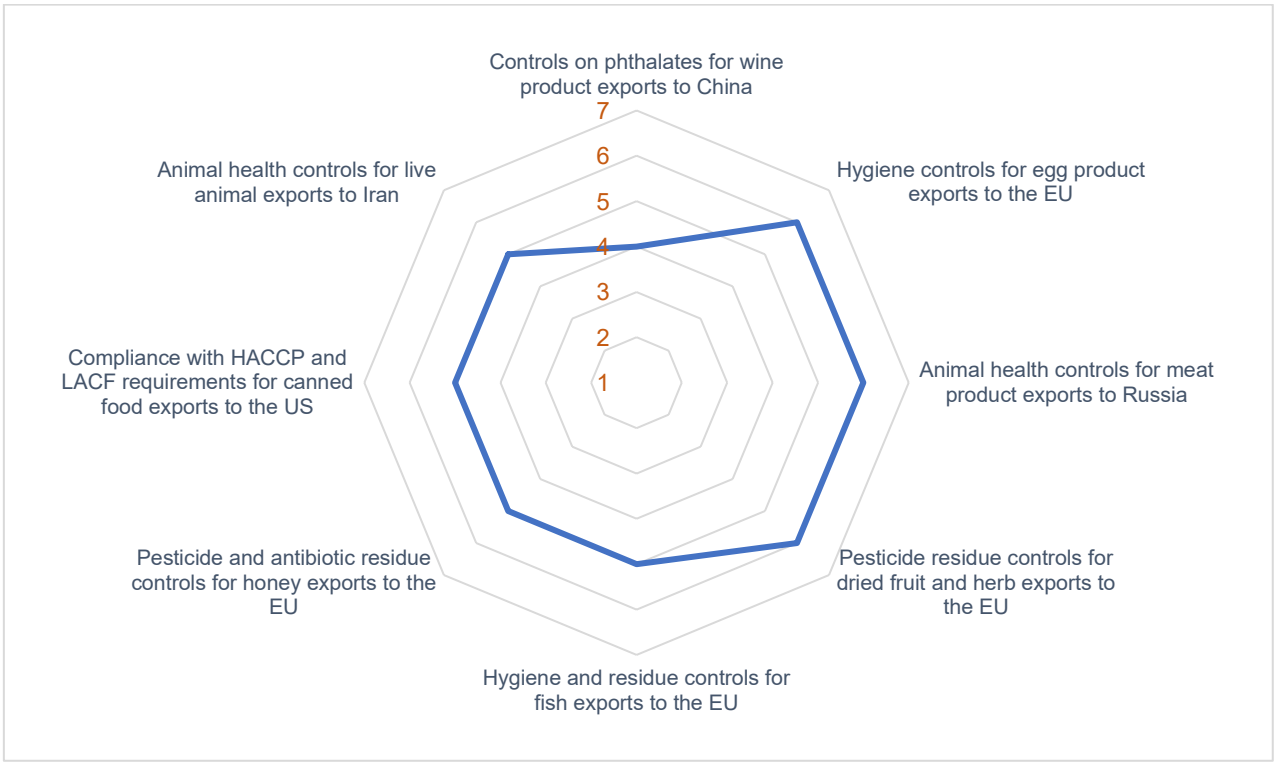


Figure 12. Decision criteria measures scores for SPS capacity-building options - Impact on Agricultural SME Development

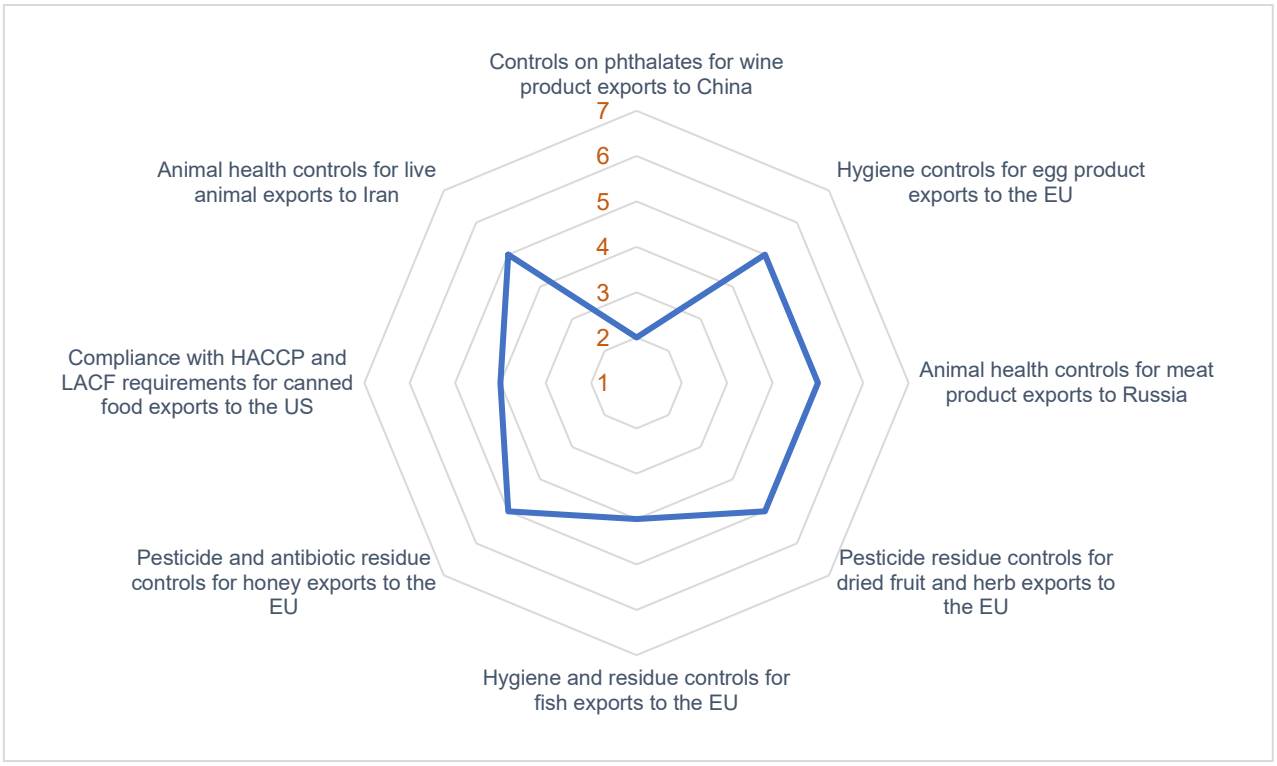
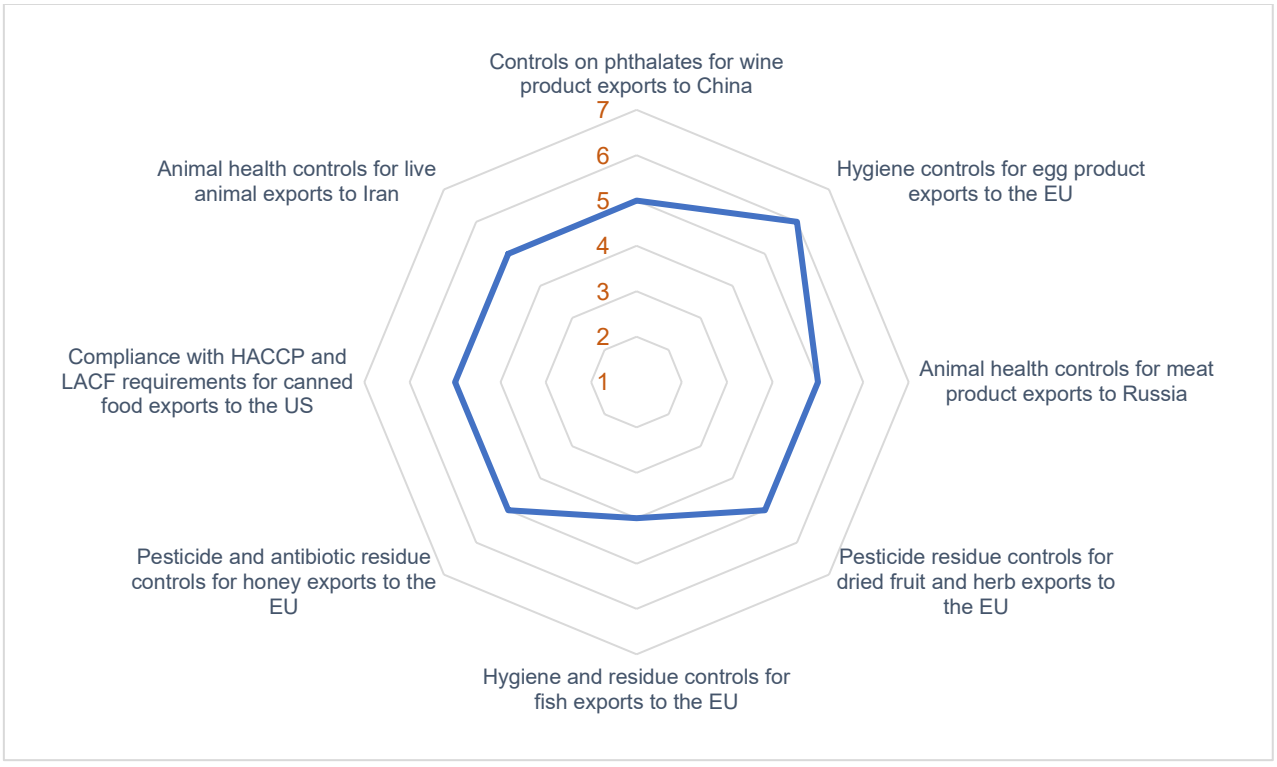


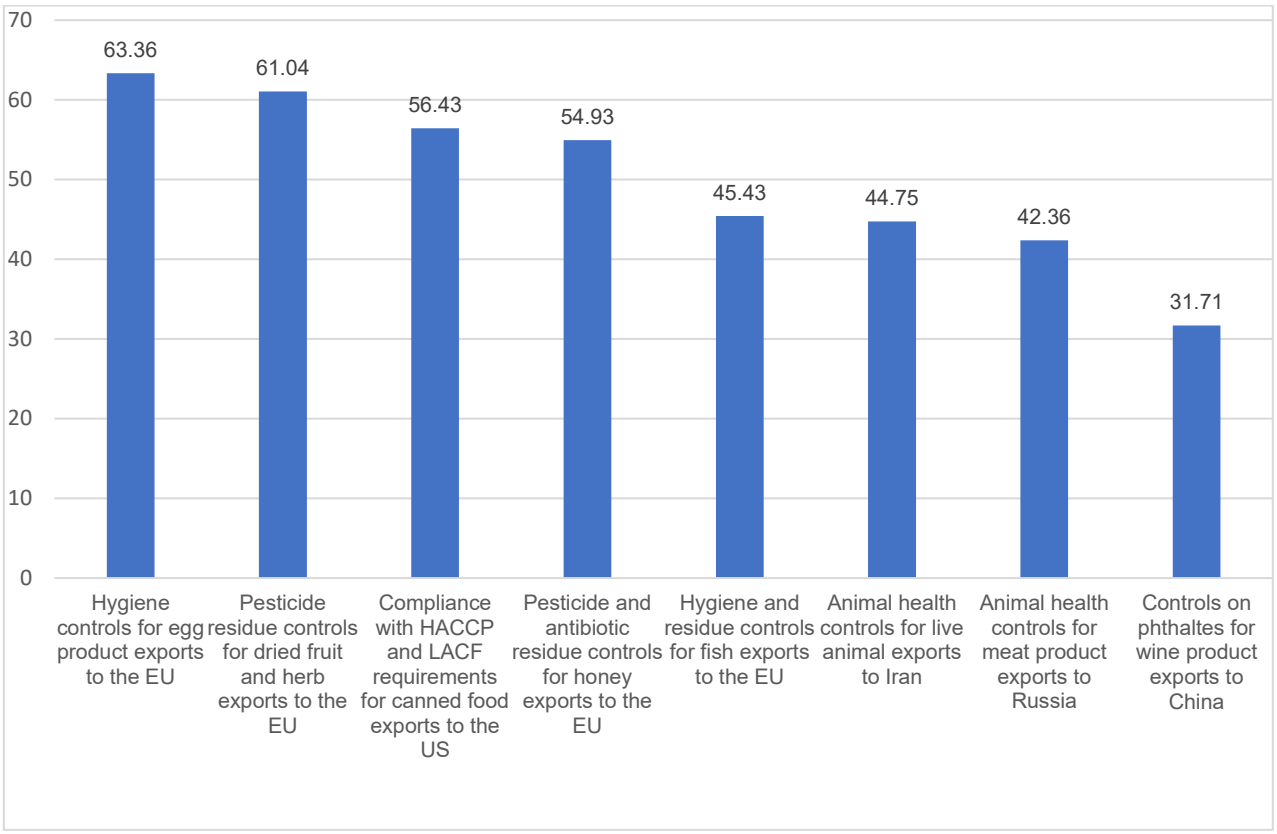
Figure 13. Decision criteria measures scores for SPS capacity-building options - Impact on Stakeholder Collaboration



Finally, all capacity building options will contribute to the strengthening of collaboration between stakeholders involved in relevant value chains. While the option 'hygiene control for egg product exports' will have significant impact on this collaboration, the impact of 'hygiene and residue controls for fish exports' is moderate.

Figure 14 reports the net flows for the eight (8) SPS capacity-building options for the baseline model; that is the prioritisation derived using the decision weights defined in the stakeholder workshops and proved during the validation workshop. The options are ordered according to decreasing score, and so declining priority. The option judged to be top priority on the basis of the 12 decision criteria is "Hygiene control for egg product exports". Other high-ranked options are "Pesticide residue controls for dried fruit and herb exports" and "Compliance with HACCP and LACF requirements for canned food exports to the US". The option ranked bottom, and with a net flow significantly below all other options is "Controls on phthalates for wine product exports".

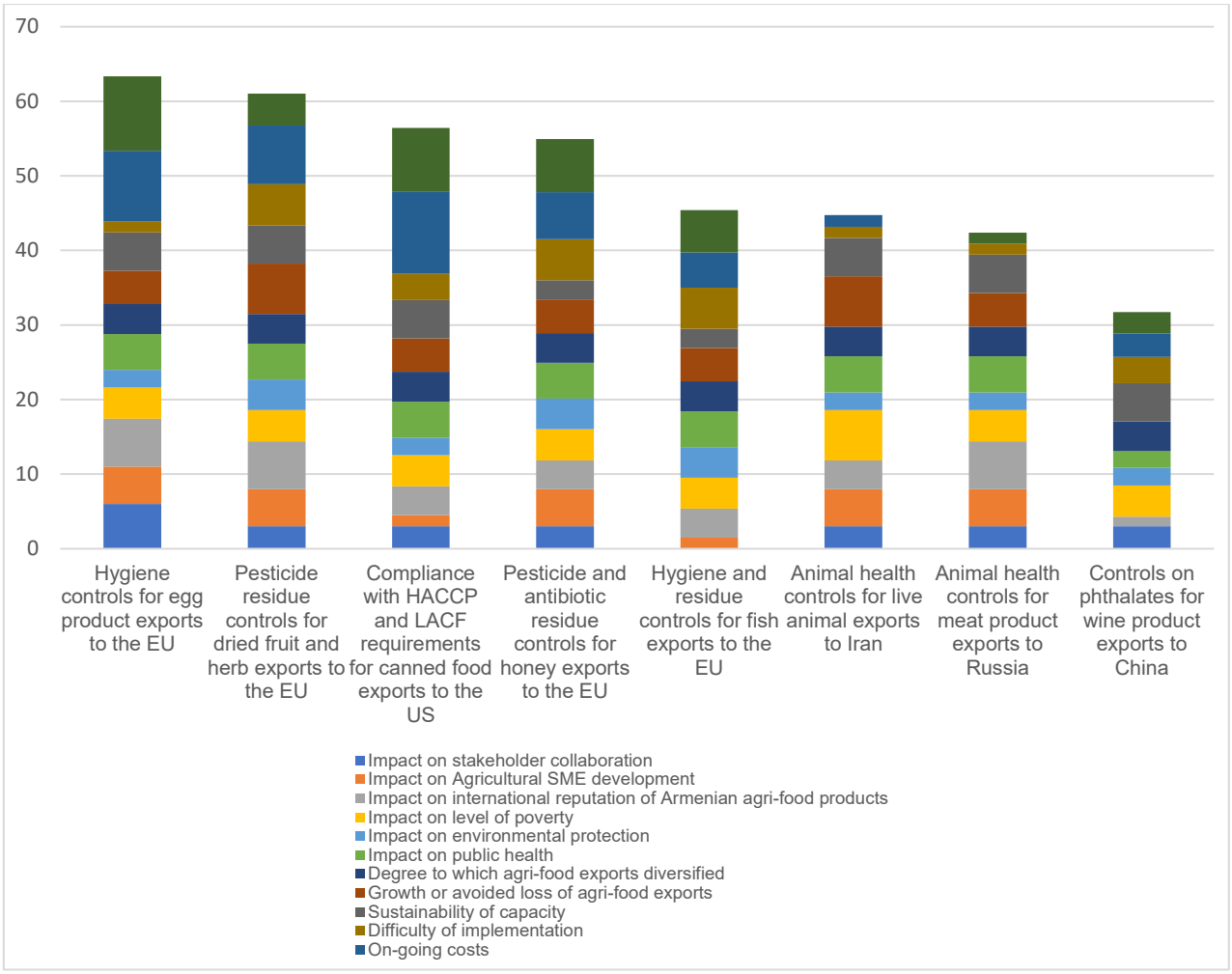
Figure 14. Net flows for baseline model, %



The ranking of each of the capacity-building options reflects the score it achieves for each of the 12 decision criteria – how well it performs relative to each of the other options in the analysis – weighted according to the decision weights. Figure 15 shows the contribution that each of the 12 decision criteria makes to the overall score achieved by the 8 options. For example, up-front investment and on-going costs criteria account big part of the overall score achieved by total hygiene control for egg product export (Option 1).

The prioritisation of the eight (8) SPS capacity-building options reflects a trade-off or compromise between all twelve (12) decision criteria, note that even the top-ranked option only achieves a score of 63.4 per cent (Figure 14). As discussed above, none of the options dominates all others with respect to every one of the 12 decision criteria. 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 still a degree of compromise in terms of under-performance with respect to certain of these criteria, relative to the other capacity-building options being considered.

Figure 15. Baseline model – criteria contribution to option scores



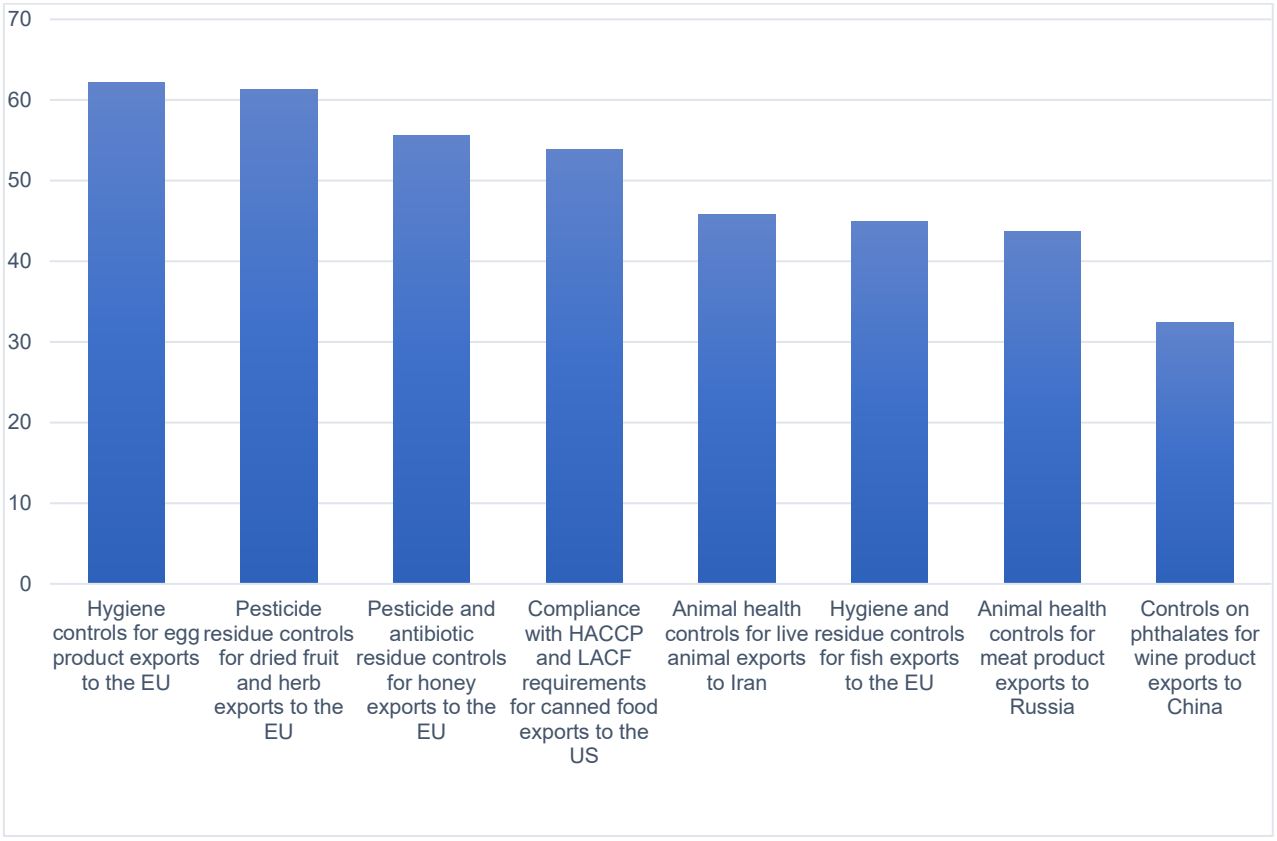
So far, the core results of the analysis have been presented. These are based on the decision criteria and weights derived from the stakeholder workshops and working group meetings, and as such they arguably represent the most valid prioritisation. It is important to recognise, however, that different stakeholder groups might have distinct perspectives on the criteria that should drive the prioritisation of the capacity-building options and/or the weights that should be assigned to particular criteria. Such differences can lead to conflict in decision-making processes, such that it is important to ascertain where distinct perspectives on the decision criteria have an appreciable impact on the prioritisation and where they do not.

In cases where the prioritisation is insensitive to changes in the decision criteria, it should be relatively easy to come to collective agreement on which options should be prioritised. Where changes to the decision criteria have appreciable impacts on the prioritisation it may be necessary to enter into a more extensive process of consultation or to explore the reasons why different stakeholder groups put more or less weight on particular criteria.

Figure 16 presents alternative scenario, the aim of which is to ascertain the sensitivity of the results of the baseline model to changes in the decision weights. This alternative model assumes that all 12 of the decision criteria are weighted equally. Implicitly this negates the weightings derived in the stakeholder workshop. For example, it might be viewed that the workshop was not representative of stakeholders more generally, or was biased towards particular interests. It will be seen, however, that only the first two capacity building options continue to be ranked top. There are some changes in the ordering of certain capacity-building options. Thus, compliance with HACCP and LACF requirements for canned food exports to the US (shifting from third to forth) and hygiene and residue

controls for fish exports (shifting from fifth to sixth) swap positions in the ranking. Likewise, pesticide and antibiotic residue controls for honey export (shifting from fourth to third) and animal health controls for live animal exports (shifting from sixth to fifth swap positions. These results suggest that the derived priorities are relatively robust to changes in the decision weights.

Figure 16. Net flows for equal weights model



3.6 LESSONS LEARNED AND CHALLENGES FOR THE FUTURE APPLICATION OF THE FRAMEWORK IN ARMENIA

Through experiences in applying the MCDA framework in Armenia, as well as other countries, a number of lessons and challenges can be identified for the future application of the framework. Below a number of the key lessons and challenges are discussed in turn, focusing on those that are most likely to be issues in the on-going application of the MCDA framework in Armenia. In each case, there is some discussion of the nature of the issue and, where appropriate how this can be addressed.

A key component of the MCDA framework is **the stakeholder workshop**. It is through the workshop that the portfolio of SPS capacity-building needs that enter the prioritisation are identified, and the decision criteria and weights that drive the analysis are defined. A concern, therefore, is the degree to which the participants at the workshop reflect the full range of stakeholder interests and concerns, for example across the public and private sectors, food safety and plant and animal health, agri-food commodities, etc. Clearly, the composition of participants at the workshop is important; if any key constituencies are excluded their voice will not be heard. It is important to recognise, however, that the numbers of participants representing a particular stakeholder group is less important. Thus, the capacity-building options and decision criteria are defined in a way that each individual has an equal voice. No effort is made to prioritise these elements of the process on the basis of the number of participants raising an issue.

In the period of COVID-19 pandemic, where organisation of off-line events is restricted, communication and organisation of workshops become more burdensome, but more important. On-line meeting tools sometimes don't allow to transfer emotions and atmosphere of face-to-face workshops. The obstacle is possible to overcome by organising tete-a-tete meetings and different online tools intended for gathering views of participants, organising workshops (Zoom, Microsoft Teams, Google Meets, Mentimeter, MURAL), etc.

The application of the MCDA framework per se, does not require any technical knowledge of food safety, plant health and/or animal health capacities. Indeed, in many ways it is important that the person driving the application of the framework has a broader perspective, including on trade and socio- economic issues, and is certainly not seen as having a particular interest in the outcome of the analysis.

At the same time, however, technical expertise in the various elements of SPS capacity is needed amongst the team involved in applying the framework. Thus, for each of the identified capacity-building needs an information card has to be completed. Estimation of the up-front investment and on-going costs, for example, may require detailed technical knowledge of the prevailing weaknesses in capacity and the actions needed to address these. The implication is that the MCDA framework should optimally be implemented by a multi-disciplinary team of SPS technical experts and social scientists.

Given that the aim is for the MCDA framework to be used on an on-going basis to establish and then to update priorities for SPS capacity-building, it is important to recognise the complementarities with other assessment frameworks, notably the PCE and PVS tools of the IPPC and OIE, respectively. From the outset, it must be recognised that the MCDA framework addresses a very different set of questions to the PCE and PVS tools. Thus, its focus is on determining priorities amongst established capacity-building needs, with a focus on the portfolio of associated costs and benefits. The PCE and PVS tools instead are aimed at identifying weaknesses in plant and animal health capacity, respectively, relative to international benchmarks. The results of the applications of these tools, therefore, can be seen as important prior information for the identifying of the capacity-building needs that enter the MCDA framework. Indeed, as explained in the P-IMA user guide, the starting point for the MCDA framework is the synthesis of prior assessments of SPS capacity.

The focus of the MCDA framework is on weaknesses in SPS capacity that result in impediments to trade. The focus of national efforts to build SPS capacity in Armenia, however, extends to weaknesses in capacity that have little or no relevance to trade but that can have significant impacts on public health and/or the natural environment. The MCDA framework does permit such considerations to enter as decision criteria, although as externalities of SPS capacity-weaknesses that do have trade implications. In order to extend the framework to SPS capacity- building needs more generally, some relatively minor adjustments would be needed to certain procedures, namely:

- The composition of participants at the stakeholder workshop would need to be extended to include more public organisations and scientific and educational institutions focused on domestic SPS issues.
- The question addressed by the framework and posed in the stakeholder workshops would need reframing to cover SPS capacity-building needs that are focused on both trade and domestic needs.
- The criteria employed to rank the identified priority-setting needs would need to be extended and reframed; this will be facilitated by the re-composition of the stakeholder workshop as described above.

Beyond these, the analysis is undertaken is exactly the same way as described in the user guide.

3.7 CONCLUSIONS

This report has presented the initial results of a priority-setting exercise for SPS capacity-building in Armenia. The priorities were defined using a prioritisation framework based on MCDA, which provides a structured and transparent approach to ranking capacity-building options on the basis of predefined and agreed decision criteria. The options to be considered were identified through a process of stakeholder consultation that was informed by a review of prior assessments of SPS capacity. A total of eight (8) distinct SPS capacity-building options are identified which are judged to be substantive SPS issues.

These eight (8) capacity-building options are prioritised on the basis of a series of twelve (12) decision criteria to which weights are applied. These criteria and weights are again derived through the stakeholder workshop and working group meetings established in the framework of the project. These criteria cover the upfront and on-going costs and difficulty of implementing the capacity-building options and sustainability of the created capacity, the pay-off from these investments in terms of impacts on agri-food exports, diversification of exports and on international reputation of Armenian agri-food products, public health and the environment, and the degree to which they bring about broader socio-economic benefits in terms of poverty, SME development and stakeholder collaboration.

The result of the application of the MCDA framework is a clear ranking of the eight (8) capacity-building options that are identified, which is apparently robust to changes in the decision criteria that are applied and to the weights attached to these criteria. Thus, of the eight (8) options in the analysis the following four (4) are consistently ranked as high priority:

- Hygiene controls for egg product exports to the EU
- Pesticide residue controls for dried fruit and herb exports to the EU
- Compliance with HACCP and LACF requirements for canned food exports to the US
- Pesticide and antibiotic residue controls for honey exports to the EU.

Conversely, animal health controls for meat product exports to Russia and controls on phthalates for wine product exports to China are consistently ranked bottom of the eight (8) options under consideration.

Given the robustness of the results, the ranking provided by the MCDA framework provides a coherent basis on which to define a national action plan for SPS capacity-building in Armenia, and to support efforts to secure the necessary resources, both nationally and internationally. However, importantly, the results presented above should be only the starting point in the use of MCDA to prioritise SPS capacity-building options in the country. Thus, these results should be revisited and revised on an on-going basis 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. If new capacity-building needs arise, these need to be added to the analysis. Conversely, as investments are made in the options included above, these need to be excluded and the priorities re-estimated.

It is possible that some stakeholders will be concerned about the prioritisation of the eight (8) capacity- building options; they may feel that a particular option has been treated harshly, or that too much weight has been attached to a particular criterion. They might also be concerned about some of the estimates in the information sheets. The rankings are based on the results of the stakeholder consultation process and the collection and collation of data directed at the compilation of the information sheets. It is almost always possible to improve on this process, for example by encompassing the perspectives of a larger number and wider range of stakeholders. It is important to recognize that a key function of the MCDA analysis is to facilitate debate over the prioritisation of

the capacity-building options; the output of the framework should not be seen as ‘final’ but instead the basis on which differences in opinion can be explored and consensus over which options should be given priority is moved towards. Thus, if a particular group of stakeholders is unhappy about the results of the prioritisation, they should be invited to present new data that can be used to revise the information sheets. Such changes can then be employed and the model re-estimated accordingly.

Following this trial application, we would love to see Armenia employing the MCDA framework on a routine basis for the planning of SPS capacity-building. Towards this end, there is a need to put in place systems for the effective capture of the data needed to populate and update the information sheets, and to enable these data to be validated. These will require that fruitful linkages are established with private sector and other stakeholders, and across those involved in various SPS and trade functions within the government.

4 Annexes

ANNEX 1. CONTENTS OF INFORMATION DOSSIER

- FAO (2019), Technical Assistance for Grape Phylloxera Resistant Planting Material Production, Yerevan
- FAO (2016), Support for Pesticide Quality Control and Residue Monitoring, Terminal Report, Rome
- USAID (2014), Enterprise Development and Market Competitiveness (EDMC); Armenia Agriculture Sector Activities Persuap; Yerevan
- ITC, Export Value Chain Study; Processed Fruit and Vegetable, Dried Fruit and Vegetable, Herbal Tea, Yerevan
- EU Delegation to Armenia (2011), Draft Food Safety Strategy Action Plan, Yerevan
- EU Delegation to Armenia (2011), The Republic of Armenia Food Safety System Development Strategy, Yerevan
- EU Delegation to Armenia (2013), Needs Assessment Report; SPS: Food Safety and Veterinary, Yerevan
- World Food Programme (2021), Value Chain and Feasibility Analysis, Fruits and berries, Yerevan
- World Food Programme (2020), Feasibility Study; Value Chain of Whole Grain Wheat in Tavush Marz of Armenia, Yerevan
- World Food Programme (2020), Feasibility analysis of crop production in greenhouses, Yerevan
- World Food Programme (2020), Tor 101- Prospective Food Value Chains in Armenia, Yerevan
- World Trade Organisation (2018); Trade Policy Review; Report by the Secretariat, Armenia; Geneva
- Food and Chemical Toxicology (2020); Davit Pipoyan, Seda Stepanyan, Meline Beglaryan, Stella Stepanyan, Alberto Mantovani; Health risk assessment of toxicologically relevant residues in emerging countries: A pilot study on Malachite Green residues in farmed freshwater fish of Armenia; Rome
- Science Press and Institute of Geochemistry (2019); G. Tepanosyan, L. Sahakyan, O. Belyaeva, M. Beglaryan, D. Pipoyan, A. Hovhannisyan, A. Saghatelyan; Studying DDTs in agricultural soils of selected rural communities of Armenia, CAS and Springer-Verlag GmbH Germany
- Cheese Production and Export Supply Chain, Armenia (2017); World Bank Group/International Finance Corporation in partnership with the Federal Ministry of Finance, EXIM and in cooperation with Ministry of Economic Development and Investments of the Republic of Armenia and Development Foundation of Armenia
- Middle East as an Alternative Market for Armenia: Greenhouse Crops, Berries, Flowers, Nuts and Processed fruits (dried/frozen), 2020; International Center for Agribusiness Research and Education foundation, World Bank Group (WBG)/International Finance Corporation (IFC) in partnership with the UK Government's Good Governance Fund
- Agri-Product Exporters' Toolkit (From Armenia to Kuwait, Qatar and UAE); International Center for Agribusiness Research and Education, IFC/World Bank Group in partnership with the UK Government's Good Governance Fund

ANNEX 2. PARTICIPANTS OF THE STAKEHOLDER WORKSHOP, 20 JANUARY, 2022

First Name, Family Name	Organisation	Position
Gevorg Ghazaryan	Ministry of Economy	Head of Food Security and Agro-Processing Development Department
Arayik Aramyan	Ministry of Economy	Deputy Head of Food Security and Agrodevelopment Department
Ashkhen Shirvanyan	Ministry of Economy	Head of Food Safety Department
Artur Petrosyan	Ministry of Economy	Head of phytosanitary devision of food safety department
Nina Ter-Grigoryan	Ministry of Economy	Chief specialist - CEPA & WTO Division of the Department of EU Economic Cooperation
Artur Hayrapetyan	Ministry of Economy	Chief Specialist of Food Security and Agrodevelopment Department
Rima Karapetyan	Ministry of Economy	Specialist in Phytosanitary Division
Magda Hovhannisyan	Ministry of Economy	Specialist
Mery Tonoyan	Ministry of Economy	Specialist
Vahagn Sargsyan	Ministry of Environment	Chief specialist
Mesrop Grigoryan	Food Safety Inspection Body	Deputy Head of Border coordination department
Jon Simonyan	Food Safety Inspection Body	Senior Inspector of the Veterinary Department
Anahit Hovsepyan	Food Safety Inspection Body	Chief Inspector
Arman Valesyan	UNDP	Programme Manager
Karen Harutyunyan	UNDP	EU GAIA project coordinator
Anahit Simonyan	UNIDO	Country Representative in Armenia
Sergey Matevosyan	UNIDO	Project coordinator
Aram Babayan	GIZ, Private Sector Development and Technical Vocational Education and Training South Caucasus	Team Leader Armenia
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Ivory Hackett-Evans	WFP	Head of Unit: Food Value chains
Nanna Skau	WFP	Deputy Country Director

First Name, Family Name	Organisation	Position
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Davit Pipoyan	CENS	Head of Informational Analytical Center for Risk assessment of food chain
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Armen Zakaryan	UMCOR Armenia Foundation	Coordinator of Agriculture and Economic Development Projects
Grigor Gasparyan	Export Insurance Agency of Armenia ICJSC	Head of Underwriting Unit
Grigor Gasparyan	Export Insurance Agency of Armenia ICJSC	Head of Underwriting Unit
Ara Papyan	BDO Armenia CJSC	Legal Counsel
Vladimir Amiryan	Chamber of Commerce and Industry of Armenia	CEO
Sergey Chakhmakhchyan	Center for Agribusiness and Rural Development	Animal Health & Food Safety Expert
Mkrtich Karapetyan	Galilia	Sales
Arthur Khachatryan	Armtax	Co-founder
Suren Khachatryan	Tevra Tea	Founder
Tigran Tsaturyan	Helensfood Ltd	Organic program director
Khoren Sukiasyan	Public organization	Director
Emil Stepanyan	Export Armenia association	Co-founder
Anna Beklyarova	Export Armenia Association	Co-founder
Anton Manukyan	Tavigh Distillery llc	Ceo
Arman Ohanyan	National Association of Veterinarians	Head
Hakob Khudaverdyan	Strategic Development Agency NGO	Business Consultant
Karen Chilingaryan	Consumers Consultation Cemter NGO	Head
Hayk Melkonyan	Fruitful Armenia initiative	Founder
Ashot Voskanyan	National Agrarian University of Armenia	Dean
Artur Mkrtchyan	National Agrarian University of Armenia	Head of department of Epidemiology and parasitology
Narine Hovhannisyan	National Agrarian University of Armenia	Head of scientific center of food safety and biotechnologies
Heghine Mkhitaryan	National Agrarian University of Armenia	Scientist
Kristine Khanamiryan	National Agrarian University of Armenia	Aspirant/scientist

First Name, Family Name	Organisation	Position
Arevik Abovyan	National Agrarian University of Armenia	Dean of the Faculty of Veterinary Medicine and Animal Husbandry
Astghik Pepoyan	National Agrarian University of Armenia	Head of division
Mick Lloyd	Consultant under ADB TA-9942 ARM	Team Leader
Seyran Hovsepyan	Forward Business	ISO management systems implementation consultant
Gor Movsesyan	New Horizon	Head of Chamber
Armen Gigoyan	Cheese Makers Union of Armenia	President
Makaryan Gagik	Republican Union of Employers of Armenia	President
Vahe Mambreyan	AM Partners Consulting Company	Executive Director
Shahane Mambreyan	AM Partners Consulting Company	Specialist
Ashot Karapetyan	Association of Meat, Feed Producers and Breeders	Board Chairman
Tatevik Yengoyan	Tea Group	Director
Lilit Petrosyan	Strategic Development Agency NGO	Component Leader
Karina Grigoryan	Armenian Society of Food Science and Technology	Head of organization
Sona Tsarukyan	“Community Agricultural Resource Management and Competitiveness” Second Project, Project implementation department Ministry of Economy	Coordinator of straightening public sector institutions component
Lusya Khachatryan	Ahead of Business	ISO expert

ANNEX 3. PARTICIPANTS OF THE STAKEHOLDER WORKSHOP, 11 FEBRUARY, 2022

First Name, Family Name	Organisation	Position
Arman Khojoyan	Ministry of Economy	Deputy Minister
Gevorg Ghazaryan	Ministry of Economy	Head of Food Security and Agro-Processing Development Department
Magda Hovhannisyan	Ministry of Economy	Deputy Head of Department
Arajik Aramyan	Ministry of Economy	Deputy Head of Food Security and Agrodevelopment Department
Artur Petrosyan	Ministry of Economy	Head of Phytosanitary Department
Nina Ter-Grigoryan	Ministry of Economy	Chief specialist - CEPA & WTO Division of the Department of EU Economic Cooperation
Rima Karapetyan	Ministry of Economy	Specialist in Phytosanitary Division
Jon Simonyan	Food Safety Inspection Body	Senior Inspector
Arusyak Alaverdyan	World Bank	Sr. Agriculture Specialist
Karen Harutyunyan	UNDP	Project coordinator
Simon Sargsyan	USAID	Project Management Specialist
Angela Khachatryan	Embassy of Switzerland in Armenia	Chief of Finance, Personnel and Administration
Patrick Gut	Embassy of Switzerland in Armenia	Trainee
Susanna Karapetyan	FAO Armenia	Social Protection Expert
Zaruhi Beglaryan	FAO Armenia	Programme Manager
Garnik Manukyan	Austrian Development Agency	Marketing Expert
Gagik Makaryan	Republican Union of Employers of Armenia	President
Anton Manukyan	Tavigh Distillery llc	Ceo and founder
Khoren Sukiasyan	Patriots LLC	Director
Suren Khachatryan	Tevra tea	founder
Misak Avetisyan	Cargo LLC	Deputy director
Karine Sarkissian	AmCham Armenia	Executive Director
Karen Martirosyan	Avenue Consulting Group LLC	Partner, Head of Strategic Management Advisory Services
Tigran Markosyan	Scientific centre for risk assessment and analysis in food safety area	Director

First Name, Family Name	Organisation	Position
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Erik Khachatryan	Export Insurance Agency of Armenia CJSC	Senior Underwriter
Tatevik Gevorgyan	Gevorgyan Legal Consulting LLC	CEO
Tigran Hovhannisyan	ECLOF Foundation	General Director
Lyudmilla Hovhannesyan	ECLOF Foundation	International Relations and Marketing Assistant
Armen Sargsyan	ECLOF Foundation	Head accountant
Arman Ohanyan	Smart Agro	Director
Gor Movsesyan	Agricultural Alliance	Expert
Seyran Hovsepyan	ARM Consult	Adviser
Artur Mkrtchyan	National Agrarian University of Armenia	Associated professor
Kristine Khanamiryan	National Agrarian University of Armenia	Aspirancy
Arevik Abovyan	National Agrarian University of Armenia	Dean of the Faculty of Veterinary Medicine and Animal Husbandry
Narine Hovhannisyan	National Agrarian University of Armenia	Head of scientific center of food safety and biotechnologies
Sergey Stepanyan	Association of poultry producers	Head

ANNEX 4. PARTICIPANTS OF THE STAKEHOLDER WORKSHOP, 13-14 JUNE, 2022

N	First Name, Family Name	Organisation
1	Seyran Hovsepyan	"For Business" Organization
2	Gagik Makaryan	Republican Union of Employers of Armenia
3	Arayik Aramyan	Ministry of Economy
4	Astghik Pepoyan	Armenian National Agrarian University
5	Khoren Sukiasyan	"Patriots" Organization
6	Ashot Voskanyan	Armenian National Agrarian University
7	Karen Martirosyan	Avenue Consulting Group LLC / Export Armenia
8	Anna Grigoryan	Mega Food LLC
9	Emil Stepanyan	Export Armenia Association
10	Tigran Jrbashyan	Ameria CJSC
11	Tigran Gasparyan	Ameria Management Advisory
12	Arevik Abovyan	Armenian National Agrarian University
13	Zhanna Baghdasaryan	El Ambassador Import Armenia
14	Narine Eghyan	Scanned Food Producer Nubarashen
15	Tigran Markosyan	Scientific center of food safety risks assessment and analyses MOE
16	Arusyak Alaverdyan	World Bank
17	Olviya Merkulova	Trade Representation of Russia in Armenia
18	Ashkhen Shirvanyan	Ministry of Economy
19	Karapet Muradyan	World Food Programme
20	Gor Movsesyan	Horizon fund
21	Vahe Galstyan	AAgrifood
22	Artur Hayrapetyan	Ministry of Economy
23	Artur Shahmuradyan	Ber
24	Simon Sargsyan	https://Mitk.am
25	Lusya Khachatryan	BUSINESSIN ANDARAG LLC
26	Flora Shakhmuradian	BER
27	Levon Nikolyan	WFP
28	Sergey Stepanyan	Poultry Association
29	Vladimir Amiryan	Chamber of Commerce and Industry of the Republic of Armenia
30	Margarit Mirzoyan	Ministry of Economy
31	Anahit Simonyan	UNIDO

32	Sona Tsarukyan	Ministry of Economy
33	Karen Harutyunyan	UNDP
34	Misak Avetisyan	Cargo LLC
35	George	Embassy of the Netherlands
36	Mikayel Haykuni	Food and Agriculture Organization, UN
37	Madga Hovhannesyan	Ministry of Economy
38	Mary Tonoyan	Ministry of Economy
39	Mesrop Grigoryan	Food Safety Inspection Body
40	Jon Simonyan	Food Safety Inspection Body
41	Arman Ohanyan	National Association of Veterinarians
42	Arpine Manukyan	30 CP AM
43	Levon Nikolyan	WFP
44	Artur Petrosyan	Ministry of Economy
45	Anna Beklarova	Export Armenia Association
46	Anahit Hovsepyan	FSIB

ANNEX 5. CAPACITY-BUILDING OPTION INFORMATION CARDS

Table 5.1.a Animal health controls for meat product exports to Russia

Decision Criterion	Value	Details	Confidence
Cost and Challenges of implementation			
Up-front investment	AMD 4,817,250,000	See table 5.1.b	Medium
On-going cost	AMD 975,160,000	See table 5.1.c	Medium
Difficulty of implementation	6	Some work has already been done, but there are still many problems (general systemic), the solutions of which are costly and time consuming. The problem can be solved, but a system must be set up, which will be controlled by the state. There is a lack of relevant capacities and qualified specialists. These activities require hard and consistent work, which is a long-term process.	Medium
Sustainability of capacity	5	It requires regular control and updates. Also, by implementing the option, relevant infrastructure could be developed, which will ensure sustainability	High
Trade impacts			
Growth or avoided loss of agri-food exports	7	Export will be extended and new markets will become available, though there are not enough production capacity	Low
Degree to which Agri-Food Exports Diversified	+1	If the country will be able to meet health and safety requirements of importing countries, it will contribute to growth and diversification of exported products and markets	High
Impact on International Reputation of Armenian Agri-Food Products	6	Safe and quality meat product, but at the long-term perspective	Low
Domestic agri-food impacts			
Impact on Public Health in Armenia	+2	Quality control systems will be in place, which will have a significant impact on food safety, though there are other factors that impact on the public health	Medium
Impact on Environmental Protection in Armenia	+1	Within one health concept, there is a direct link between animal and public health and the environment, and the change in each of them effects on the others.	Medium

Decision Criterion	Value	Details	Confidence
Social impacts			
Impact on Level of Poverty in Armenia	+1	Costs will increase, but in the long run, we will have quality food and more people can be involved in the meat production	Medium
Impact on agricultural SME development	5	There will be a tendency to increase SMEs, as a result of which they will grow and be more efficient, though currently big farms are involved in the production of meat	Low
Impact on stakeholder collaboration	5	In the case of increased profitability, cooperation will be a greater incentive. Moreover, the stakeholders will have the common interest - safe food	Low

Table 5.1.b. Estimated up-front investment

Item	Estimated cost (AMD)
Regionalization	5,000,000.0
Compartmentalization	10,000,000.0
Define the FMD free zone (for food from cattle and ruminants)	50,000,000.0
Introduction of product traceability electronic automated system	1,500,000,000.0
Animal numbering	1,247,250,000.0
Vaccination	1,500,000,000.0
Improvement of laboratory capacities (Technical equipment and training of specialists)	500,000,000.0
Visibility and public awareness raising activities	5,000,000

Table 5.1.c. Estimated on-going costs

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated system	15,000,000.0
Animal numbering	1,960,000.0
Post-vaccination service	300,000,000.0
Raising the level of professional education,	50,000,000.0
Improvement of control mechanisms (including an increase in funding for monitoring, etc.)	100,000,000.0
Improvement of legislation	5,000,000.0
Implementation of relevant measures approved by the state programmes	500,000,000.0
Visibility and public awareness raising activities	1,200,000.0
Waste disposal and waste management	2,000,000.0

Table 5.2.a Pesticide residue controls for dried fruit and herb exports to the EU

Decision Criterion	Value	Details	Confidence
Cost and Challenges of implementation			
Up-front investment	AMD 1,865,000,000	See table 5.2.b	Medium
On-going cost	AMD 251,000,000	See table 5.2.c	Medium
Difficulty of implementation	4	There is a lack of specialists, certified laboratories and relevant skills among SMEs. Involvement of relevant specialists and food safety experts will easily improve the situation	Low
Sustainability of capacity	5	Sustainability of capacity is based on other factors as well, however implementation of necessary measures, training with farmers and introduction of relevant standards and requirements can contribute to the sustainability	Medium
Trade impacts			
Growth or avoided loss of agri-food exports	8	Meeting with relevant standards and food safety protection can have a positive demand on Armenian food products and positive impact on export level	Medium
Degree to which Agri-Food Exports Diversified	+1	There is a demand from third countries and export markets on these products and export can be diversified if food safety requirements of those markets are met	High
Impact on International Reputation of Armenian Agri-Food Products	6	The quality and safety of food will be increased, which will create a confidence among partners	Medium
Domestic agri-food impacts			
Impact on Public Health in Armenia	+2	Absence of products of dubious quality, will have a positive effect on human health problems caused by pesticide residues	Medium
Impact on Environmental Protection in Armenia	+2	Controlling the use of pesticides will have a significant impact on arable land and the overall environment	High
Social impacts			
Impact on Level of Poverty in Armenia	+1	There will be healthy food and as a result, consumers will be healthier and will spend less. Though the high-quality food will cost higher, as control over pesticides will promote import of high-quality pesticide, which are expensive.	Medium
Impact on agricultural SME development	5	There are many SMEs producing dried fruits and herbs and increase the quality of products and export growth will have an impact on them	Low
Impact on stakeholder collaboration	5	New production approaches and export growth will require to intensify multisectoral cooperation.	Low

Table 5.2.b. Estimated up-front investment

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	1,500,000,000.0
Control over the sale of pesticides	100,000,000.0
Control over the sale of antibiotics	100,000,000.0
Special measures for land consolidation and cluster formation	30,000,000.0
Improvement of control mechanisms (including an increase in funding for monitoring, etc.)	100,000,000.0
Visibility and public awareness raising activities	5,000,000.0
Ensure conformity of manufactured products to EU standards	30,000,000.0

Table 5.2.c. Estimated on-going costs

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	15,000,000.0
Raising the level of professional education	50,000,000.0
Control over the sale of pesticides	30,000,000.0
Control over the sale of antibiotics	30,000,000.0
Special measures for land consolidation and cluster formation	12,000,000.0
Improvement of laboratory capacities (Technical equipment and training of specialists)	15,000,000.0
Improvement of legislation	5,000,000.0
Implementation of relevant measures approved by the state programmes (laboratory testing)	80,000,000.0
Visibility and public awareness raising activities	2,500,000.0
Waste disposal and waste management	1,500,000.0
Ensure conformity of manufactured products to EU standards	10,000,000.0

Table 5.3.a Hygiene and residue controls for fish exports to the EU

Decision Criterion	Value	Details	Confidence
Cost and Challenges of implementation			
Up-front investment	AMD 1,847,000,000	See table 5.3.b	Medium
On-going cost	AMD 348,200,000	See table 5.3.c	Medium
Difficulty of implementation	4	Control over the sale and usage of MG and other types of antibiotics can be done through creation of a traceability system. Involvement of relevant specialists and food safety experts will improve the situation	Low
Sustainability of capacity	4	Implementation of necessary measures, training with farmers and introduction of relevant standards and requirements makes this activity more sustainable. Nevertheless, it requires regular control	Low
Trade impacts			
Growth or avoided loss of agri-food exports	7	There is a wide opportunity for new markets	Low
Degree to which Agri-Food Exports Diversified	+1	Entrance to new markets. Moreover, it will give a possibility to export products that are not currently exported. Nevertheless, there is no enough volume for exports and there is a need of the country positioning	High
Impact on International Reputation of Armenian Agri-Food Products	5	Improving quality and safety will contribute to the increase of reputation	Low
Domestic agri-food impacts			
Impact on Public Health in Armenia	2	Due to the permissible level of residual substances, including antibiotics	Medium
Impact on Environmental Protection in Armenia	+2	Negative impact on environment will be decreased	Medium
Social impacts			
Impact on Level of Poverty in Armenia	+1	The growth of exports and production volumes will also contribute to the increase of incomes of the population involved in the sphere	Medium
Impact on agricultural SME development	4	SMEs are not involved in fish farming, though the increase of export could have an impact on them	Low
Impact on stakeholder collaboration	4	New production approaches and export directions will require to intensify multisectoral cooperation	Low

Table 5.3.b. Estimated up-front investment

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	1,500,000,000.0
Education and awareness raising of farmers, including on the use of safer products	10,000,000.0
Publication of information leaflets and implementation of public awareness campaigns	5,000,000.0
Ensure conformity of manufactured products to EU standards	30,000,000.0
Introduction of an effective certification system in close cooperation with the governmental authorities and other stakeholders, including private businesses	100,000,000.0
Providing information on safe alternatives of MG and their effectiveness	2,000,000.0
Improvement of control mechanisms (including an increase in funding for monitoring, etc.)	100,000,000.0
Ensure control over the use of antibiotics	100,000,000.0

Table 5.3.c. Estimated on-going costs

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	15,000,000.0
Education and awareness raising of farmers, including on the use of safer products	5,000,000.0
Publication of information leaflets and implementation of public awareness campaigns	1,200,000.0
A proper, continuous monitoring of the presence of MG and LMG residues in aquaculture products	60,000,000.0
Ensure conformity of manufactured products to EU standards	10,000,000.0
Introduction of an effective certification system in close cooperation with the governmental authorities and other stakeholders, including private businesses	10,000,000.0
Providing information on safe alternatives of MG and their effectiveness	500,000.0

Item	Estimated cost (AMD)
Improvement of laboratory capacities (Technical equipment and training of specialists)	150,000,000.0
Improvement of legislation	5,000,000.0
Implementation of relevant measures approved by the state programmes (laboratory testing)	60,000,000.0
Waste disposal and waste management	1,500,000.0
Ensure control over the use of antibiotics	30,000,000.0

Table 5.4.a Pesticide and antibiotic residue controls for honey exports to the EU

Decision Criterion	Value	Details	Confidence
Cost and Challenges of implementation			
Up-front investment	AMD 1,745,000,000	See table 5.4.b	Medium
On-going cost	AMD 261,000,000	See table 5.4.c	Medium
Difficulty of implementation	4	It is easy to control, through creation of relevant system, awareness raising and training of farmers	Low
Sustainability of capacity	4	Implementation of necessary measures, training with farmers and introduction of relevant standards and requirements makes this activity more sustainable, though there is a need of continuous control	Low
Trade impacts			
Growth or avoided loss of agri-food exports	7	There is a possibility to export organic honey	Low
Degree to which Agri-Food Exports Diversified	+1	Though there is no enough quantity, the export will be increased which will bring to diversification	High
Impact on International Reputation of Armenian Agri-Food Products	5	Export of safe food (particularly organic) will increase Armenia's reputation, though there is no enough quantity	Low
Domestic agri-food impacts			
Impact on Public Health in Armenia	+2	Control over pesticides and antibiotic residues will reduce their usage and will have a positive impact on public health	High
Impact on Environmental Protection in Armenia	+2	Will positively impact on environment	Medium
Social impacts			
Impact on Level of Poverty in Armenia	+1	Producers of honey are manly small farmers located in regions. Export growth will increase their revenue	High
Impact on agricultural SME development	5	New opportunities will be opened for SMEs	Medium
Impact on stakeholder collaboration	5	Different stakeholders are involved and it will increase their collaboration (farmers, honey producers and educational institutions etc.)	Medium

Table 5.4.b. Estimated up-front investment

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	1,500,000,000.0
Organise training with farmers	10,000,000.0
Control over the sale of pesticides	100,000,000.0
Control over the sale of antibiotics	100,000,000.0
Visibility and public awareness raising activities	5,000,000.0
Ensure conformity of manufactured products to EU standards	30,000,000.0

Table 5.4.c. Estimated on-going costs

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	15,000,000.0
Raising the level of professional education	50,000,000.0
Organise training with farmers	2,000,000.0
Control over the sale of pesticides	30,000,000.0
Control over the sale of antibiotics	30,000,000.0
Improvement of laboratory capacities (Technical equipment and training of specialists)	15,000,000.0
Improvement of control mechanisms (including an increase in funding for monitoring, etc.)	40,000,000.0
Improvement of legislation	5,000,000.0
Implementation of relevant measures approved by the state programmes (laboratory testing)	60,000,000.0
Visibility and public awareness raising activities	2,500,000.0
Waste disposal and waste management	1,500,000.0
Ensure conformity of manufactured products to EU standards	10,000,000.0

Table 5.5.a HACCP and LACF requirements for canned food exports to the U.S.

Decision Criterion	Value	Details	Confidence
Cost and Challenges of implementation			
Up-front investment	AMD 1,680,000,000	See table 5.5.b	Medium
On-going cost	AMD 157,000,000	See table 5.5.c	Medium
Difficulty of implementation	5	There is a relevant legislation in place. In case of availability of relevant finances, it will be possible to implement required activities and promote introduction of HACCP in the country	Low
Sustainability of capacity	5	The experience and knowledge will contribute to the sustainability	Low
Trade impacts			
Growth or avoided loss of agri-food exports	7	Certification of production according to HACCP and LACF requirements will have positive impact on export and will increase confidence among partners	Medium
Degree to which Agri-Food Exports Diversified	+1	Introduction of HACCP and LACF requirements will positively impact on export diversification by opening new export markets and producing new products	High
Impact on International Reputation of Armenian Agri-Food Products	5	Will have a positive reputation as food safety requirements will be met	Low
Domestic agri-food impacts			
Impact on Public Health in Armenia	+2	Safety food production	High
Impact on Environmental Protection in Armenia	+1	Will reduce the use of harmful substances	High
Social impacts			
Impact on Level of Poverty in Armenia	+1	Though there are lot of stakeholders involved, the impact on poverty will be moderate	Medium
Impact on agricultural SME development	4	The connection is weak and it has a dual effect. Moreover, there is a need of capacity building activities and improvement of knowledge	Low
Impact on stakeholder collaboration	5	Lot of stakeholders are involved, which makes a collaboration difficult	Low

Table 5.5.b. Estimated up-front investment

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	1,500,000,000.0
Development of relevant guidelines	30,000,000.0
Production of video materials	50,000,000.0
Improvement of control mechanisms (including an increase in funding for monitoring, etc.)	100,000,000.0

Table 5.5.c. Estimated on-going costs

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	15,000,000.0
Raising the level of professional education	50,000,000.0
Regular revision, update and development of checklists	2,000,000.0
Training of inspectors	15,000,000.0
Development of relevant guidelines	2,000,000.0
Production of video materials	10,000,000.0
Development of standard forms	1,000,000.0
Waste disposal and waste management	2,000,000.0
Improvement of control mechanisms (including an increase in funding for monitoring, etc.)	60,000,000.0

Table 5.6.a Animal health controls for live animal exports to Iran

Decision Criterion	Value	Details	Confidence
Cost and Challenges of implementation			
Up-front investment	AMD 4,907,250,000	See table 5.6.b	Medium
On-going cost	AMD 845,160,000	See table 5.6.c	Medium
Difficulty of implementation	6	Some work has already been done, but there are still many problems (general systemic), the solutions of which are costly and time consuming	High
Sustainability of capacity	5	This sustainability depends on many factors, including the willingness of farmers to meet the requirements. It requires regular control and updates	Low
Trade impacts			
Growth or avoided loss of agri-food exports	8	Export will be extended and new markets will become available, if industrial breeding practices will be introduced.	Low
Degree to which Agri-Food Exports Diversified	+1	Contribute to the growth of exports of animal products and the possible involvement of new markets	High
Impact on International Reputation of Armenian Agri-Food Products	5	Stability to various infectious diseases will enhance the reputation of products derived from them.	Low
Domestic agri-food impacts			
Impact on Public Health in Armenia	+2	Quality control system will have a positive impact on health, though there are other factors that impact on the public health. Relating to zoonotic diseases, if we have a healthy livestock population, the chances of infecting people will be significantly reduced	Medium
Impact on Environmental Protection in Armenia	+1	Wildlife - Pets - Environment connection is always there and the strengthening of each of these links will strengthen the overall system.	Medium
Social impacts			
Impact on Level of Poverty in Armenia	+2	Mainly small farmers living in rural areas are involved. Creating and maintaining a more complete system will also increase the number of people involved in production of live animals and animal products and their income	High
Impact on agricultural SME development	5	The growth of volumes and the establishment of new productions can increase the number of SMEs in this field	Low
Impact on stakeholder collaboration	5	The value chain has a lot of stakeholders and their collaboration will be improved. New production approaches and export directions will require to intensify multisectoral cooperation.	Low

Table 5.6.b. Estimated up-front investment

Item	Estimated cost (AMD)
Regionalization	5,000,000.0
Introduction of product traceability electronic automated systems	1,500,000,000.0
Implementation of vaccinations and other required anti-epidemic measures	1,500,000,000.0
Animal numbering	1,247,250,000.0
Improvement of laboratory capacities (Technical equipment and training of specialists)	500,000,000.0
Improvement of control mechanisms (including an increase in funding for monitoring, etc.)	100,000,000.0
Ensure conformity of manufactured products to the standards of Iran	50,000,000.0
Visibility and public awareness raising activities	5,000,000.0

Table 5.6.c. Estimated on-going costs

Item	Estimated cost (AMD)
Introduction of product traceability electronic automated systems	15,000,000.0
Raising the level of professional education	50,000,000.0
Post-vaccination services	300,000,000.0
Animal numbering	1,960,000.0
Improvement of legislation	5,000,000.0
Implementation of relevant measures approved by the state programmes	400,000,000.0
Training of specialists	50,000,000.0
Ensure conformity of manufactured products to the standards of Iran	20,000,000.0
Visibility and public awareness raising activities	1,200,000.0
Waste disposal and waste management	2,000,000.0

Table 5.7.a Hygiene controls for processed egg exports to the EU

Decision Criterion	Value	Details	Confidence
Cost and Challenges of implementation			
Up-front investment	AMD 430,700,000	See table 5.7.b	Medium
On-going cost	AMD 162,800,000	See table 5.7.c	Medium
Difficulty of implementation	6	Though there are not so many poultry farms, the capacity building options require long-term activities which makes the implementation process a bit complicated	High
Sustainability of capacity	5	If all planned activities will be implemented it will be sustainable for the long-term perspectives	Low
Trade impacts			
Growth or avoided loss of agri-food exports	7	Production capacities of poultry farms will be increased and new type of egg products will lead to the growth of export	Low
Degree to which Agri-Food Exports Diversified	+1	New exporting products and new export markets will ensure diversification of the export	High
Impact on International Reputation of Armenian Agri-Food Products	6	Armenia will become one of countries where high quality and safety egg and egg products are produced	High
Domestic agri-food impacts			
Impact on Public Health in Armenia	+2	Processed egg is safer which will improve health conditions of the population	High
Impact on Environmental Protection in Armenia	+1	Indirectly all the actions will have positive impact on the environment	Medium
Social impacts			
Impact on Level of Poverty in Armenia	+1	Export growth will lead to creation of new jobs and increase the labour demand, which will bring to the reduction of the level of poverty	Medium
Impact on agricultural SME development	5	Though there are not so many SMEs involved in the sector, implementation of the planned activities will have non-direct impact on small rural farmers and their interest to produce more eggs	Low
Impact on stakeholder collaboration	6	Communication and cooperation between stakeholders from different sectors and institutions (public, private, educational etc.) will be improved and they will be involved in implementation of foreseen activities.	Medium

Table 5.7.b. Estimated up-front investment

Item	Estimated cost (AMD)
Production of eggshell processing (including factory, disinfection station, washing station, transportation, creation of eggs products to be exported)	397,700,000.0
Sanitary-hygienic practices implementation in small farms	20,000,000.0
Certification of production and egg powders and liquids (ISO 22000, ISO 9001, HACCP)	6,000,000.0
Development of relevant quality and GAP guidelines	2,000,000.0
Visibility and public awareness raising activities	5,000,000.0

Table 5.7.c. Estimated on-going costs

Item	Estimated cost (AMD)
Production of eggshell processing (including factory, disinfection station, washing station, transportation, creation of eggs products to be exported)	34,000,000.0
Training of specialists	50,000,000.0
Vaccination - bronchitis, New castle, Salmonella	16,000,000.0
Vitaminization in feed or water	8,000,000.0
Raising the level of professional education	300,000.0
Capacity building and training of farmers	50,000,000.0
Waste disposal as a part of environmental protection	1,500,000.0
Visibility and public awareness raising activities	2,000,000.0
Development of relevant quality and GAP guidelines	1,000,000.0

Table 5.8.a Controls on phthalates for wine product exports to China

Decision Criterion	Value	Details	Confidence
Cost and Challenges of implementation			
Up-front investment	AMD 2,158,000,000	See table 5.8.b	Medium
On-going cost	AMD 377,000,000	See table 5.8.c	Medium
Difficulty of implementation	5	The implementation of actions requires extensive work. There are lot of players in the sector and involving them in the capacity building options will be difficult	High
Sustainability of capacity	5	In the long-term perspective if all activities will be implemented properly, it is possible to achieve sustainability as a new system will be developed	Low
Trade impacts			
Growth or avoided loss of agri-food exports	5	As the capacity building options mainly ensure production of high-quality products it will contribute to the growth of export, which will be moderate	Medium
Degree to which Agri-Food Exports Diversified	1	Only in terms of access to new markets	High
Impact on International Reputation of Armenian Agri-Food Products	4	Will have a positive impact as quality of exported products will be increased	Low
Domestic agri-food impacts			
Impact on Public Health in Armenia	+1	Due to the decrease in the content of toxic substances	Medium
Impact on Environmental Protection in Armenia	+1	If use of pesticides will be regulated	High
Social impacts			
Impact on Level of Poverty in Armenia	+1	Non-direct impact on the poverty, as there is only limited number of wine product producers	High
Impact on agricultural SME development	2	Will contribute to the introduction of modern technologies in production	Medium
Impact on stakeholder collaboration	5	There are many different stakeholders involved in the sector and implementation of the capacity building options will contribute to the strengthening of their collaboration	Medium

Table 5.8.b. Estimated up-front investment

Item	Estimated cost (AMD)
Isotope laboratory capacity development, development and management of the National Data Bank	573,000,000.0
Introduction of product traceability electronic automated systems	1,500,000,000.0
Special measures for land consolidation	30,000,000.0
Improvement of control mechanisms within the sector (including control over MRL of pesticides)	50,000,000.0
Visibility and public awareness raising activities	5,000,000.0

Table 5.8.c. Estimated on-going costs

Item	Estimated cost (AMD)
Isotope laboratory capacity development, development and management of the National Data Bank	62,000,000.0
Introduction of product traceability electronic automated systems	15,000,000.0
Raising the level of professional education	50,000,000.0
Special measures for land consolidation	12,000,000.0
Improvement of laboratory capacities (technical equipment and training of specialists for pesticide analysis)	100,000,000.0
improvement of control mechanisms within the sector (including control over MRL of pesticides)	30,000,000.0
Capacity building and training for farmers and producers	100,000,000.0
Visibility and public awareness raising activities	1,500,000.0
Waste disposal and waste management	1,500,000.0
Improvement of legislation	5,000,000.0

ANNEX 6. PARTICIPANTS OF THE VALIDATION WORKSHOP, 06 JULY, 2022

First Name, Family Name	Organisation
Arpine Manukyan	The JUS Project
Lilit Petrosyan	SDA
Arthur Petrosyan	Ministry of Economy
Armen Zakaryan	UMCOR Armenia Fund
Astghik Pepoyan	Armenian National Agrarian University
Armen Hovhannisyan	ECLOF Foundation
Lyudmila Hovhannisyan	ECLOF Foundation
Lusya Khachatryan	Ahead of business' organization
Mesrop Grigoryan	Food Safety Inspection Body
Artur Hayrapetyan	Ministry of Economy
Vahe Danielyan	Food Safety Inspection Body
Armine Martirosyan	VISTAA Expert Center
Arthur Melikyan	Food Safety Inspection Body
Ara Alekyan	Food Safety Inspection Body
Tigran Markosyan	Ministry of Economy
Vardan Torchyan	Austrian Development Agency
Sona Tsarukyan	Ministry of Economy
Liliya Ivanyan	ClinChoice LLC
Anoush Iskandaryan	TMW CJSC
Sergey Stepanyan	Head of Poultry Association NGO
Kristina Mazmanyan	SPAP
Armine Antonyan	Ministry of Economy
Svetlana Hovhannisyan	Mehrabyan and Sons LLC
Jon Simonyan	Food Safety Inspection Body
Karina Grigoryan	Armenian Society of Food Science and Technology