

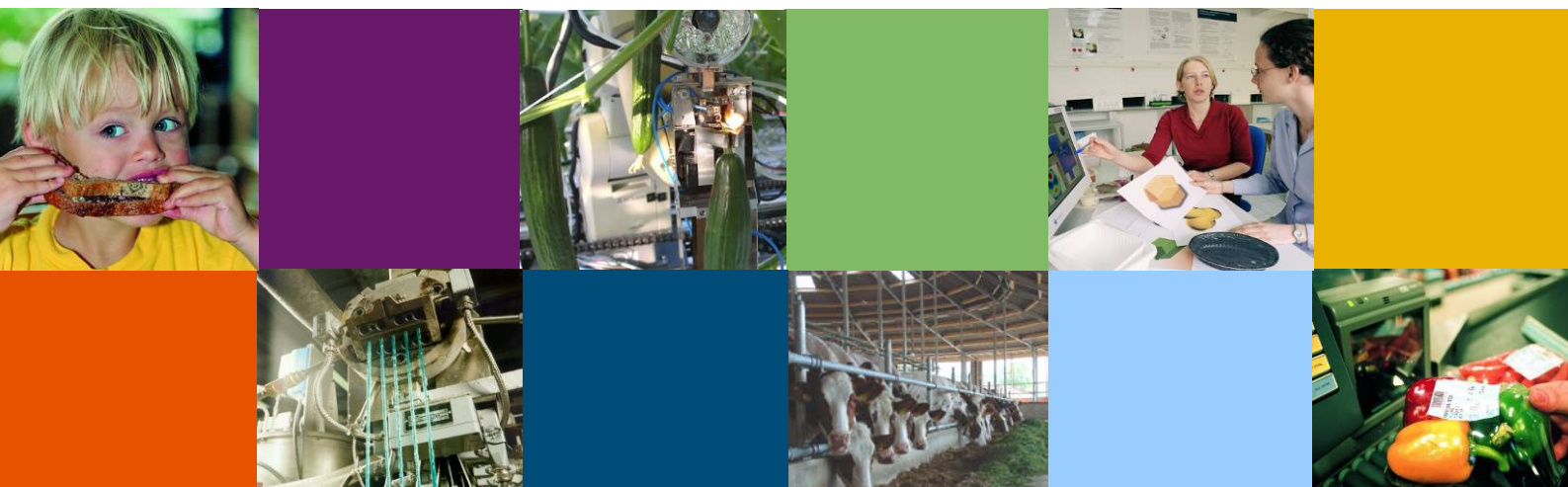


# Mexico - Pilot Program PNA

Design Phase 1A

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Report 1616



## Colophon

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## Summary

The purpose of the pilot program under the National Program for Agrologistics (PNA) is a quick start of the PNA as it was announced by then Minister of Agriculture Martínez y Martínez in December 2014. The PNA was designed in order to reach Mexico's goal to be among the top 10 export countries for agrifood products by 2030. This current project was set up in order to prepare the implementation of the pilot program. The first phase of the project, the design phase, aims at having the three most promising pilot projects identified and described in all detail so that the implementation of these can start immediately in phase 2 after contracting procedures with SAGARPA. These three selected pilots can be used to demonstrate that it is possible, with the developed criteria and other tools, to operate the pilot program and reap the declared benefits. This report covers part A of the design phase.

As a first step an inventory was set up consisting of 24 possible pilot projects which comply with the basic criteria of the pilot program. The 24 projects were identified based on expert consultation and knowledge as well as earlier work performed in the design of the PNA. The projects are defined based on individual products. Interventions relevant to opportunities and challenges in the value chain of this product are linked to each individual product.

In a second step, this list was further refined to a pre-selection of the most promising projects. In order to reach this, the ten most promising projects were defined based on a selection model, which consists of a set of indicators to evaluate the impact as well as the feasibility of a project. These criteria were applied to all products and related interventions of the inventory leading to the ten highest ranking projects. Following this ranking, the projects were analysed for synergy potential in order to create the highest possible impact. For each of ten pre-selected projects all other products and interventions of the inventory were analysed as to whether these could be combined, validating the production location and destination, the opportunity and intervention(s) and the type of product and whether these could be treated and transported together. Finally, in a third step, out of these ten the five most promising projects for export and the most promising project for a domestic chain were identified. This final selection was decided upon based on the volume of the product(s), the significance of the interventions for the future development of the sector and the degree of organization of the sector. It was deliberately chosen to have both, export and domestic chains in this pre-selection.

These six pre-selected projects were then validated with sector representatives and described in more detail based on the sector interviews and expert knowledge from within the project team. This detailed selection and validation process led to the following six pre-selected projects:

- Project 1: Increase of meat exports to Asian markets
- Project 2: Direct supply of Mexican greenhouse tomatoes to North American final customers
- Project 3: Better market access of avocado in Europe

- Project 4: Improvement of cooling infrastructure for berries
- Project 5: Import replacement of powder milk
- Project 6: Shortsea shipping of papaya to the US

The idea and approach of the pilot program PNA was very well received by the sector. Sector representatives were interested in discussing current issues, opportunities and possible interventions for their respective field of activity and are willing to participate in pilot projects that will enable them to turn existing opportunities into real benefits.

This part A of the design phase ends with the description of the pre-selected pilot projects. Phase B of pilot program design will consist of two parts: First, the selection of the Top 3 based on a final selection step of the selection model, which has to be applied to the pre-selected pilot projects to come to the final selection. This selection model is based on the same general approach as the model for the Top 10 selection, however, the set of indicators is more detailed and the feasibility of a project has a higher impact. Second, the elaboration of a detailed project plan for each of those three final projects.

## Acronyms and abbreviations

AMHPAC	Asociación Mexicana de Horticultura Protegida
ASERCA	Apoyos y Servicios a la Comercialización Agropecuaria
BID	Banco Interamericano de Desarrollo
CMP	Confederación de Porcicultores Mexicanos
CEO	Chief Executive Officer
CNA	Consejo Nacional Agropecuario
DG	Dirección General
DGLA	Dirección General de Logística y Alimentación
e.g.	exempli gratia
etc.	et cetera
FAO	Food and Agriculture Organization
FBR	Food & Biobased Research
FIRCO	Fideicomiso de Riesgo Compartido
GCMA	Grupo Consultor de Mercados Agrícolas
ha	hectare
IAEME	Impulsora Agro-Exportación Michoacán Europa
incl.	including
Ltd	limited
MXN	Mexican Peso
N	No
NOM	Norma Oficial Mexicana
OPORPA	Organización de Porcicultores del País
PhD.	philosophiae doctor
PNA	Programa Nacional de Agrologística
RTC	Regional Transformation Centre
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación
SCM	Supply Chain Management
SENASICA	Servicio Nacional de Sanidad Inocuidad y Calidad Agroalimentaria
SIAP	Servicio de Información Agroalimentaria y Pesquera
SME	Small and medium-sized enterprise
SNPL	Sistema Nacional de Plataformas Logísticas
UK	United Kingdom
US	United States
USD	US Dollar
TIF	Establecimiento Tipo Inspección Federal
VIDA	Nueva Visión para el Desarrollo Agroalimentario de México
Wageningen UR	Wageningen University & Research Centre
Y	Yes

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# 1 Introduction

## 1.1 Background

In the ambition to be among the top 10 export countries for agrofood products by 2030, the Mexican government commissioned Wageningen UR Food & Biobased Research to design the National Program for Agrologistics Mexico (Programa Nacional de Agrologística, PNA). The program consists of fifteen actions in five worklines that will lead to improvements in Mexico's logistic performance and thus its export position, maximising the potential of the agrofood sector. The program was officially presented in October 2014, and on 18 December 2014 President Peña Nieto and then Minister of Agriculture Martínez y Martínez announced that the PNA would begin implementation in 2015. In order to make a 'quick start' of the PNA and show the Mexican agrofood sector that the PNA is kicked off, the preparation and implementation of a pilot program was decided.

The intended effects of the pilot program as a whole are the following:

- Show the Mexican agrofood sector that the PNA is operational;
- Reach clearly visible and tangible results that will be an example for other initiatives to replicate and multiply;
- Build up knowledge in agrofood supply chains;
- Reduce losses in the chain;
- Reach a higher product quality that will open access to new high-end and export markets: higher turnover and profit;
- Increase value of the product.

## 1.2 Objectives

This current project was set up in order to prepare the implementation of the pilot program PNA. The first phase of the project, the design phase, aims at having the three most promising pilot projects identified and described in all detail so that the implementation can start immediately in phase 2 after contracting procedures with SAGARPA. The final three pilots in this project can be used to demonstrate that it is possible, with the developed criteria and other tools, to operate the pilot program and reap the declared benefits.

Part A of the design phase, of which the results are presented in this report, consists of

- set up of an inventory of possible pilot projects;
- design of a selection model for pre-selection of the most promising projects out of this inventory;
- high-level description of each of these pre-selected projects based on expert interviews as well as expertise and knowledge gained from earlier work;
- design of a selection model for selection of the final three pilot projects.

This will then allow for a selection of the final three projects out of the pre-selected projects and finally for preparing detailed project proposals for each of these final three projects. These activities form part of phase B of the design phase.

### 1.3 Report outline

This document consists of the following parts:

First, the general methodology for coming to the final three pilot projects is outlined (chapter 2). Then, the setting up the inventory of possible projects (chapter 3) and the inventory itself (chapter 4) are presented. The following chapter explains the selection model for pre-selecting the most promising out of these projects (chapter 5), which is followed by a high-level description of the pre-selected projects (chapter 6). Finally, the selection model for the selection of the final three pilot projects is presented (chapter 7). The report finishes with an overview of conclusions and next steps (chapter 8).

**Table 1: Relation between agreed deliverables and chapters of the report.**

<b>Agreed deliverable</b>	<b>Related chapter of report</b>
1 – High-level inventory of possible pilots	Chapters 3 and 4
2 – Selection model	Chapters 5 and 7
3 – Description of pre-selected pilots	Chapter 6

## 2 General approach

This chapter describes the general methodology on how to get to the selection of the final three pilot projects. First, an inventory is set up. This inventory is an overview of possible pilot projects, which fall into the scope of the pilot program PNA. Chapter 3 explains how the inventory is set up and how the possible pilot projects were sourced. This approach leads to an inventory consisting of 24 possible pilot projects (chapter 4). In a second step, the list is further refined to a pre-selection of the most promising projects. In order to reach this, the ten most promising projects are defined based on the selection model explained in chapter 5. Out of these ten the five most promising projects for export and the most promising project for a domestic chain are selected and then described. In a final step the selection model explained in chapter 7) will be applied to the pre-selected projects, which will lead to the final three projects. This final selection will be part of phase B of the design phase and is thus not covered in this report.

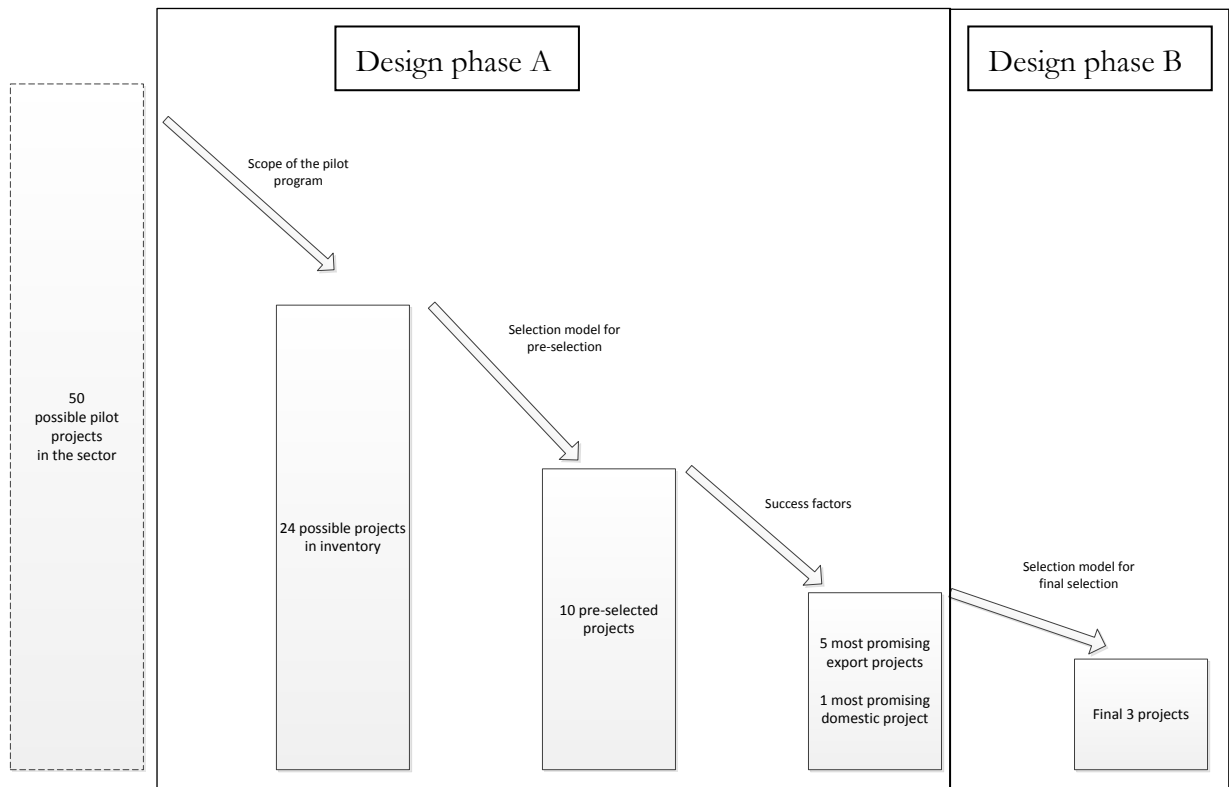


Figure 1: General approach for selection of final three pilot projects.

## 3 Design of inventory

### 3.1 Introduction

The purpose of the inventory is to have a high-level overview of interesting and relevant pilot projects that could be executed in the context of the PNA. This chapter explains how the inventory for possible pilot projects was designed. An important aspect of the design is a clear set of criteria that scope the pilot program, so that only projects that comply with these criteria of the pilot program are included in the inventory.

### 3.2 Approach

The inventory takes into account all projects that comply with basic criteria as explained in 3.4. Projects that do not comply with these criteria are not included in this inventory. Impact and feasibility of the projects are not evaluated at this stage of setting up the inventory.

Before setting up the pilot program PNA it is important to have a clear definition of a pilot project under that program. We define it as follows:

“A project that aims to improve the agrolgistic performance of one or more agro-food value chains from both a private as well as a general, sectorial or cross-sectorial point of view. The project looks at the agro-food value chain(s) from a holistic perspective, that is, considered in their totality and as a whole, where all the participants of the chain are interconnected and their actions affect the entire chain.”

Furthermore, in the set-up of the project it was agreed between the client and the project team to keep the high-level inventory very short; no detailed description of the pilots will be included but a high-level overview of possible projects will be given. The most relevant elements of the interesting value chains are briefly covered and key expert opinions are gathered. However, the value chains are not elaborated, evaluated or validated in detail with private sector parties as this would require a considerable amount of effort and time, which clearly exceeds the boundaries of the current project. The inventory consists of the following elements:

- Product
- Opportunity
- Elements of the intervention
- Main producing state(s)
- Possible destinations (regions or countries)

The starting point for the definition of a project is an individual product. Interventions relevant to opportunities and challenges in the value chain of this product are linked to each individual product. In the inventory product groups or possible combinations are not considered yet.

### 3.3 Sources

It was further agreed that the inventory should not be established with new analyses and evaluations but be based on expert knowledge and earlier work performed in the design of the PNA as to limit the effort to be spent on it. Consequently, the following sources were used in order to set up the inventory of possible pilot projects:

1. Expert knowledge
  - Peter Ravensbergen (Account Manager Mexico and Project Manager PNA, Wageningen UR/FBR)
  - Olga Vazquez (Director, Concept Compass Ltd)
  - Arturo Calderón Ruanova (Director General de Inspección Fitozoosanitaria, SENASICA)
  - Jorge Gustavo Tenorio (Director de Análisis Estratégico, SIAP)
  - Noe Serrano Rivera (Coordinador de Enlace, ASERCA)
  - Juan Carlos Hernández Ramírez (Director Ejecutivo de Microcuencas, FIRCO)
  - Omar Ahumada (Profesor de Catedra, Universidad de Occidente)
  - Maximiliano Ramirez (Director Seafreight Perishable Cargo, Kuehne + Nagel)
  - Mirte Cofino (Project Officer Agroparks and Metropolitan Food Clusters, Wageningen UR/Alterra)
  - Lia Bijnsdorp (General Director, IAEME)
  - Oscar Woltman (General Director, FreshMex)
  - Project team (Mónica Cabildo, Han Soethoudt, Nina Waldhauer)
2. PNA final reports (SAGARPA, 2014)
3. Sistema Nacional de Plataformas Logísticas de México (SNPL-Mex) report (BID, 2013).

### 3.4 Criteria

It is crucial to define basic criteria which possible pilot projects have to comply with in order to be included in the inventory. Projects that do not comply with one or several of these basic criteria are not eligible to be listed in the inventory, will not be evaluated further and thus cannot be one of the final Top 3 projects that will be proposed for receiving subsidies for implementation in 2016.

In consultation with SAGARPA the following criteria were applied to possible projects in order to determine whether or not to include them in the inventory of possible projects:

Table 2: Criteria for project inventory.

	<b>In scope</b>	<b>Out of scope</b>
<b>Agrochain part</b>	Post-harvest	Pre-harvest, harvest
<b>Type of products</b>	<ul style="list-style-type: none"> <li>Perishable agricultural products</li> <li>Products currently being produced in Mexico</li> </ul>	<ul style="list-style-type: none"> <li>Non-perishable agricultural products</li> <li>Products not being produced in Mexico currently</li> </ul>
<b>Type of project</b>	<ul style="list-style-type: none"> <li>Implementation</li> <li>Execution</li> <li>Market-related projects</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge transfer<sup>1</sup></li> <li>Policy-related projects</li> <li>Analyses</li> <li>Strategy development</li> </ul>
<b>Private vs. public</b>	<ul style="list-style-type: none"> <li>Private sector</li> <li>Private-public partnerships</li> </ul>	Public sector <sup>2</sup>
<b>Topics</b>	Alignment with PNA interventions: <ul style="list-style-type: none"> <li>Infrastructure in production area or logistic hub (e.g. terminals, logistics platform, multimodal centre, cold storage)</li> <li>Services (shipping route facilitation, modalities)</li> <li>Processes (marketing associations, quality standards)</li> </ul>	Public and long-term/strategic topics: <ul style="list-style-type: none"> <li>National or regional quality systems</li> <li>Customs</li> <li>ICT (standards, coding)</li> </ul> Topics related to policy of other countries  Agroparks <sup>3</sup>
<b>Duration</b>	Duration of $\leq 3$ years	Duration of $>3$ years <sup>4</sup>

<sup>1</sup> It is to be noted though that knowledge transfer can be one of several elements of an intervention in order to make sure that the intervention is sustainable. In this, knowledge transfer can be highly relevant for the success and impact of a project. However, knowledge transfer will not be a project in itself.

<sup>2</sup> The subsidy program targets the private sector and intends to give support and incentive to realize private sector or private-public partnership projects. Purely public projects do not need to be realized via this program and are thus out of scope.

<sup>3</sup> Covered in a separate Agropark program of SAGARPA.

<sup>4</sup> The duration of the implementation is highly relevant in the selection of relevant and feasible projects. Long-term projects are still interesting and relevant; however, they are beyond the boundaries of this project.

## 4 Inventory of possible pilot projects

After a first round of collecting possible pilot projects, the number of projects in the inventory amounted to about 50 projects which were considered interesting and relevant. However, not all of these complied with the basic criteria as explained under 3.4, thus not all would be projects as we target them within this program, e.g. due to the topic addressed in the project, due to the alignment with the PNA, due to their analytical instead of implementation oriented nature and other.

After application of the basic criteria the inventory contains 24 projects (see Table 3), which are considered relevant, interesting for the Mexican situation and fitting in the pilot program PNA. As explained earlier the projects are arranged according to the product that the intervention relates to. The list hereunder is arranged in alphabetical order of the products.<sup>5</sup>

**Table 3: Inventory of possible pilot projects**

<b>Product</b>	<b>Opportunity and Intervention(s)</b>	<b>Main producing state(s)</b>	<b>Possible destinations</b>
Avocado	Facilitate further growth and the reach of untapped markets, include small growers: - Develop container terminals, cold infrastructure and improve shipping routes - Shared collection facilities and infrastructure especially for smaller farmers, e.g. Regional Transformation Centres (RTCs) - Marketing association for joint activities in current and new markets - Air transport to Europe and the Middle East	Michoacán Jalisco	Europa Middle East China Japan
Beef	Improve quality: - Develop cold terminal(s) and improve shipping lines	Veracruz Jalisco Chiapas	Japan China South Korea
Bell pepper	Reach new markets by reducing logistics and transportation cost: - Railroad service to the US and intermodal terminal - Shared consolidation and distribution facility	Baja California Sur Sinaloa Sonora	East coast US Midwest US High end Mexico
Berries	Improve market situation and quality, reach new markets by reducing costs and improving market connections: - Rail road service to the US/Canada - Air transport to Europe and Middle East, incl. cold infrastructure - Export association - Shared facilities for SMEs	Jalisco Michoacán Baja California Colima	US Canada Europe Middle East

<sup>5</sup> Several experts pointed out that ready to eat products (salads, snacks, vegetables) are a great opportunity for Mexico and should be part of the pilot projects. We decided to not list these as a separate project as the type of category would be different to an individual product and thus comparison would be very difficult, in particular in quantitative terms. To still include this opportunity we decided to include the option to look for ready to eat opportunities for all relevant products and then analyze the potential per product once the final selection is made.



<b>Product</b>	<b>Opportunity and Intervention(s)</b>	<b>Main producing state(s)</b>	<b>Possible destinations</b>
Broccoli	<p>Improve market situation and competitiveness:</p> <ul style="list-style-type: none"> <li>- Set up cold infrastructure, incl. for small-scale producers</li> <li>- Set up shared facilities for storage, packaging and transportation</li> <li>- Improve inspections facilities</li> <li>- Combine with trainings in handling, quality control and SCM</li> </ul>	Guanajuato Michoacán Jalisco	US (in particular California, Texas) High end Mexico
Carrot	<p>Improve market situation and competitiveness:</p> <ul style="list-style-type: none"> <li>- Set up cold infrastructure, incl. for small-scale producers</li> <li>- Set up shared facilities for storage, packaging and transportation</li> <li>- Improve inspections facilities</li> <li>- Combine with trainings in handling, quality control and SCM</li> </ul>	Mexico Guanajuato Zacatecas Puebla	US (in particular California, Texas) High end Mexico
Cauliflower	<p>Improve market situation and competitiveness:</p> <ul style="list-style-type: none"> <li>- Set up cold infrastructure, incl. for small-scale producers</li> <li>- Set up shared facilities for storage, packaging and transportation</li> <li>- Improve inspections facilities</li> <li>- Combine with trainings in handling, quality control and SCM</li> </ul>	Puebla Guanajuato Hidalgo Michoacán	US (in particular California, Texas) High end Mexico
Chickpeas	<p>Improve market situation and competitiveness:</p> <ul style="list-style-type: none"> <li>- Improve cold management</li> <li>- Improve inspections facilities</li> </ul>	Sinaloa Sonora Baja California Sur Michoacán	US High end Mexico
Coriander	<p>Improve market situation and competitiveness:</p> <ul style="list-style-type: none"> <li>- Set up cold infrastructure, incl. for small-scale producers</li> <li>- Set up shared facilities for storage, packaging and transportation</li> <li>- Combine with trainings in handling, quality control and SCM</li> </ul>	Puebla Baja California Tlaxcala	US (in particular California, Texas)
Cucumber	<p>Reaching untapped markets in the US by reducing transportation cost:</p> <ul style="list-style-type: none"> <li>- Railroad service to the US and intermodal terminal</li> <li>- Shared consolidation and distribution facility</li> </ul>	Sinaloa Sonora Michoacán Yucatan	East coast US Midwest US High end Mexico
Cut flowers	<p>Reaching US, Canadian and high end Mexican market through better quality:</p> <ul style="list-style-type: none"> <li>- Set up logistics centre and cold infrastructure</li> <li>- Combine with quality trainings</li> </ul>	State of Mexico Puebla Baja California	US Canada High end Mexico
Fish	Reduce losses due to inefficient transportation	Jalisco	Mexico

Product	Opportunity and Intervention(s)	Main producing state(s)	Possible destinations
	and cold management: - Set up efficient transportation and cold chain management	Michoacán Sinaloa Veracruz	(domestic)
Milk	Import replacement through quality improvement: - Improve collection infrastructure and transport equipment according to standards	Jalisco Coahuila Durango Chihuahua	Mexico (domestic)
Fresh tomato	Reach untapped markets through improved transportation cost: - Railroad service to the US/ Canada, incl. infrastructure (intermodal terminal) and quality management	Sinaloa Baja California Sur Jalisco	US (East coast, Midwest) Canada High end Mexico
Guava	Improve quality through better postharvest management, avoiding fruit flies and sanitary detentions at borders: - Local or regional RTCs (processing, packaging, handling, storage, pre-cooling) - Treatment facility with radiation for large volumes of fruits	Aguascalientes Michoacán Zacatecas Mexico	US (possibly other export) Mexico (domestic)
Juice	Improve transportation cost: - Railroad service to the US/Canada for frozen cargo - Sea transport of fresh juice and/or concentrates to Europe/US	Veracruz Tamaulipas Nuevo Leon San Luis P.	US Canada Europe
Lettuce	Reach untapped markets and market segments, incl. opportunities for small-scale producers: - Set up cold infrastructure, incl. for small-scale producers - Set up shared facilities for storage, packaging and transportation - Combine with trainings in handling, quality control and SCM - Analyse ready to eat potential	Guanajuato Baja California Zacatecas	US (Texas, California)
Mango	Improve market access and standing, reach untapped markets, improve exports and export quality: - Set up local or regional RTCs (processing, packaging, handling, storage, pre-cooling) - Set up treatment facility with radiation for large volumes of fruits - Set up container terminals, improved shipping routes and marketing association - Analyse ready to eat potential	Guerrero Nayarit Chiapas	Europe (UK, Netherlands, Germany) US South Korea Mexico (domestic)
Onion	Reduce transport costs, improve logistics and commercialization: - Set up railroad service to the US and intermodal terminal - Set up shared consolidation and distribution facility	Baja California Tamaulipas Chihuahua Morelos	US (East coast, Midwest) High end Mexico

<b>Product</b>	<b>Opportunity and Intervention(s)</b>	<b>Main producing state(s)</b>	<b>Possible destinations</b>
Papaya	<p>Improve market access and standing, reach untapped markets, improve exports and export quality::</p> <ul style="list-style-type: none"> <li>- Set up shared collection centre</li> <li>- Set up short-sea shipping to the US, incl. quality protocols</li> <li>- Analyse ready to eat potential</li> </ul>	<p>Colima Oaxaca Chiapas Veracruz</p>	US
Pork	<p>Improve quality, decrease lead time and costs for export:</p> <ul style="list-style-type: none"> <li>- Vertical integration of supply chain including processing and packing</li> <li>- Improve inspections for reduction of lead times</li> <li>- Set up cold terminal and improved shipping lines</li> </ul>	<p>Jalisco Sonora Puebla Yucatan</p>	<p>Japan China South Korea</p>
Potato	<p>Reduce transport cost to reach untapped markets and market segments in US and high end Mexico:</p> <ul style="list-style-type: none"> <li>- Set up railroad service to the US and intermodal terminal</li> <li>- Set up shared consolidation and distribution facility</li> </ul>	<p>Sinaloa Sonora Nuevo Leon Veracruz</p>	<p>US (East coast, Midwest) High end Mexico</p>
Rambutan	<p>Improve market situation and access for SMEs:</p> <ul style="list-style-type: none"> <li>- Set up consolidation facilities</li> <li>- Set up export association</li> </ul>	Chiapas	US
Shrimp	<p>Reduce losses due to inefficient transportation and cold management:</p> <ul style="list-style-type: none"> <li>- Set up efficient transportation and cold chain management</li> </ul>	<p>Sinaloa Sonora Tamaulipas Nayarit Baja California Sur</p>	Mexico (domestic)

## 5 Selection model for pre-selection of pilot projects

### 5.1 Introduction

The selection model serves to pre-select promising pilot projects out of the inventory. These will be further elaborated, so that the final three projects can then be selected. This chapter explains how the selection model was designed, how the selection procedure works and which criteria are used. It also shows the ranking of the 24 projects from the inventory after application of the selection model.

### 5.2 Approach

The final goal of the selection procedure is to select three pilots that will be proposed for receiving support for implementation in 2016. In order to come to this Top 3 it was decided to first define the Top 10 pilot projects among those listed in the inventory. The Top 10 project ideas will be further narrowed down to the five most promising export-related projects and the one most promising domestic project. Those were then validated with sector representatives and described in more detail based on these interviews and expert knowledge from within the project team. The final three projects will be selected out of these.

As a general statement we can say that the final projects should comply with the following two aspects:

- Target high potential value chains:  
It is important to choose value chains where strong leads already exist (companies, organisations, individuals), who might have the capacity to organise a significant share of the chain and to lead the pilot bringing together public sector, private sector, knowledge institutions and civil society. If a value chain is chosen where such a strong player does not exist, chances are high that a project will fail or at least fail to achieve its full potential. Often these leads control one part of the chain, represent one company, etc. For the project they will probably need to team up with other organizations in order to create strong leaderships for the pilot to be successful and more importantly to be feasible.
- Have a significant general and/or sectorial impact:  
The pilot program will subsidize selected projects. In general, subsidizing selected projects needs to serve public goals and a sector, the economy or society as a whole in order to be justified. Thus, it is important to evaluate the impact of a possible pilot project on the country as a whole and/the sector in particular in order to decide whether the project should be part of the pilot program. Also, this impact can differ in degree from one project to another, which should be taken into account in the process of selecting the final projects.

Taking these two aspects into account is the starting point for the preselection of the final pilot projects. Furthermore, it could be interesting to have both an export chain as well as a domestic chain among the final Top 3. Therefore, indicators for both, export and domestic, are taken into account, so that both types of projects have equally good opportunities to be one of the selected three.

### 5.3 Selection procedure

Five selection criteria were defined in consultation with SAGARPA (see 5.4). These criteria are applied to all products and related interventions of the inventory. Two of the five criteria are quantitative and three are qualitative.

The data used in quantitative indicators comes from official sources that are publicly available in SAGARPA, INEGI, Trademap and others. The qualitative criteria were evaluated by a panel of experts. The following experts gave their evaluations:

- SAGARPA
  - Sergio Fadl (then Chief of Staff of the Senior Officer/Oficial Mayor)
  - Arturo Calderón (General Director Phytosanitary Inspections)
  - Georgius Gotsis (General Coordinator for Trade Promotion and Exports)
  
- Private Sector
  - Fernando Haro (President, CNA)<sup>6</sup>
  - Eric Viramontes (CEO, VISER)
  - Maximiliano Ramirez (Director Seafreight Perishable Cargo, Kuehne + Nagel)
  
- Academia
  - Dr. Benjamín Peña (Research Professor, Colegio de Postgraduados)
  - Omar Ahumada, PhD. (Professor, Universidad de Occidente)
  
- PNA project team
  - Peter Ravensbergen (Account Manager Mexico and Project Manager PNA, Wageningen UR/FBR)
  - Olga Vazquez (Director, Concept Compass Ltd)

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<sup>6</sup> Fernando Haro delegated the evaluation to Marco Galindo from the Department of economic studies of the CNA who did the evaluation in his name.

In addition to the above the following persons were asked for their evaluations but were unfortunately not able to give their input due to availability or other restrictions:

- Mauricio Fernández (Deputy General Director DGLA)
- Enrique Merigo (Vice-President, CNA/VIDA)
- Luis Raúl Fortuño (Gerente Corporativo de Ventas, Frialsa)
- Dr. Roberto Rendón (Profesor Investigador, Universidad Autonoma Chapingo)
- Juan Ariel Reyes (President, AMHPAC)

The points for each criterion were added up per product and related intervention, which led to a ranking of all the projects of the inventory. The ten products and related interventions with the highest scores are the identified ten pre-selected products.

In a second step, synergy potential between different projects was identified. For each single product and related intervention of the ten pre-selected projects it was analysed whether this could be combined with any other product(s) and interventions of the inventory in order to have a group of products that could be targeted within one single project. For example, beef and pork could be grouped as 'meat' as they share similar transport conditions and overlap in producing states and interesting destinations for the possible pilot projects. This grouping will lead to a higher impact of each project as more products, more volume and potentially also more stakeholders can benefit from it. The relevant criteria for identifying synergies were:

- Same production area
- Same destination
- Same or similar intervention(s)
- Products with similar characteristics

#### 5.4 Criteria

The following five criteria are defined for the pre-selection of the pilot projects:

- **Feasibility of the pilot project**
  - a) Existing chain with significant value
  - b) Existing contacts with relevant private sector party/parties
- **Impact of the pilot project**
  - c) Relevant product and chain for Mexico
  - d) Relevant impact/result for industry and economy
  - e) Sectorial impact

Table 4 shows the indicator and related points for each of these five criteria.

**Table 4: Selection criteria, indicators and points for pre-selection model.**

No.	Criteria	Max. points
<b>a)</b>	<b>Existing chain with significant value</b>	<b>15</b>
	Production value (MXN)	
<b>b)</b>	<b>Existing contacts with relevant private sector party/ parties</b>	<b>15</b>
<b>c)</b>	<b>Relevant product and chain for Mexico</b>	<b>20</b>
	Domestic consumption value (MXN)	5
	Import value (MXN)	5
	Export value (MXN)	5
	Export trend (2010 – 2014) (%)	5
<b>d)</b>	<b>Relevant impact/ result for industry and economy</b>	<b>10</b>
	Direct job creation from project	
<b>e)</b>	<b>Sectorial impact</b>	<b>10</b>
	Value chains benefitting from the project	

Given that it is difficult to find indicators that are both comparable and available for the different type of products, we had to construct a smaller set of indicators, which properly reflected the objectives and assumptions as presented earlier. As mentioned before the data used in quantitative indicators come from official sources that are publicly available in SAGARPA, INEGI, Trademap and others. One potential issue of using data across different sources is to correctly classify products and to deal with the available level of aggregation. For example, trade data might not have the same level of product aggregation as production data, and production data with consumption data. For our project in particular, we tried to match the data as much as possible to the products presented in the inventory of potential products, but for some of them it was not possible to have a clear amount and we had to make some educated guesses (see also 5.5).

Below every criterion and the respective scoring are explained in more detail:

- a) Existing chain with significant value (quantitative)  
This criterion is measured in the value of production on national level. The production value rather than size of production area (ha) or production volume allows us to compare different value chains (e.g. meat and vegetables).

Points for the indicator:

Production value (Millions MXN)	Points
>9,000	15
4,500-9,000	10
2,250-4,500	5
<2,250	0

Source: SIAP, SAGARPA (2014)

b) Existing contacts with relevant private sector party/parties (qualitative)

This criterion can be scored as yes/potentially/no. From earlier work, meetings and existing networks we have input on possible investors. Some of them are interested and sometimes have invested already in similar projects (yes), whereas others show interest but might need further information for a decision on whether or not to invest (potentially). If no possible investors and leads for the projects are known, this criterion is scored no. As explained earlier, having strong project leads is a very critical factor in setting up a successful project. The scoring was done based on expert judgement. If one of the experts could provide one clear contact, the criterion was scored yes. If one of the experts could provide one potential contact, the criterion was scored potentially. If none of the experts could provide any contact, the criterion was scored no.

Points for the criterion:

- Yes: 15 points
- Potentially: 7 points
- No: 0 points

c) Relevant product and chain for Mexico (quantitative)

This criterion is measured in four indicators: two indicators relating to the domestic market and two relating to the export market. Domestic consumption and import value give an indication of the relevance of the chain for the domestic market and the potential for import replacement. For export, the two indicators are export value and export growth (average of the last 5 years) indicating the relevance as well as the future potential for the export market. Taking the export growth into account also allows excluding saturated or highly competitive markets.<sup>7</sup> For each criterion the products were ranked according to the respective value of the indicator. According to the rank points were given.

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<sup>7</sup> As a reference: The overall average growth of all products over the last 5 years is 12%.



Points for the criterion:

Domestic consumption value (MXN)		Import value (MXN)	
Top 10	5	Top 10	5
Rank 11-20	2	Rank 11-20	2
Rank 21 or lower	0	Rank 21 or lower	0

Source: ENIGH, INEGI (2014)

Export value (MXN)		Export trend (%)	
Top 10	5	Top 10	5
Rank 11-20	2	Rank 11-20	2
Rank 21 or lower	0	Rank 21 or lower	0

Source: Trademap, ITC (2010-2014)

The range for the different points was selected according to the total list of food products and ranking them from the one with the most exports (Rank 1) to the one with the least. The break point for the first group of products (Top 10) was selected to aim for the best performing in the list, then the second tier (11-20) in the ranking, and finally all else (21 or lower). The approach of granting points only to the best products is chosen to select among the best candidates in the list.

d) Relevant impact/ result for industry and economy (qualitative)

This criterion is expressed in the expected direct creation of jobs as a result of the project. The scoring is done based on expert judgment. Every expert gave his score for each of the possible pilot projects. The average of all expert judgements was taken into account for the final total score.

Points for the criterion:

- Products or processes that generate many jobs: 10 points
- Products or processes that generate some jobs: 5 points
- Products or processes that generate few jobs: 1 point

e) Sectorial impact of the project (qualitative)

The impact for a sector as a whole or cross-sectorial impact is measured in the relevance for most, some or only a few agricultural value chains. It is also scored based on expert judgment and the average score of all expert judgements per project was taken into account for the final total score.

Points for the criterion:

- High - relevant for most agricultural value chains: 10 points
- Medium - relevant for some agricultural value chains: 5 points
- Low - limited to one or very few agricultural value chains: 0 points

## 5.5 Ranking of possible pilot projects

This selection model was applied to the 24 possible pilot projects of the inventory in order to define the ten most promising projects. The resulting scoring and ranking according to the total score is to be found in Table 5. The following assumptions were made regarding the SIAP data and the products/product groups:

- For fresh tomato the data for all tomatoes (open field and greenhouse) was used.
- For juice the combined production data for oranges and grapefruit was used since these are the most important fruit types for juices for exports and national consumption.
- Bell pepper comprises *chile bell* and *chile morron*.
- For milk import and export the used data is milk powder. Liquid milk is hardly traded; powder milk is recorded in import data.
- For fresh fish the data for whole fresh fish was used. Fish could have been fillets or whole, we chose whole to be consistent with consumption data.
- Cut flowers contains *rosas* and others. Rosas are by far the highest traded cut flower and some of the largest products on this category.

Table 5: Scoring and ranking of all projects from the inventory.

#	Product	a) Production (Million MXN)	b) Contact	c.1) Domestic consumption (Million MXN, 2014)	c.2) Import value (Million MXN, 2014)	c.3) Export value (Million MXN, 2014)	c.4) Export growth (% 2010 - 2014)	d) Jobs	e) Impact	Total points
1	beef	15	15	5	5	5	5	9	8	67
2	pork	15	15	5	5	5	0	7.6	7.5	60.1
3	fresh tomato	15	15	5	2	5	0	7.6	8.5	58.1
4	avocado	15	15	2	0	5	2	9.5	9	57.5
5	berries	15	15	0	0	5	2	8.5	8.5	54
6	shrimp	15	7	0	5	2	0	6.5	8.5	44
7	juice	10	7	5	2	5	0	5.5	7	41.5
8	bell pepper	5	15	0	0	5	0	7.5	8	40.5
9	milk	15	0	5	5	0	0	8.1	7.1	40.2
10	potato	15	7	5	2	0	0	4.7	4.1	37.8
11	papaya	5	15	2	0	0	0	7	8.5	37.5
12	mango	10	7	0	0	0	0	9.5	9	35.5
13	onion	10	0	5	2	2	0	7	7	33
14	fish	10	0	5	0	0	2	6.5	8	31.5
15	cucumber	5	7	0	0	5	0	6	7.5	30.5
16	cauliflower	0	15	0	0	0	0	6.6	7	28.6
17	lettuce	0	7	2	0	0	0	8	8.5	25.5
18	coriander	0	15	0	0	0	0	4.7	4.1	23.8
19	guava	0	7	0	0	0	5	5.5	6	23.5
20	broccoli	0	7	0	0	0	0	7.1	8.5	22.6
21	carrot	0	7	2	0	0	0	6.1	6	21.1
22	cut flowers	5	0	2	0	0	0	7.5	6	20.5
23	rambutan	0	7	5	0	0	0	3.8	4.1	19.9
24	chickpeas	0	0	0	0	0	0	5.7	4.6	10.3

The used product data as well as the scoring by the experts can be found in the annex.

Resulting from this ranking the ten highest scoring projects are the following:

Table 6: Ten highest scoring projects.

#	Product	Opportunity & Intervention(s)	Production	Destination
1	Beef	Improve quality: - Develop cold terminal(s) and improve shipping lines	Veracruz Jalisco Chiapas	Japan China South Korea
2	Pork	Improve quality, decrease lead time and costs for export: - Vertical integration of supply chain including processing and packing - Improve inspections for reduction of lead times - Set up cold terminal and improved shipping lines	Jalisco Sonora Puebla Yucatan	Japan China South Korea
3	Fresh tomato	Reach untapped markets through improved transportation cost: - Railroad service to the US/Canada, incl. infrastructure (intermodal terminal) and quality management	Sinaloa Baja California Sur Jalisco	US (East coast, Midwest) Canada High end Mexico
4	Avocado	Facilitate further growth and the reach of untapped markets, include small growers: - Develop container terminals, cold infrastructure and improve shipping routes - Shared facilities and infrastructure especially for smaller farmers, e.g. RTCs - Marketing association for joint activities in current and new markets - Air transport to Europe and the Middle East	Michoacán Jalisco	Europa Middle East China Japan
5	Berries	Improve market situation and quality, reach new markets by reducing costs and improving market connections: - Rail road service to the US/Canada - Air transport to Europe and Middle East, incl. cold infrastructure - Export association - Shared facilities for SMEs	Jalisco Michoacán Baja California Colima	US Canada Europe Middle East
6	Shrimp	Reduce losses due to inefficient transportation and cold management: - Set up efficient transportation and cold chain management	Sinaloa Sonora Tamaulipas Nayarit Baja California Sur	Mexico (domestic)
7	Juice	Improve transportation cost: - Railroad service to the US/Canada for frozen cargo - Sea transport of fresh juice and/or concentrates to Europe/US	Veracruz Tamaulipas Nuevo Leon San Luis P.	US Canada Europe

8	Bell pepper	Reach new markets by reducing logistics and transportation cost: - Railroad service to the US and intermodal terminal - Shared consolidation and distribution facility	Baja California Sur Sinaloa Sonora	East coast US Midwest US High end Mexico
9	Milk	Import replacement through quality improvement: - Improve collection infrastructure and transport equipment according to standards	Jalisco Coahuila Durango Chihuahua	Mexico (domestic)
10	Potato	Reduce transport cost to reach untapped markets and market segments in US and high end Mexico: - Set up railroad service to the US and intermodal terminal - Set up shared consolidation and distribution facility	Sinaloa Sonora Nuevo Leon Veracruz	US (East coast, Midwest) High end Mexico

## 5.6 Synergy potential

As explained in section 5.2, after having identified the ten most promising projects (Table 6), the projects were analysed for synergy potential in order to create the highest possible impact. For each of ten pre-selected projects – beef, pork, tomatoes, avocado, berries, shrimp, juices, bell peppers, milk and potatoes – all other projects of the inventory (the 24 projects as presented in Table 3) were analysed as to whether these could be combined with one of the Top 10 projects. In order to make this choice the production location and destination, the opportunity and intervention(s) and the type of product and whether these could be treated and transported together was analysed. If these criteria were matching the projects were combined into one single project. As an example: the shrimp and the fish subsectors face similar challenges, both suffer from inefficient transportation and cold management, which leads to significant losses. Consequently, the proposed interventions for solving this issue are identical. At a high-level view and without deeper analysis, we can assume that transport conditions are similar enough for both products arrange for combined transportation. Also, for both products the relevant and interesting market is the domestic market. Finally, there are overlaps in production areas. Consequently, we can assume that it is possible to realize one larger project for both products that will have a larger impact than a project for only one of the products. It has to be stated that it might still be sensible to have a project design that takes into account several products though start the implementation with one product as a first step and add the additional products in a second step. This will have to be decided case by case in the following phase of the pilot program.

For most of the initial ten projects complementary products were found. For some, the complementary products were already part of the initial Top 10 list, for example, beef and pork are a very good combination, and both products ranked among the Top 10 projects. However, for others, the complementary product(s) ranked lower than the Top 10 of the initial list, for example, shrimp and fish which ranked 6 and 14 respectively. Consequently, due to combining

complementary products the original Top 10 projects were condensed into seven projects (meat, tomato and complementary products, avocado, berries, shrimp and fish, juice, milk). Projects that were initially ranked lower than the Top 10 ‘moved up’ in the ranking and were considered as well, namely papaya and other tropical fruit, cucumber and cauliflower with complementary products being now numbers 8, 9 and 10 of the Top 10. Overall only few projects of the initial inventory are not included as a main or a side product in the final Top 10. The resulting ten pre-selected projects are to be found in Table 7.

**Table 7: Ten pre-selected projects with main and side products.**

#	Main product	Side product(s)	Intervention	Possible production area	Destination
1	Meat (beef, pork)		Improve quality of fresh meat, decrease lead time and costs for export: - Vertical integration of supply chain including processing and packing - Improve inspections for reduction of lead times - Set up cold terminal and improved shipping lines	Jalisco	Japan China South Korea
2	Tomato	Bell pepper, potato, onion, chickpeas	Reach new markets by reducing logistics and transportation cost: - Shared consolidation and distribution facility - Improve cold management - Improve inspections facilities	Queretaro	USA Canada
3	Avocado		Facilitate further growth and the reach of untapped markets, include small growers: - Develop container terminals, cold infrastructure and improve shipping routes - Marketing association for joint activities in current and new markets - Shared facilities and infrastructure especially for smaller farmers, e.g. RTCs	Jalisco	Europa Middle East China Japan
4	Berries		Improve market situation and quality, reach new markets by reducing costs and improving market connections: - Air transport to Europe, incl. cold infrastructure - Export association - Shared facilities for SMEs	Jalisco Michoacan	Europe
5	Shrimp	Fish	Reduce losses due to inefficient transportation and cold management: - Set up efficient transportation and cold chain management	Sinaloa	Mexico (domestic)
6	Juice		Improve transportation cost: - Railroad service to the US/ Canada for frozen cargo - Sea transport of fresh juice and/or concentrates to Europe/US	Veracruz Tamaulipas Nuevo Leon San Luis P.	US Canada
7	Milk		Import replacement through quality improvement: - Improve collection infrastructure and transport equipment according to standards	Jalisco Coahuila Durango Chihuahua	Mexico (domestic)
8	Papaya	Mango, rambutan	Improve market access and standing, reach untapped markets, improve exports and export quality: - Set up local or regional RTCs (collection, processing, packaging, handling, storage, pre-cooling) - Set up treatment facility with radiation for large volumes of fruits - Set up container terminals, improved shipping routes and marketing association	Chiapas	US
9	Cucumber		Reaching untapped in the US by reducing transportation cost: - Railroad service to the US and intermodal terminal - Shared consolidation and distribution facility	Sonora Michoacan Yucatan	East coast US Midwest US High end Mexico
10	Cauliflower	Broccoli, carrot, lettuce, coriander	Improve market situation and competitiveness: - Set up cold infrastructure, incl. for small-scale producers - Set up shared facilities for storage, packaging and transportation - Improve inspections facilities - Combine with trainings in handling, quality control and SCM	Guanajuato Zacatecas Puebla	US (in particular California, Texas)

## 6 Pre-selected pilot projects

### 6.1 Introduction

The initial inventory of project was brought back to the ten most promising projects looking at a high-level overview of each project (Table 6: Ten highest scoring projects.). Looking for synergies to have the highest possible impact of a project by including as much as possible not only one but several products led to an adjusted Top 10 (Table 7: Ten pre-selected projects with main and side products.). A consequence of this step was that almost all initial 24 projects are included as either main or side product in the ten projects presented in Table 7. Thus, this list also includes projects with a significantly lower chance of success. In consultation with SAGARPA it was decided to refine adjusted Top 10 one step further so as to have a pre-selection that does indeed have a good chance of success for implementation as this was the final goal of the selection throughout the entire process. This final selection was decided upon based on the following ‘success factors’:

- Enough volume being available to warrant the type of investment the respective project requires;
- Interventions that are significant for the future development of the sector (such as new container terminals, new or improved shipping lines, radiation treatment facilities, etc.);
- Sectors that are relatively well organized.

These criteria were once more applied to each of the projects in Table 7 and judged based on expert view by the project team. Furthermore, the balance between projects targeting export chains and projects targeting domestic chains was taken into account by deliberately choosing the five best suitable export chains (according to the three criteria named here above) and the one most suitable domestic chain (according to the three criteria named here above).

This final step results in the following six projects (numbering according to Table 7):

- #1 Main product meat (pork, beef)
- #2 Main product tomato
- #3 Main product avocado
- #4 Main product berries
- #7 Main product milk
- #8 Main product papaya

For each of these projects interviews were held with sector representatives. A full list of all interviewed stakeholders can be found in the annex. The objectives of the interviews were the following:

- Validate the project ideas and adjust where necessary according to needs of the sector.
- Take decisions as regards production and destination for each project.
- Find stakeholders that are interested in participating in the project.
- If possible identify a stakeholder that might be interested in taking over the project lead.

The findings of the interviews were the main input for the following project descriptions. This was completed with expert knowledge from the project team. It is important to note that the original project ideas were sometimes modified based on the results of the interviews. The presented choice of the production area was made based on the expert interviews as well as statistical data (mainly production data). At the start of the next phase, this choice will be validated once more with experts from the sector and will depend also on final commitments of project partners, meaning the production area for each of the projects is not entirely definitive at this stage of the pilot program.

## 6.2 Project 1: Increase of meat exports to Asian markets

Table 8: Description of project 1: Increase of meat exports to Asian markets.

Project 1	Increase of meat exports to Asian markets
<p><b>Background:</b></p> <p>The Mexican meat sector as a whole is facing some important problems that hinder its further growth. The selection model came to a close tie between beef and pork, the only difference turned out to be in the export growth, which was significantly stronger for beef than pork. In the question of whether to take pork or beef as a starting point, the export growth could have been an indication for choosing beef; however, in further discussion with the meat sector, it became clear that beef had received significant governmental support for promotion of the product abroad. In other words, pork is not performing as well yet, thus this sector is more in need of support and the impact and opportunities for improvement are higher. The pork chain is not well integrated and the cold chain is still an important issue. Consequently, we decided to focus on pork as a main product with beef as a possible side product. Asia offers interesting opportunities for Mexican meat. Exports to Japan and South Korea already exist, however, in low volumes. The export of Mexican pork to Japan increased every year from 2010 (40 kton) to 2014 (63 kton) (about 8% of Japan import) representing a value of 340 million USD. Export to South Korea in 2014 is much less with 9 kton (2-3% of South Korea import) and moreover unstable over the last 5 years (UNCOMTRADE, 2014). For both destinations improvement in the chain is expected to lead to a better position on the respective market and thus offering interesting opportunities. China, on the other hand, has low prices on imported pork, a reason why some producers of the region prefer serving the national market absorbing around 45% of the offer (UNCOMTRADE, 2014). Consequently, this project focuses on Japan and South Korea. Further narrowing down on one of those two countries will still be necessary in the next step. Jalisco offers good opportunities for export to these two countries via the port of Manzanillo; it is also the biggest pork meat producing state in Mexico with 245 kton in 2014 (19% of national production) (SIACON, SIAP, 2014). However, there are some problems that the pork sector in Jalisco is facing, which have to be addressed in order to increase export volumes of the state. First, Jalisco's producers lack integration and companies producing in the state are small and focused on satisfying the national market only. Second, only 35 out of the 400 Mexican TIF plants (Establecimiento Tipo Inspección Federal) for slaughtering, cutting, deboning, adding value and cooling are situated in Jalisco; from those, only 10 are for pork. The TIF inspection system is the only system approved by foreign sanitary authorities; therefore, limiting the volumes that are adequately handled for foreign markets (SENASICA, 2014). Additionally to the lack of proper infrastructure, the frequency with which shipping lines go to Asia is not optimal. Low frequency means that shipments cannot go as regularly as it would be ideal for the producers, resulting in increasing logistics costs for the exporters.</p>	



<b>Main product:</b> Pork	<b>Product specifications:</b> The meat requirements of customers can vary highly depending on the culture. Currently, pork steaks are the main imported product by South Korea and Japan.	<b>Location of production:</b> Jalisco
		<b>Current destination:</b> South Korea and Japan
<b>Additional product(s):</b> Beef could be a side product as transport conditions are similar. However, the two chains are entirely separate and as it turned out during the sector interviews they face different challenges. Thus, in a first step it is not recommended to take up both products in the pilot.	<b>Product specifications:</b> When setting up a future project for beef, it has to be checked which beef products are mainly required in the destination countries.	<b>Location of production:</b> n/a
		<b>Current destination:</b> n/a
<b>Goal of the intervention:</b> The goal of the project is to increase the volume and value of meat exports, leading to a higher market share of Mexican produce on Asian markets, specifically South Korea and Japan. The intervention consists of two main parts: higher meat safety is an important aspect of the pork chain that is not well controlled yet. Additionally, the competitiveness of the Mexican exports needs to be increased by decreasing the logistics cost.		
<b>Main elements of the intervention:</b> <ul style="list-style-type: none"> <li>• Increase the number of TIF plants for slaughtering, cutting, deboning, adding value, packaging and cooling.</li> <li>• Support the sector in negotiating higher frequency of shipping connections to South Korea and Japan leading to shorter lead times and reduced logistics costs</li> </ul>		
<b>Route and modalities:</b> <ul style="list-style-type: none"> <li>• Trucking to port of Manzanillo</li> <li>• Shipping from port of Manzanillo to port of Busan (South Korea) or port of Yokohama (Japan).</li> </ul>		
<b>Necessary public and private stakeholders:</b> <ul style="list-style-type: none"> <li>• Producers</li> <li>• Freight forwarder</li> <li>• Shipping line</li> <li>• Sanitary authorities</li> <li>• Importers to Japan and South Korea</li> </ul>		

**Identified public and private stakeholders:**

- Grupo Proteína Animal PROAN (producer): Tel. 01 (395) 725-28-20
- Sonora Agropecuaria S.A. de C.V. (producer): Martín Cisneros, [Cisneros@sasapork.com](mailto:Cisneros@sasapork.com)
- GCMA (Agricultural markets consultancy group, representing one of the biggest meat producers and exporters in México): Claudia Monroy, [cmonroy@gcma.com.mx](mailto:cmonroy@gcma.com.mx)
- PROMEXICO (governmental institution for the promotion of Mexico): Elizabeth Rojas, [Elizabeth.rojas@promexico.gob.mx](mailto:Elizabeth.rojas@promexico.gob.mx)
- OPORPA (pork industry association): Enrique Gómez, [egomez@oporpa.org](mailto:egomez@oporpa.org)
- CMP (pork industry association): Alejandro Ramírez, [aramirezcmp@prodigy.net.mx](mailto:aramirezcmp@prodigy.net.mx)
- Kuehne + Nagel (Freight Forwarder): Maximiliano Ramirez, [Maximiliano.Ramirez@kuehne-nagel.com](mailto:Maximiliano.Ramirez@kuehne-nagel.com)
- LogFret (Freight Forwarder) Marco Croes, [marco.croes@logfret.nl](mailto:marco.croes@logfret.nl)

**Expected results (qualitative estimates):**

- Market growth: Larger market share in Japan and South Korea to be expected due to higher quality and lower logistics cost.
- Cost reduction: Reduction of cost due to more efficient logistics.
- Job creation: No significant job creation expected.
- Sustainability effects: Higher quality, better cold chain management and less storage time due to higher shipment frequency should lead to reduction of losses.

**Necessary investments:**

- Improve the TIF infrastructure within the state.

**Context requirements:**

As mentioned before, the consumption of meat is particularly impacted by cultural effects determining what other parts of an animal are eaten and how is crucial before starting the project so as to adjust production to the market requirements. Further points that were raised during the interview as challenges for the sector are the following: Along the country there are many checkpoints from all different authorities involved in the control of smuggling merchandise, sanitary regulations, etc. It is often the case that fresh produce suffers from these checks, losing control on cold chain management and even resulting in robbery of the cargo. Also, a higher efficiency of sanitary controls would add significantly to reducing lead times and thus logistics costs. Furthermore, a significant improvement of meat quality is needed by reducing the use of antibiotic and growth stimulators. These concerns do not fall into the scope of the pilot program, however, should be taken into account when targeting an improvement of the value chain as they would contribute significantly to higher quality of the pork value chain.

Currently two initiatives already work on related topics:

- The “Asia and South America” transport service initiative (ASA) connecting some of the main commercial ports in Asia (including Busan and Yokohama) and America

(including two Mexican ports, Manzanillo and Lazaro Cardenas)

- The “Refrigerator Platform” aiming to include 3 refrigerated platforms in Manzanillo for customs inspections to happen in controlled temperature, keeping the cold chain closed and accelerating dispatch times.

The pilot project has to be set up in close cooperation with these initiatives as to connect well to their activities, so that the projects support and reinforce each other.

6.3 **Project 2: Direct supply of Mexican greenhouse tomatoes to North American final customers**

Table 9: Description of project 2: Direct supply of Mexican greenhouse tomatoes to North American final customers.

<b>Project 2</b>	<b>Direct supply of Mexican greenhouse tomatoes to North American final customers</b>
<p><b>Background:</b></p> <p>Mexican greenhouse tomato growers produce almost exclusively for the North American market, however they do not have a significant stake in the distribution to the final customer (supermarkets, food service providers, home delivery companies). Mexican greenhouse tomato production has increased in volume by 373% over the last 5 years and had a 40% share in total production in 2014 (SIAP, SAGARPA), which makes this subsector a particularly interesting one for setting up a pilot project as compared to open field production. Mexican growers usually sell to a North American broker/distributor and deliver the tomatoes at the US/Mexican border. The broker subsequently manages the merchandise and takes care of transport and storage. Also re-packing to retail specifications is mostly done by the distributor within US territory. Information about the market is not shared with the grower, the grower is not involved in product development and innovation, and managing the relations with the retailer and dealing with its requirements is the exclusivity of the broker/distributor. This setting offers significant potential for improvement, to have more value creation within Mexico and to empower the Mexican tomato growers by making them have more control on the supply chain downstream and thus a stronger standing in the value chain.</p> <p>By understanding the needs of the North American retailers and food service companies the Mexican tomato growers want to develop direct distribution channels and explore the opportunities of providing an even fresher value added product with superior service to the final customer. The objective of the Mexican producer is to optimize the supply chain and generate a higher return to the greenhouse. An improvement of the producer's results will accelerate investment in expansion, creation of jobs both directly as well as indirectly, and secure the sustainable development of the greenhouse sector.</p> <p>The objective of this pilot is to identify potential final customers for greenhouse tomatoes in North America, understand their needs and requirements and accordingly develop plans to reorganize the supply chain in order to enhance efficiency with the objective to maximize the benefit for the Mexican greenhouse tomato grower.</p> <p>This situation of the grower not being in direct contact with the final customer and thus being dependent on a North American broker or distributor is common for many Mexican products. In other words, the Mexican agrofood sector suffers from a general weakness in this aspect and could gain significantly from changing this set-up. A successful pilot in the pilot program PNA can lead to developing a generic approach for this situation. This can be then applied for other products as well and thus can have a significant positive impact on the</p>	

Mexican agrofood sector as a whole.		
<b>Main product:</b> Greenhouse tomatoes	<b>Product specifications:</b> Various varieties and volumes, wholesale as well as retail packaging	<b>Location of production:</b> Agropark, Ajuchitlán, Querétaro
		<b>Current destination:</b> Mexican/US border (North American broker/distributor)
<b>Additional product(s):</b> Greenhouse cucumber, greenhouse bell pepper, greenhouse eggplant	<b>Product specifications:</b> Various varieties and volumes, wholesale as well as retail packaging	<b>Location of production:</b> State of Querétaro
		<b>Current destination:</b> Mexican/US border (North American broker/distributor)
<b>Goal of the intervention:</b> Organizing the supply chain of fresh greenhouse tomatoes (by understanding the needs of American retail multiples and food service companies) so that it complies with, or even exceeds, customer requirements with the objective to maximize the benefit of the Mexican greenhouse producer. In a more general manner the project as a whole aims at developing a structurally different approach for export to the US, which can be applied for many other products as well.		
<b>Elements of the intervention:</b> <ul style="list-style-type: none"> <li>• Market research: identify potential final customers, understand their way of operation and needs, and translate the outcome in customer specific marketing plans</li> <li>• Supply chain analysis: describe the current supply chain and make plans for improved profitability through increased efficiencies based on customer specific management plans</li> <li>• Post-harvest analysis: modify procedures, technology, cold chain management and packaging according to customer management plans</li> <li>• Product management: revise varieties, production cycle, packaging etc. and prepare an innovative pro-active approach based on customer needs and expectations</li> </ul>		
<b>Route and modalities:</b> <ul style="list-style-type: none"> <li>• Truck transport</li> <li>• Rail transport</li> <li>• Multiple Mexican/US border crossings</li> <li>• Border cross dock facilities</li> <li>• Distribution hubs</li> <li>• Warehousing and (re)packing facilities</li> </ul>		

<p><b>Necessary public and private stakeholders:</b></p> <ul style="list-style-type: none"> <li>• Tomato grower(s)</li> <li>• Post-harvest specialist</li> <li>• Supply chain specialist fresh produce</li> <li>• Retail specialist fresh produce</li> <li>• Phytosanitary inspection agency / customs authorities</li> </ul>
<p><b>Identified public and private stakeholders:</b></p> <ul style="list-style-type: none"> <li>• Finka (Finca Ahuehuetes, S.A. de C.V.) (greenhouse tomato grower): <ul style="list-style-type: none"> <li>○ Mauricio Revah, General Manager</li> <li>○ Hugo Escoto, Operations Manager</li> <li>○ Robert van der Geest, Project Manager, <a href="mailto:rvandergeest@eghp.mx">rvandergeest@eghp.mx</a></li> </ul> </li> <li>• Eugène Kerklaan, Retail specialist <a href="mailto:eakerklaan@gmail.com">eakerklaan@gmail.com</a></li> </ul>
<p><b>Expected results (qualitative estimates):</b></p> <ul style="list-style-type: none"> <li>• Market growth: The project is expected to lead to a 15% increase in the market share of the tomato grower.</li> <li>• Cost reduction: A more efficient and more customised process will lead to about 10% cost reduction and a margin improvement of 30%.</li> <li>• Job creation: A significant number of jobs will be created in Mexico due to the interventions.</li> <li>• Sustainability effects: Expected effects are a reduction of CO<sub>2</sub> emission due to more efficient supply chain. Also, food losses are expected to be reduced significantly as customer needs are better taken into account from the beginning of the process and the supply chain is organized in a more efficient manner. Additionally, the interventions on postharvest management should lead to a reduction of food losses.</li> <li>• Others: This project is shaped around tomato producers. However and as mentioned before, the general project set-up is also applicable to other greenhouse produce and even beyond that. Thus, with a successful project under the pilot program PNA the approach could be replicated for quite a number of other products and have a significant impact on the agrofood sector as a whole.</li> </ul>
<p><b>Necessary investments:</b></p> <p>The main investments in this project will be for the following facilities:</p> <ul style="list-style-type: none"> <li>• Centralized postharvest facilities with specialized packaging lines</li> <li>• Cold store facilities</li> <li>• Distribution centre</li> <li>• Technology transfer centre</li> </ul>
<p><b>Context requirements:</b></p> <p>This project aims to shift from a traditional supply chain with US wholesalers/brokers as end-consumers towards a direct delivery to US retailers, food service providers and home delivery companies with Mexican produce. This shift includes an expansion of production including packaging and marketing of fresh produce. As mentioned earlier, this general model could be</p>

rolled out to other products that currently face the same situation and thus lead to a significant change in the Mexican agrofood sector.

## 6.4 Project 3: Better market access of avocado in Europe

Table 10: Description of project 3: Better market access of avocados in Europe.

Project 3		Better market access of avocado in Europe	
<p><b>Background:</b>            Michoacán and Jalisco are the main producing states of avocados. Michoacán covers 80% of the national production in 2014, and during the last years they received significant support, which led to a significant improvement of the avocado sector in Michoacán. Also, Michoacán avocados have received authorization by the USDA for import to the US, which makes it the main export market for Michoacán. Jalisco, producing about 100 kton in 2014, which is 7% of the national production, is the second producer behind Michoacán, its avocado sector still offering significant potential for improvement, in particular in its export to Europe and Asia (SIACON, SIAP, 2014). For these reasons we decided to choose Jalisco as the producing state. Investments in the sector of Jalisco are expected to have a significantly higher impact as the challenges are still bigger. In validating the project set up with stakeholders from Jalisco it became clear that the improvement of the market access in Europe is one of their main goals on which the pilot program could support. The EU-28 avocado import value increased from 400 million USD in 2010 with 50% to 600 million USD in 2014 (UNCOMTRADE, 2014). The pilot project aims at doing so by setting up a shared packing facility for SME producers and increasing or identifying direct cargo shipments (air and sea) between Mexico and Europe.</p>			
<p><b>Main product:</b>            Avocados</p>	<p><b>Product specifications:</b>            Hass and Mendez varieties, packed mostly in 4.5 kg corrugate, volume up to 20 tons by sea container and per pallet in air cargo.</p>	<p><b>Location of production:</b>            Jalisco</p>	<p><b>Current destination:</b>            Europe</p>
		<p><b>Additional product(s):</b>            No additional products</p>	<p><b>Product specifications:</b>            n/a</p>
<p><b>Goal of the intervention:</b>            The main goal of the intervention is to facilitate further growth of the European market for avocados from Jalisco, including for SME producers. SME producers already have a high quality product but lack shared infrastructure. The demand in Europe is growing and offers opportunities for Mexican avocados if those can be offered at a high quality and a competitive price.</p>			



**Main elements of the intervention:**

The projects intervenes at several points in order to reach the described goal:

- Currently, there are 15 packing houses in Jalisco, however, no shared ones. SMEs suffer from this. Setting up shared packing houses will have SMEs benefit from the intervention.
- There is no direct shipping line to Europe at the moment. Therefore the shipping time from Altamira or Veracruz to Rotterdam is 20 -22 days. Negotiating a direct shipping line would decrease the lead time, which would be very beneficial for the product quality and shelf life as well as the price.
- Another approach to improve the market access is the increase of air shipments to Europe. Currently the Luxemburg hub (Panalpina and Cargolux) is the access point to the main European markets, the connection to Frankfurt (Lufthansa) provides access to Central and Eastern Europe. However, the sector strongly wishes for connections to Amsterdam, which would allow for a much better entry point to the European market. At the moment air connectivity to Amsterdam is only from Mexico City (KLM), so that cargo to Amsterdam from Jalisco has first to be brought to Mexico City by land, which is a major disadvantage in terms of increased cost, lead time, additional handling and extra risks.
- The pilot should be accompanied by an evaluation of the quality of the produce when arriving at the European port (temperature, humidity and others transportation parameters, quality and shelf life of the fruit at destination) and accordingly the set-up of a quality protocol.
- Additionally, promotional and marketing campaigns in Europe will facilitate the gain of market share for the Mexican product.

**Route and modalities:**

- Trucking from Jalisco to Port of Altamira or Port of Veracruz.
- Shipping from Port of Altamira or Veracruz to Port of Rotterdam.

It could also be a good opportunity to ship via the Port of Manzanillo. A route via the Panama canal takes only a maximum of two days more than the shipping from the Port of Altamira. This option avoids the trucking from Jalisco to the East Coast of Mexico.

**Necessary public and private stakeholders:**

- Producers
- Packers
- Producers association
- Freight forwarder
- Shipping line
- Importer for Europe
- Customs agents
- Food Safety Inspections

**Identified public and private stakeholders:**

- APEAJAL (Jalisco avocado growers & exporters association, possible project leader): Ignacio Gomez, [info@apeajal.com](mailto:info@apeajal.com)
- Council of Industrial chambers Jalisco (Industry Association): Federico Lepe Montoya, [federico.lepe@gmail.com](mailto:federico.lepe@gmail.com)
- Kuehne + Nagel (Freight Forwarder): Maximiliano Ramirez, [Maximiliano.Ramirez@kuehne-nagel.com](mailto:Maximiliano.Ramirez@kuehne-nagel.com)
- LogFret (Freight Forwarder): Marco Croes, [marco.croes@logfret.nl](mailto:marco.croes@logfret.nl)
- Nature's Pride (European Importer)
- The Greenery (European Importer)
- Hars & Hagebauer (European Importer): Henk van der Meij

**Expected results (qualitative estimates):**

- Market growth: Larger market share in Europe to be expected due to higher quality, longer shelf life and lower transportation cost.
- Cost reduction: Reduction of cost due to more efficient transportation.
- Job creation: Setting up shared packing houses will create a significant number of new jobs in these facilities.
- Sustainability effects: Shorter lead time should lead to reduction of postharvest losses.
- Others: SMEs will benefit from the project as they are supported through creating shared facilities. A direct shipping line Altamira or Veracruz – Rotterdam will also benefit other export products. This is not explicitly included in this project as the project focuses on various interventions along the avocado value chain, however, is a positive impact that should be noted.

**Necessary investments:**

The main necessary investments are the shared packing houses.

**Context requirements:**

- Special requirements from European authorities for avocados need to be taken into account, to design the packing house and all production and handling activities accordingly.
- A strong coordination with different agencies in government is required to ensure that the investment effort is followed with the improved container routes, promotion, etc.

## 6.5 Project 4: Improvement of cooling infrastructure for berries

Table 11: Description of project 4: Improvement of cooling infrastructure for berries.

Project 4	Improvement of cooling infrastructure for berries	
<p><b>Background:</b>            In interviews with the berry sector it turned out that the sector itself considers the states of Michoacán, Jalisco, Guanajuato and Colima as one berry producing region. With respect to strawberry, blackberry and raspberry these four states cover 65%, 100% and 84% respectively of the total Mexican production in 2014 (SIACON, SIAP, 2014). Colima is a very small player in relation to the other three. In their perspective, choosing one state out of these is not a valid approach. Furthermore, it became clear that the export of the berries is very well organized, transportation works well and the cold chain for transportation is closed. Airfreight export from Guadalajara as is done currently is the preferred option as the customer requires supply of small but frequent volumes. The main issue that the sector is facing – and within the sector mainly smaller producers with less financial capacity – is an adequate amount of coolers close to the production areas. This is currently the weakest part in the chain where a project within the pilot program could support. The pilot project consists thus of setting up coolers in the entire berry region as to close this gap and give additional support in particular to SMEs. The export of berries from Mexico is increasing and currently mainly consists of strawberries (91% in volume, 93% in value). The growth however is the strongest in the other berries (UNCOMTRADE, 2014).</p>		
<p><b>Main product:</b> Berries</p>	<p><b>Product specifications:</b> Blackberries, strawberries, raspberries, blueberries</p>	<p><b>Location of production:</b> Michoacán, Jalisco, Guanajuato, Colima</p> <p><b>Current destination:</b> Intervention is independent form current destination, production for all current destinations benefits from it.</p>
<p><b>Additional product(s):</b> No additional products</p>	<p><b>Product specifications:</b> n/a</p>	<p><b>Location of production:</b> n/a</p> <p><b>Current destination:</b> n/a</p>
<p><b>Goal of the intervention:</b>            The main goal of intervention is to improve the cooler infrastructure for berries in the berry producing region. Currently, not enough producers have adequate cooler facilities. Adequate shared cooler facilities in the area of the fields in the producing region (Michoacán, Jalisco, Guanajuato, Colima) will increase the product quality, increase shelf-life and reduce postharvest losses. Eventually this will also lead to economic benefits. The growth of the</p>		

sector and the export to more and more countries and regions will be further facilitated.
<p><b>Main elements of the intervention:</b></p> <p>The intervention consists of setting up shared cooling facilities. This will be accompanied by capacity-building activities around handling and cooling of berries.</p>
<p><b>Route and modalities:</b></p> <p>Not applicable for this intervention as the transportation process, destinations, modalities and other will not be modified from the current ones.</p>
<p><b>Necessary public and private stakeholders:</b></p> <ul style="list-style-type: none"> <li>• Producers</li> <li>• Producers association</li> <li>• Investors</li> </ul>
<p><b>Identified public and private stakeholders:</b></p> <ul style="list-style-type: none"> <li>• ANEBERRIES (berry sector organization, possible project leader): Mario Andrade, <a href="mailto:marioaac@glr.com.mx">marioaac@glr.com.mx</a></li> <li>• Council of Industrial chambers Jalisco (Industry Association): Federico Lepe Montoya, <a href="mailto:federico.lepe@gmail.com">federico.lepe@gmail.com</a></li> <li>• Frigo Dinamica de Mexico, S.A. de C.V. (cold store company): Adolfo Soto</li> </ul>
<p><b>Expected results (qualitative estimates):</b></p> <ul style="list-style-type: none"> <li>• Market growth: Export of berries expected to grow further as better quality and longer shelf-life can be realized through this intervention.</li> <li>• Cost reduction: Not expected.</li> <li>• Job creation: Set up of new facilities is expected to lead to significant job creation in these facilities.</li> <li>• Sustainability effects: Better cooling and higher quality should lead to reduction of postharvest losses.</li> <li>• Others: The intervention will support the berry sector as a whole, both larger producers and SMES, and be a benefit to the product independent of its final destination.</li> </ul>
<p><b>Necessary investments:</b></p> <p>As a first estimate by the sector, ideally the producing regions would need about the following number of additional cooling facilities:</p> <ul style="list-style-type: none"> <li>• Michoacán: 8</li> <li>• Jalisco: 5</li> <li>• Guanajuato: 2</li> <li>• Colima: 1</li> <li>• Total: 16</li> </ul> <p>It should still be investigated further whether the infrastructure should provide for both, fresh and frozen fruit handling. According to sector estimates, frozen fruit represents about 20% of</p>

the total production of the berry producing states.

**Context requirements:**

The major challenge the sector faces currently are inefficient customs inspections. These do not fall within the scope of the pilot program and are thus excluded from this project; however, for a real support of the sector, this issue should be addressed and tackled. Another recent concern raised by the industry is the housing of employees. Due to the high demand large parts of the labor come from other parts of Mexico and there is not sufficient housing for them. This is even expected to increase further and can in the future impact the cost structure of the sector.

6.6 Project 5: Import replacement of powder milk

Table 12: Description of project 5: Import replacement of powder milk.

Project 5	Import replacement of powder milk
<p><b>Background:</b></p> <p>Currently, the milk sector in Mexico faces several challenges, an important one lies in the domain of international prices and free trade agreements: Due to the high production of powder milk in countries like the US, India, Australia and New Zealand, international prices are sometimes lower than those of liquid national production. In addition to low international prices, Mexico has opened import quotas for several producer countries due to the signing of different trade agreements. During 2015 the negotiations of the Trans Pacific Partnership Agreement ended, obliging Mexico to set quotas for Australia and New Zealand, two of the biggest producers of milk in the world, which will cause an even stronger increase in imports and decrease in prices for national producers. As a result of the above mentioned, in 2015, around 49.5% of consumption needs for powder milk were satisfied through imports mainly from the US (UNCOMTRADE, 2014). Additionally, the competitiveness of the sector as a whole lies behind the competitiveness of some of the above mentioned countries, the average productivity for Mexico is just 1.8 tons/head, while USA registers 10.10, Canada 8.81, Australia 5.71 and New Zealand 4.24 (SIAP, SAGARPA, 2015). Besides, at least 80% of the national producers are small farms with less than 30 cows. Those small producers are not well linked to the processing industry and lack the right infrastructure to consolidate and commercialize their production, creating the need to have intermediaries that consolidate milk from different small producers (SIAP, 2015). Even though SAGARPA, through SENASICA, has implemented a Good Husbandry Practices program, there is an important lack of competitiveness in the sector because production does not meet with the industry’s quality standards regarding nutritional values, antibiotics use, cold chain management, etc. The goal of this project is thus to increase the quality of domestic production and competitiveness of the sector with powder milk imports so as to replace imports with domestic production. In order to reach this goal, small producers need to be supported to meet quality standards and be linked to the processing through setting up shared cooling and collection infrastructure and transportation means complying with standards. Production in Mexico during 2014 accounted for around 11,000 million litres of fresh milk, with Jalisco being the largest producer with about 2000 million litres of fresh milk (18% of national volume) (SIAP, SAGARPA, 2015). Jalisco is followed by Coahuila (1300 million litres), Durango (1000 million litres) and Chihuahua (980 million litres). A final choice of the production state has not been made yet as this should also be based on the structure of the producers in the states and finding a group of smaller producers committing on participating in this project.</p>	

<b>Main product:</b> Milk	<b>Product specifications:</b> Fresh milk	<b>Location of production:</b> Jalisco, Coahuila, Durango, Chihuahua
		<b>Current destination:</b> National market
<b>Additional product(s):</b> Currently no further products for addition planned, however dairy products (cheese, yogurt, etc.) face the same problems	<b>Product specifications:</b> n/a	<b>Location of production:</b> n/a
		<b>Current destination:</b> n/a
<b>Goal of the intervention:</b> The main goal of the project is to replace imports of powder milk by improving the quality and competitiveness of the national production. In order to realize this, small producers, most importantly missing proper cold chain infrastructure and management, will be linked to the market through supporting them in meeting quality standards and setting up shared collection facilities and appropriate transportation.		
<b>Main elements of the intervention:</b> The intervention consists of several elements: <ul style="list-style-type: none"> <li>• Planning and construction of shared cold chain infrastructure near the production areas to ensure the immediate cooling and consolidation.</li> <li>• Set up adequate transportation means complying with the required standards.</li> <li>• Facilitate the creation of NOMs (Norma Oficial Mexicana) to establish internal parameters to regulate the market and quality of the product.</li> <li>• These interventions should be accompanied by training modules for small producers.</li> </ul>		
<b>Route and modalities:</b> The market is the domestic market. Transportation will thus be over land (trucking). The concrete route will depend on the retailer cooperating in the project.		
<b>Necessary public and private stakeholders:</b> <ul style="list-style-type: none"> <li>• Producers</li> <li>• Collectors</li> <li>• Processors</li> <li>• Logistics service providers</li> <li>• Cold storage operators</li> <li>• Government</li> <li>• Retailer</li> </ul>		
<b>Identified public and private stakeholders:</b> <ul style="list-style-type: none"> <li>• CANILEC (industry association for milk and dairy products): Rene Fonseca,</li> </ul>		

[rfonseca@canilec.org.mx](mailto:rfonseca@canilec.org.mx)

- Nestle (Nutrition company): Juan Carlos Pardo Bejarano, [canilec@canilec.org.mx](mailto:canilec@canilec.org.mx)
- Ministry of Economic Affairs, DG Basic Industries: Héctor Hernández, [hector.hernandez@economia.gob.mx](mailto:hector.hernandez@economia.gob.mx)
- LogFret (Freight Forwarder) Marco Croes. [marco.croes@logfret.nl](mailto:marco.croes@logfret.nl)

**Expected results (qualitative estimates):**

- Market growth: The market share of domestic production will increase. Imports of milk powder will decrease.
- Cost reduction: Costs are not expected to be reduced; however, income for Mexican producers will increase.
- Job creation: Set up of new facilities is expected to lead to some job creation in these facilities.
- Sustainability effects: Better cooling and higher quality should lead to reduction of losses.
- Others: The intervention will support small producers.

**Necessary investments:**

- Shared collection centres and cold rooms
- Adequate trucks for transportation complying with requirements

**Context requirements:**

A strong coordination with different agencies in government is required to ensure that the investment effort is well embedded and leads to a sustainable improvement for the sector.



## 6.7 Project 6: Shortsea shipping of papaya to the US

Table 13: Description of project 6: Shortsea shipping of papayas to the US.

Project 6	Shortsea shipping of papaya to the US	
<p><b>Background:</b>            In 2014 Chiapas produced 160 kton (19% of national production) of papayas and is the second most important producing state, first is Oaxaca. Moreover their production is increasing about 4% annually (SIACON, SIAP, 2014). Chiapas also offers good opportunities for combined projects with other tropical fruit, in particular in cooperation with the Chiapas agropark. Searching for synergies between the pilot program and the agropark will reinforce the positive impact of both. On the other hand, shortsea shipping from Mexico to the US is an interesting opportunity that has been discussed in the sector for longer however never been realized. In making shortsea shipping an attractive alternative to trucking, the distance has to be long enough, so combining the idea of shortsea shipping with a project in the South of the country is a logic consequence. During the validation period of the project ideas we got into contact with AgroMod, a producer of among others papayas, who are interested in setting up the project. A successful project on shortsea shipping can serve as a leading example for other products and regions of Mexico. The project thus aims at setting up a shortsea connection for papayas to the US. In combination with a more efficient process and better quality control a better market access and standing on the market in the US – and in the longer run also Canada – will be realized. US papaya imports have been increasing annually since 2011 to 159 kton in 2014, representing a value of about 106 million USD. In 2014 Mexico covered 80% of those US imports in weight and value (UNCOMTRADE).</p>		
<p><b>Main product:</b>            Papayas</p>	<p><b>Product specifications:</b>            Maradol Papayas            5000 cases/week to US            35lbs/case</p>	<p><b>Location of production:</b>            Tapachula, Chiapas</p> <p><b>Current destination:</b>            Florida, US</p>
<p><b>Additional product(s):</b>            Currently no further products planned. Other tropical fruits could be added at a later stage.</p>	<p><b>Product specifications:</b>            n/a</p>	<p><b>Location of production:</b>            n/a</p> <p><b>Current destination:</b>            n/a</p>
<p><b>Goal of the intervention:</b>            The main goal of intervention is to better penetrate the US and Canadian market with a higher quality product. This will be reached through better quality control before shipping and cost reduction through more efficient transportation and avoiding additional repacking. Higher quality and lower cost will enable an increase in volume that is shipped to the US and Canada by c. 50%.</p>		

**Main elements of the intervention:**

The core of the intervention are the following two elements:

- Currently the product is transported by truck from Chiapas to Florida via Monterrey. In the future the product will be brought by truck from Chiapas to the Port of Coatzacoalcos and then be shipped to the Port of Manatee (Florida, US). From there the product is sold to clients and distributors in Florida as well as in other parts of the US (Chicago, New York).
- At the moment, the products are packed in Tapachula, sent to Monterrey and then sorted, conditioned, treated and repacked in Monterrey. This step in Monterrey takes about 48h. In the future, washing, conditioning, treatment, sorting and packing of fruits (final consumer packing) will be done in Chiapas before transportation starts.
- These elements should be accompanied by training in postharvest treatment, handling and quality control in Tapachula.

**Route and modalities:**

- Harvest, washing, treating, sorting and final packing in Tapachula, Chiapas
- Trucking to Port of Coatzacoalcos
- Shipping to Port of Manatee

**Necessary public and private stakeholders:**

- Producer
- Freight forwarder
- Shipping line
- Importer

**Identified public and private stakeholders:**

- Agromod SA de CV (Producer of papayas, potential project leader): Raul Magaña, [rmagana@agromod.net](mailto:rmagana@agromod.net)
- Delkan Farmers Inc. (Client in the US): Daniel Blazer, [produce@decalfarmersmarket.com](mailto:produce@decalfarmersmarket.com)
- World Direct Shipping (Shipping line with existing Coatzacoalcos – Manatee operations): Romulo Ochoa, [rochoa156@gmail.com](mailto:rochoa156@gmail.com)

**Expected results (qualitative estimates):**

- Market growth: Larger market share in US and Canada to be expected due to higher quality and lower cost.
- Cost reduction: Reduction of cost due to more efficient transportation and avoiding of repacking in Monterrey.
- Job creation: Additional jobs will be created in Tapachula, however, jobs in Monterrey might get lost and the net result might be fewer jobs.
- Sustainability effects: Modal change will lead to a reduction in CO2 emissions. Shorter lead times should lead to reduction of postharvest losses.

**Necessary investments:**

The necessary investments for this project are investments in the infrastructure in Tapachula, so that the product can be prepared there for the shipment to Florida. The following will be needed:

- Conditioning rooms
- Forced air cooling equipment
- Equipment for postharvest assessment of the product
- Packing material

**Context requirements:**

This project requires a consistent amount of product (volume) and demand for a number of months, to improve the odds of the project. We recommend including more tropical products, like mangos, and supporting the interventions with export promotion efforts.

## 7 Selection model Top 3 pilot projects

### 7.1 Introduction

As pointed out several times before, the final goal of the selection procedure is to select three pilots that will be proposed for receiving subsidies for implementation in 2016. After the pre-selection of the Top 10 as described before and the further narrowing down to the Top 5 export chains plus the one most relevant domestic chain this selection model explained in the following will lead to identifying the Top 3 projects out of these pre-selected described in chapter 6.

These will be worked out in detailed project proposal in order to be submitted to SAGARPA for financial support in their implementation. This chapter explains how the selection model was designed, how the selection procedure works and which criteria are used. The selection procedure itself is not part of the design phase 1A, which is described in this report, but of the design phase 1B, the following phase. Thus the application of the model and the result are not included in this report.

### 7.2 Approach

Evidently, the main aspects that the final three projects should comply with are the same as the ones for the pre-selected projects:

- Target high potential value chains:  
It is important to choose value chains where strong leads already exist (companies, organisations, individuals), who might have the capacity to organise a significant share of the chain and to lead the pilot bringing together public sector, private sector, knowledge institutions and civil society. If a value chain is chosen where such a strong player does not exist chances are high that a project will fail or at least fail to achieve its full potential. Often these leads control one part of the chain, represent one company, etc. For the project they will probably need to team up with other organizations in order to create strong leaderships for the pilot to be successful and more importantly to be feasible.
- Have a significant general and/or sectorial impact:  
The pilot program will subsidize selected projects. In general, subsidizing selected projects needs to serve public goals and a sector, the economy or society as a whole in order to be justified. Thus, it is important to evaluate the impact of a possible pilot project on the country as a whole and/ the sector in particular in order to decide whether the project should be part of the pilot program. Also, this impact can differ in degree from one project to another, which should be taken into account in the process of selecting the final projects.

Additionally, detailing the projects further and discussing them with stakeholders from the sector gave additional information on the shaping and the feasibility of the individual project. These two aspects are highly relevant and will also influence whether a project is finally selected or not.

### 7.3 Selection procedure

The criteria and indicators explained in the following chapter will be applied to the six pre-selected projects, which will lead to a ranking of these. The score per criterion and indicator will be recorded for all six projects. The three projects with the highest overall score will be the final Top 3 projects.

Nine criteria were defined in consultation with SAGARPA. The data used in quantitative indicators come from official sources that are publicly available at SAGARPA, INEGI, Trademap and others. For the qualitative criteria an expert panel will be set up to evaluate these criteria. The panel will consist of a representative selection of the private sector, governmental institutions and academia and will strive for a good representation of the value chain. The concrete participants in the panel will be agreed upon with SAGARPA before setting up the panel.

The points for each criterion will be added up per project, which will lead to a ranking of the six pre-selected projects. The three projects with the highest scores will be the final Top 3 products.

### 7.4 Criteria

Following the earlier reasoning the following criteria were defined:

- a) Relevant food value chain
- b) Market potential
- c) Food loss reduction potential
- d) Employment generation
- e) Project impact
- f) Feasibility of the project
- g) Producer association(s) involved
- h) Added value in the value chain
- i) Beneficial to small and medium-sized producers

The different criteria are weighed according to their importance. The criteria are measured by the following indicators and points are accordingly distributed:

Table 14: Selection criteria, indicators and points for final selection model.

No	Criteria	Points
a)	<b>Relevant food value chain</b>	<b>15</b>
	Export value or domestic consumption (USD)	7
	Production value (MXN)	8

<b>b)</b>	<b>Market potential</b>	<b>10</b>
	Export growth (2010 – 2014) (%)	5
	Market share of exports (USD)	5
<b>c)</b>	<b>Food loss reduction potential</b>	<b>10</b>
	Current food losses	5
	Expected benefit from project	5
<b>d)</b>	<b>Employment generation</b>	<b>10</b>
	Direct from project (jobs)	10
<b>e)</b>	<b>Project impact</b>	<b>10</b>
	Small and medium-sized producers involved in the project (#)	5
	Reach of the project result	5
<b>f)</b>	<b>Feasibility of the project</b>	<b>20</b>
	The timetable fits with the pilot program.	10
	A group of stakeholders and a project leader are identified.	10
<b>g)</b>	<b>Producer association(s) involved</b>	<b>10</b>
	One or more producer association(s) is/are involved.	10
<b>h)</b>	<b>Added value in the value chain</b>	<b>10</b>
	Improved quality of products expected	5
	More value added of products and services expected	5
	<b>Maximum total points</b>	<b>95</b>

As can be observed, the second part of the selection process is a more in depth analysis about the potential, feasibility and the impact of the proposed project. Such detailed analysis is needed in order to better select among the pre-selected projects, which are already a selection among the complete list presented in Section 4. Unfortunately, for some indicators it is difficult to find reliable sources for the data, and faced with the decision of doing a superficial analysis with limited official information, or doing a better analysis with quantitative data taken from experts in the field, we opted for the latter. Thus the data for some of the indicators will be taken from a panel of experts that will be given the same information and asked the same questions about the list of products being evaluated. This approach might also have its limitations, however, we are confident that the results obtained will be consistent and that the resulting Top 3 are very good options for successful pilot projects.

Below every criterion, indicators and the respective scoring are explained in more detail:

a) Relevant food value chain:

This criterion is measured in two indicators. The first indicator is the export value used for the five export chains, respectively the domestic consumption used for the one domestic chain. The second indicator is the production value on national level. The production value rather than size of production area (ha) or production volume allows us to compare meat and vegetable supply chains. For each criterion the six projects will be ranked according to the respective value of the indicator. According to the rank points will be given.

Indicator 1: Export value or Domestic consumption (USD): 7 points

Export value (USDm)	Points	Domestic consumption (USDm)	Points
Top 10	7	Top 10	7
Rank 11 – 20	4	Rank 11 – 20	4
Rank 21 or lower	1	Rank 21 or lower	1

Source: Trademap, ITC (2010-2014)

Indicator 2: Production value (MXN): 8 points

Value of production (Millions MXN)	Points
>9,000	8
4,500-9,000	4
2,250-4,500	2
<2,250	0

Source: SIAP, SAGARPA (2014)

b) Market potential:

This criterion is also measured in two indicators, the average export growth over the last five years and the market share of exports, indicating the relevance as well as the future potential for the export market. Taking the export growth into account also allows excluding saturated or highly competitive markets.<sup>8</sup> For indicator 1 the products will be

<sup>8</sup> As a reference: The overall average growth of all products over the last 5 years is 12%.

ranked according to the respective value of the indicator. According to the rank points will be given.

Indicator 1: Average export growth (2010 - 2014) (%): 5 points

Export growth (%)	Points
Top 10	5
Rank 11-20	2
Rank 21 or lower	0

Source: Trademap, ITC (2010-2014)

Indicator 2: Market share of exports (USD): 5 points

Market share exports (USDm)	Points
>500	5
250-500	4
100-250	3
>50	2

Source: Trademap, ITC (2010-2014)

### c) Food Loss Reduction Potential

The indicators for this criterion will be judged based on expert judgement. Every expert will give his score for each of the possible pilot projects. The average of all expert judgements will be taken into account for the final total score. Existing studies, such as done by the FAO<sup>9</sup> or the WRI<sup>10</sup>, will be used as input and to double check assumptions. The criterion is split into two indicators, the current food losses and the expected benefit from the respective project. In this way, the impact of a project in relation to the current amount of losses can be taken into consideration.

Indicator 1: Current food losses (5 points):

- Large perceived loss: 5 points
- Small perceived loss: 3 points
- No perceived loss: 0 points

<sup>9</sup> FAO (2011): Global food losses and food waste – Extent, causes and prevention.

<sup>10</sup> Lipinski et al. (2013): Reducing Food Loss and Waste. Working Paper, Instalment 2 of Creating a Sustainable Food Future.



Indicator 2: Expected benefit from the project (5 points):

- Significant reduction as consequence of the project expected: 5 points
- Small reduction as consequence of the project expected: 3 points
- No reduction as consequence of the project expected: 0 points

#### d) Employment Generation

The scoring for this criterion is based on expert judgment. Every expert will give his score for each of the possible pilot projects. The average of all expert judgements will be taken into account for the final total score.

Indicator 1: Direct jobs generated by project (10 points):

- Products or processes that generate many jobs: 10 points
- Products or processes that generate some jobs: 5 points
- Products that generate few jobs: 0 points

#### e) Project Impact

The criterion is measured by two indicators, the number of small and medium-sized producers impacted by the project and the value chains involved in the projects. The first indicator will be scored by expert judgement. Every expert will give his score for each of the possible pilot projects. The average of all expert judgements will be taken into account for the final total score for the indicator. The scoring for the second indicator will be done by the project team based on the project description.

Indicator 1: Number of small and medium producers in the project (#) (5 points):

- Many SME producers impacted: 5 points
- Some SME producers impacted: 3 points
- Few SME producers impacted: 1 point

Indicator 2: Reach of the project result (5 points):

- Project result useful for the entire value chain of more than one product: 5 points
- Project result useful for the entire value chain of one product: 3 points
- Project result useful for more a product group: 1 point
- Project result useful for one product: 0 points

#### f) Feasibility of the project

The scoring for this criterion will be done by the project team based on the description of the projects. The criterion is measured in two indicators, the expected time needed for the project to be fitting with the program and the identification of stakeholders to be willing to participate in the project.

Indicator 1: The timetable fits with the pilot program. (10 points)

- Y=10 points
- N=0 points

Indicator 2: A group of stakeholders willing to participate in the project and a project leader are identified. (10 points)

- Y=10 points
- N=0 points

g) Producer association(s) involved

The scoring for this criterion will be done by the project team based on the description of the projects.

Indicator 1: One or more producer association(s) is/are involved. (10 points)

- Y=10 points
- N=0 points

h) Added value in the value chain

The scoring for this criterion is based on expert judgment. Every expert will give his score for each of the possible pilot projects. The average of all expert judgements will be taken into account for the final total score. The criterion is scored in two indicators, the improved quality as a result of the project and the expected added value of products and services.

Indicator 1: Improved quality of products through project expected (5 points)

- Y=5 points
- N=0 points

Indicator 2: More value added of products and services through project expected (5 points)

- Y=5 points
- N=0 points

## 8 Conclusions and next steps

### 8.1 Conclusions

The purpose of the design phase 1A of the pilot program PNA, described in this report, was

- to identify an inventory of possible relevant and interesting pilot projects falling under the scope of the National Program for Agrologistics;
- to develop selection models that will enable the selection of the final three pilot projects from the initial inventory and
- To make a first pre-selection of relevant projects, discuss and validate those with sector representatives so as to come to a further description of these projects.

The necessary activities to realize these were described in this report. The initial inventory of 24 pilot projects was reduced to the most promising pilot projects and those were discussed with the sector in order to discuss and validate the general approach, the perceived opportunities for certain products and product groups and the planned interventions. The six pre-selected projects are:

- Project 1: Increase of meat exports to Asian markets
- Project 2: Direct supply of Mexican greenhouse tomatoes to North American final customers
- Project 3: Better market access of avocado in Europe
- Project 4: Improvement of cooling infrastructure for berries
- Project 5: Import replacement of powder milk
- Project 6: Shortsea shipping of papaya to the US

The idea and approach of the pilot program PNA was very well received by the sector. Sector representatives were interested in discussing current issues, opportunities and possible interventions for their respective field of activity and are willing to participate in pilot projects that will enable them to turn existing opportunities into real benefits. Out of the six pre-selected projects, four project ideas turned out to be considered relevant and interesting by the sector. During the interviews the sector representatives confirmed the necessity for or opportunity of these interventions in order to solve current issues or realize existing opportunities. For two projects, however, project 2 Direct supply of Mexican greenhouse tomatoes to North American final customers and project 4 Improvement of the cooling infrastructure for berries it turned out that the originally defined interventions were not considered the most relevant by the sector itself. In those two cases, the interviews were extremely important to come to this conclusion and identify the most relevant interventions to improve the value chain.

### 8.2 Next steps

This part of the design phase ends with the description of the pre-selected pilot projects. Now that this has been done and a first validation round with sector representatives took place, it is important to make the final choice for the three pilot projects in order to continue the process

for preparation of the pilot program. In order to come to this selection the final selection model as presented in chapter 7 has to be applied to the pre-selected projects. It is advisable, however, to have another interview round with sector representatives for the pre-selected project before making the final choice. The first round was clearly targeting validation and/or adjustment of the original project ideas as they were presented in the inventory. This goal was achieved which led to the now defined six pilot projects. A second interview round should focus on the willingness of the interested stakeholders to contribute a significant part to the final project, possibly 50% or more of the total project cost. As the first interview round was targeting the interventions themselves, the sector representatives were asked on their general interest and willingness to participate in a project, which includes a financial contribution. However, the amount of the financial contribution and all related details were not discussed yet. This willingness to contribute will be a significant element to evaluate criterion e, indicator 2 of the selection model, namely the question of whether a group of stakeholders has been identified.

Once, the final Top 3 projects are selected, they will be elaborated in detail with a future project consortium with the goal to prepare a complete project proposal that can be submitted to SAGARPA for receiving financial support in implementation. These two activities, the final selection and the preparation of the project proposal, are the key elements of the following phase, design phase 1B.

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## Appendices

### Appendix 1 – Interviews

The following interviews were held in the context of this project:

Mario Andrade (President, ANEBERRIES), personal interview, 07 October 2015, Guadalajara.

Marco Croes (Business Development Manager, LogFret), personal interview, 28 October 2015, Wageningen.

Hugo Escoto (Operations manager, Finca Ahuehuetes, S.A. de C.V.), personal interview, 09 October 2015, Querétaro.

Jorge Facio (Regional Director, Hellmann Logistics), personal interview, 07 October 2015, Guadalajara.

Ulises Fernandez (Consultant, Competitiveness), personal interview, 06 October 2015, Mexico City.

Rene Fonseca (General Director, CANILEC), personal interview, 19 November 2015, Mexico City.

Robert van der Geest (New Projects manager Energy Greenhouse Park), personal interview, 29 September 2015, Alphen a/d Rijn.

Ignacio Gomez (General Director, APEAJAL), personal interview, 07 October 2015, Guadalajara.

Roelof van Haren (Director General, Translogistic S.A. de C.V.), personal interview, 05 October 2015, Mexico City.

Macarena Hernández (Director, COMECARNE), personal interview, 05 October 2015, Mexico City.

Federico Lepe (President International Trade Commission, Council of Industrial Chambers, Jalisco), personal interview, 07 October 2015, Guadalajara.

Raul Magana (Representative, AgroMod), phone interview, 01 October 2015.

Enrique Merigo, (Vice-President, CNA / VIDA), personal interview, 10 June 2015, Mexico City.

Claudia Monroy (Consultant, Agricultural Markets Consulting Group), personal interview, 18 November 2015, Mexico City.

Maximiliano Ramirez (Director Seafreight Perishable Cargo, Kuehne + Nagel), personal interview, 06 October 2015, Mexico City.

Mauricio Revah (General Manager, Finca Ahuehuetes, S.A. de C.V.), personal interview, 09 October 2015, Querétaro.

Elizabeth Rojas (Deputy Director Processed Food Exports, ProMexico), personal interview, 12 November 2015, Mexico City.

Jorge Alberto Velasco (Gerente de Perecederos, RH Logistics), personal interview, 07 October 2015, Guadalajara.

Aldo Venegas (Field Sales International Forwarding, Kuehne + Nagel Guadalajara), personal interview, 07 October 2015, Guadalajara.

Oscar Woltman (General Director, FreshMex), personal interview, 23 April 2015, Mexico City.

## Appendix 2 – Product data

Table 15: Product data used for the pre-selection model.

Product	a) Production (Million MXN)	c.1) Domestic consumption (Million MXN, 2014)	Rank	c.2) Import value (Million MXN, 2014)	Rank	c.3) Export value (Million MXN, 2014)	Rank	c.4) Export growth (%, 2010 - 2014)	Rank
avocado	20715.99	5785.62	11	0.09	99	1401.45	2	21	20
beef	90963.13	74561.68	1	912.84	2	770.81	4	36	8
bell pepper	3230.46	466.53	58	2.08	63	894.36	3	11	45
berries	11997.37	649.33	53	1.28	71	601.91	5	21	20
broccoli	2051.44	927.04	45	4.22	54	140.90	30	9	54
carrot	808.03	3023.30	19	6.34	43	35.41	61	12	41
cauliflower	249.93	84.73	67	4.22	54	140.90	30	9	54
chickpeas	1535.96	176.92	65	0.09	100	183.41	24	19	24
coriander	232.46	782.31	48	0.00	112	0.00	109	0	86
cucumber	3568.83	1605.15	33	0.00	112	411.06	10	15	28
cut flowers	4341.54	4341.54	14	1.89	65	24.46	68	5	71
fish	4752.91	6942.14	8	11.69	32	49.15	49	30	14
fresh tomato	15735.51	19710.71	4	32.80	20	1752.80	1	0	86
guava	1291.96	1690.33	32	0.00	112	9.74	91	35	10
juice	7370.32	6848.76	9	48.84	14	419.31	9	11	44
lettuce	1226.33	3260.70	18	7.83	40	47.33	50	6	64
mango	4847.99	392.13	59	4.15	56	213.99	23	-4	101
milk	65000.18	50935.50	2	896.97	3	61.78	42	0	86
onion	5665.17	8293.90	7	44.17	17	297.50	18	5	68
papaya	3601.66	3529.13	17	0.00	112	87.07	35	9	54
pork	49025.96	24643.76	3	1561.08	1	429.04	8	13	37
potato	11983.64	11950.45	5	48.29	16	0.00	109	0	86
rambutan	24.19	0.02	0	0.00	112	0.00	109	0	86
shrimp	9316.82	2505.76	21	192.40	7	355.65	15	10	47

Sources:

Criterion a: SIAP, SAGARPA (2014).

Criteria c.1; c.2: ENIGH, INEGI (2014).

Criteria c.3; c.4: Trademap, ITC (2010-2014).



## Appendix 3 – Expert judgements

Expert judgements for the criteria d and e of the selection model (see 5.5)

Table 16: Expert judgement criterion d (direct job creation).

Product	AC	EV	OA	BP	SF	GG	OV	PR	MG	MR	Average
Avocado	10	10	5	10	10	10	10	10	10	10	9.50
Beef	10	10	10	10	5	5	10	10	10	10	9.00
Bell pepper	5	10	10	10	5	5	5	10	10	5	7.50
Berries	5	10	10	10	5	10	5	10	10	10	8.50
Broccoli	5	10	10	5	10	1	10	5	10	5	7.10
Carrot	5	10	5	5	10	1	10	5	5	5	6.10
Cauliflower	5	5	10	5	10	1	10	5	10	5	6.60
Chickpeas	5	10	1	5	10	1	5	5	10	5	5.70
Coriander	1	5	5	5	10	5	5	5	1	5	4.70
Cucumber	5	10	5	5	5	5	5	5	10	5	6.00
Cut flowers	5	5	10	10	5	10	5	10	10	5	7.50
Fish	5	10	10	5	5	10	5	5	5	5	6.50
Fresh tomato	10	10	10	10	5	1	5	10	10	5	7.60
Guava	5	5	5	5	10	5	5	5	5	5	5.50
Juice	5	5	5	5	5	5	5	5	10	5	5.50
Lettuce	5	10	10	10	10	5	10	5	10	5	8.00
Mango	10	10	10	10	10	10	10	10	10	5	9.50
Milk	10	10	10	10	10	10	5	10	10	1	8.10
Onion	5	10	10	5	5	5	5	10	10	5	7.00
Papaya	5	10	10	10	5	5	5	5	10	5	7.00
Pork	10	10	10	10	5	1	10	5	10	5	7.60
Potato	5	10	5	5	5	1	5	5	1	5	4.70
Rambutan	1	5	1	5	5	5	5	1	5	5	3.80
Shrimp	5	10	5	5	5	10	5	5	10	5	6.50

Table 17: Expert judgement for criterion f (impact).

Product	AC	EV	OA	BP	SF	GG	OV	PR	MG	MR	Average
Avocado	10	10	5	5	10	10	10	10	10	10	9.00
Beef	10	10	10	10	0	10	5	10	10	5	8.00
Bell pepper	0	5	10	5	10	10	10	10	10	10	8.00
Berries	10	10	10	0	10	10	10	10	10	5	8.50
Broccoli	5	10	10	5	10	5	10	10	10	10	8.50
Carrot	0	10	5	0	10	5	10	5	5	10	6.00
Cauliflower	0	5	10	0	10	5	10	10	10	10	7.00
Chickpeas	0	10	1	0	10	0	10	5	10	0	4.60
Coriander	0	5	5	0	10	5	10	0	1	5	4.10
Cucumber	5	10	10	5	10	5	10	5	10	5	7.50
Cut flowers	5	5	10	10	0	10	5	5	10	0	6.00
Fish	10	10	10	5	0	10	10	10	5	10	8.00
Fresh tomato	10	10	10	5	5	10	5	10	10	10	8.50
Guava	10	5	5	0	10	5	10	5	5	5	6.00
Juice	10	5	5	10	5	10	5	5	10	5	7.00
Lettuce	5	10	10	5	10	5	10	10	10	10	8.50
Mango	10	10	10	5	10	10	10	10	10	5	9.00
Milk	10	10	10	10	0	10	5	10	1	5	7.10
Onion	5	10	10	5	5	5	5	10	10	5	7.00
Papaya	5	10	10	5	10	10	10	10	10	5	8.50
Pork	10	10	10	5	0	5	10	10	10	5	7.50
Potato	5	10	5	0	5	0	5	5	1	5	4.10
Rambutan	0	5	1	0	10	5	10	0	5	5	4.10
Shrimp	10	10	5	5	5	10	10	10	10	10	8.50

Abbreviations of expert names:

- AC: Arturo Calderón
- EV: Eric Viramontes
- OA: Omar Ahumada, PhD.

- BP: Dr. Benjamín Peña
- SF: Sergio Fadl
- GG: Georgius Gotsis
- OV: Olga Vazquez
- PR: Peter Ravensbergen
- MG: Marco Galindo
- MR: Maximiliano Ramirez