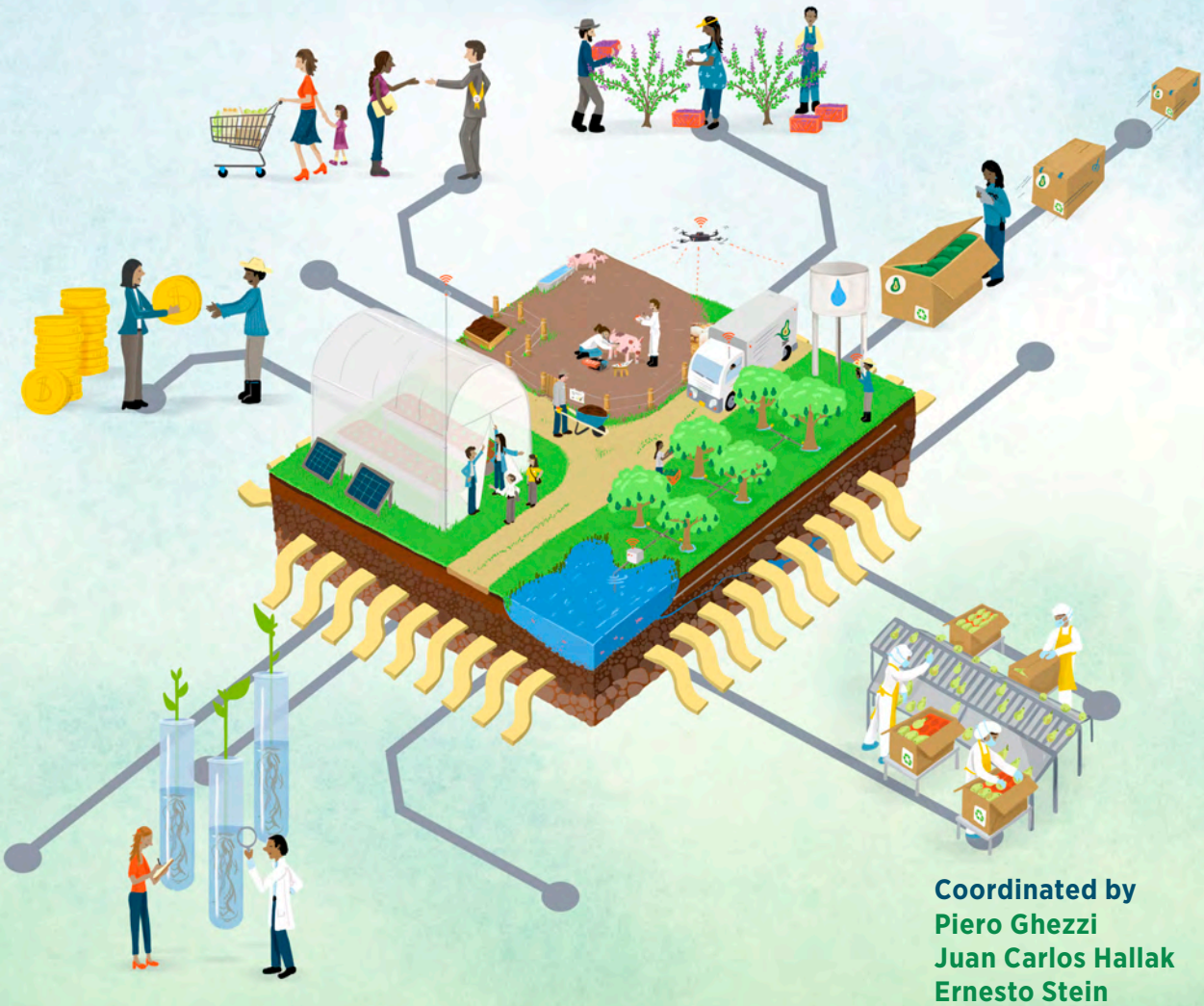
Latin American and Caribbean Microeconomic Report

# Competing in Agribusiness

## Corporate Strategies and Public Policies for the Challenges of the 21st Century




Coordinated by
Piero Ghezzi
Juan Carlos Hallak
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# Contents

# Preface

In recent years, one issue has been front and center on the IDB Group's agenda: the enormous opportunity that countries in Latin America and the Caribbean have to integrate into global value chains. Usually, when we think of these opportunities for regional and global integration, the first thing that comes to mind is manufacturing. And this is no accident: trade conflicts, the blockage of the Suez Canal, the COVID-19 pandemic, the withdrawal of the United Kingdom from the European Union, and Russia's war against Ukraine have disrupted supply chains in many strategic industries. In an effort to increase agility and resilience, both countries and companies are seeking to reorganize and diversify their supply chains by working with physically closer partners. To a certain extent, *just-in-time* production practices are becoming more *just-in-case*, generating key opportunities for the countries of our region.

However, the opportunities offered by a globalized world go far beyond the manufacturing industry. This report focuses on the agribusiness sector, where the region has traditionally shown competitive strength but still has enormous opportunities to add value. It is based on some 30 case studies of successful international integration in agrifood markets, with a wide variety of products ranging from fresh foods like fruits, vegetables and meats, to processed products like organic mango puree, essential lemon oil, or gourmet chocolate bars.

There is a tendency to think of agriculture as a technologically lagging sector that innovates little and does not generate good income for the general population. Precisely for this reason, a central element of development has traditionally involved the structural transformation of economies, reallocating workers and other productive resources from agriculture to industry. But while subsistence agriculture is still widespread in the region, it coexists with a much more dynamic agriculture: one that incorporates technology—from advanced genetics to precision farming practices, drones, and satellite images—and that responds quickly to the changing standards imposed by large buyers—supermarkets, processors, and others—and consumers themselves. In a world where development through industrialization has clear limitations, this report proposes an alternative strategy—or, rather, a complementary one: a vertical, structural transformation, within the agribusiness sector itself, that takes advantage of the opportunities offered by modern agro-export value chains.

But integrating into these value chains is not easy. It requires producers to meet quality standards and comply with commercial conditions imposed by international buyers. In addition, they must respond to the demands of consumers who increasingly want more information about the products they consume and less negative impact on societies and the environment. Integration into these chains also requires that the governments of the region fulfill their role by providing the public goods necessary—road and irrigation infrastructure, trade agreements, phytosanitary control, research, extension, and financing—for the private sector to prosper.

The agribusiness success stories analyzed in this report generally do not focus on commodities but on an array of differentiation and value-adding strategies. There is no single formula. Successful companies employ a wide range of strategies that include taking advantage of the northern hemisphere's off-season, when prices are higher; adopting environmental and social quality seals that are increasingly valued by the markets—such as organic and regenerative production or fair trade; searching for attributes like better flavor and size, or longer shelf life; developing brands and designations of origin; and adapting production to the precise specifications defined by each client.

Just as the competitive and market positioning strategies of companies are varied, so are the forms of organizing production and the characteristics of companies that have managed to successfully integrate into agribusiness value chains. Some are large, vertically integrated firms that are on the technological cutting edge in their respective sectors. However, a very important and attractive element of the agribusiness sector is its ability to integrate small producers into modern value chains, many of them from indigenous communities or small family farms. These producers would have a hard time integrating on their own. Instead, they either group themselves into cooperatives or associations of small producers, or work with anchor firms that provide them with technical assistance and financing and help them connect with the opportunities offered by a globalized world. Examples in the report are abundant and striking, ranging from organic honey produced under fair trade arrangements by cooperative beekeepers in the Gran Chaco ecoregion of Argentina to small organic mango farmers in Nicaragua, whose production, through an anchor firm, is integrated into the value chains of companies like Happy Family (Danone Group) and Innocent Drinks (Coca-Cola). We are also proud that several of the cases discussed in the report involving small farmers have been financed by IDB Lab or IDB Invest.

That is precisely what vertical structural transformation is all about. In line with IDB's Vision 2025, to solve the major development problems facing the region, we must promote the integration of our companies into global value chains. In the agribusiness sector, this means incorporating small farmers into modern agriculture, with production processes that are resilient to climate change and environmentally friendly.

A clear message of the report is that while the private sector plays a critical role, joint action by the public and private sectors is required for success. For example, the fruit companies on the Peruvian coast that produce avocados, blueberries and other fruits are among the largest and most sophisticated in the world. But they would not have developed without the irrigation infrastructure projects deployed decades ago by the Peruvian state, or without the presence of a competent health authority. It is crucial for the public sector to understand the dynamics of these chains and their needs, and that—in collaboration with the private sector—it can identify the relevant public goods and guarantee their availability. It is my hope that this document will become a must-read not only for people who are constantly innovating in the agricultural sector, but also for policymakers in the region who are looking for new and better sources of economic growth. At the IDB Group, from both the public and private sides, we will be supporting these processes and working together to ensure the cases reviewed in this book are not the exception. By partnering with governments and companies across Latin America and the Caribbean, we can unleash the sustainable and inclusive development that our region needs.

**Eric Parrado**
*Chief Economist*

# Acknowledgments

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| Chapter 10 | Piero Ghezzi and Ernesto Stein |

The idea for this volume emerged from a previous project, undertaken by Piero Ghezzi and Ernesto Stein together with Sergio Ardila and Thomas Reardon. The coordinators owe a debt of gratitude to Sergio and Tom for their intellectual contributions to this report. In addition, this publication draws on a project of the IDB Research Network, coordinated by Ernesto Stein, Piero Ghezzi, Romina Ordoñez, and Lina Salazar. As part of the project, interdisciplinary teams from 12 countries produced close to 30 case studies on successful international integration in global agribusiness chains. The researchers who participated in the project are Diego Aboal, Carlos Aggio, Cecilia Alemany, Jeffrey Alwang, Fernando Aramayo, Víctor Barrera, Roberto Bisang, Felipe Cáceres Pizarro, Carlos Caicedo, Enrique Carreras, Héctor Castello, Arnaldo Chibbaro Sch., Luis Escudero, Fernando Chibbaro, María Elena Cruz, Carlo Ferraro, Pedro García M., Juan Manuel Garzón, Piero Ghezzi, Miguel I. Gómez, Andrea González, Juan Carlos

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The production of this report was led by Tom Sarrazin of the Research Department. Mikel Alcázar worked tirelessly editing the manuscript in Spanish. The English translation was done by Peter Krupa and edited by David Einhorn. Paula Saenz Umaña illustrated the cover image under the creative leadership of Lina María Botero Estrada. The Word Express was responsible for typesetting the volume.

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# The Substantial Potential of Agribusiness for Latin America's Development

## An Introduction


• Piero Ghezzi
• Juan Carlos Hallak
• Ernesto Stein


Latin America does not grow enough, and the jobs it creates are of poor quality. The region's per capita growth rate over the last 40 years has been slower than that of the rest of the world, hindering the region from closing the development gap with more advanced countries. Historically, the vast majority of countries across the world that developed did so through processes of structural transformation—that is, by moving workers from low-productivity sectors (mainly traditional agriculture) to high-productivity sectors (particularly the manufacturing industry). This process of structural transformation resulted in substantial increases in aggregate productivity. The most effective response to development challenges, therefore, was industrialization.

Manufacturing was used as the vehicle for transformation because it was perceived to have certain unique characteristics: its productivity was high and increasing, and it was able to create jobs for a large portion of the unskilled labor force, which is sizable in developing countries. At the same time, because manufacturing production was exportable, its growth was not limited by the size of the domestic market. Finally, unlike traditional agriculture, which involved repetitive tasks that produced specialized knowledge rarely applicable in other industries, manufacturing generated certain "capabilities"—especially technological ones—that could then be used to produce increasingly sophisticated goods in a wide range of industries.

However, recent experience suggests that today, development based on manufacturing may no longer be the natural vehicle for structural transformation, at least not for

most Latin American countries, which are typically rich with natural resources and fertile land. Rodrik (2015) notes that as countries develop, manufacturing as a share of GDP and employment tends to peak at lower levels than in the past, as well as at lower per capita income levels. This process—which Rodrik calls "premature deindustrialization" and which could be associated with technological changes such as automation and the emergence of China as a new industrial power—suggests that development strategies based mainly on manufacturing may be risky or even not viable in most developing countries, particularly in Latin America.

Recent experience suggests that today, development based on manufacturing may no longer be the natural vehicle for structural transformation, at least not for most Latin American countries, which are typically rich with natural resources and fertile land.

As indicated in the Inter-American Development Bank's Vision 2025 strategy, the region needs to make progress on reactivating the productive sector and increase productivity through innovation and entrepreneurship, the growth of small and medium-sized firms, the adoption of new digital-based technologies, and the strengthening of regional and global value chains. With that said, as indicated above, it is necessary to explore development and structural transformation strategies that go beyond the manufacturing sector. Fortunately, other sectors have undergone remarkable development in recent decades to become promising vehicles for structural transformation. In particular, both agribusiness and services today exhibit several of the characteristics that have historically been attributed to the manufacturing industry. For example, they use advanced production methods that incorporate technology, continuous improvement, and short learning cycles that depend on the acquisition of general skills applicable to a wide variety of productive activities. In other words, the opportunities for capacity-building that can sustain modern value-generating production have become widespread.

In this sense, a more promising development strategy is no longer to move workers from traditional agriculture to manufacturing, but to ensure that, within each sector or industry, more workers are employed in more productive firms using more advanced production methods—that is, a vertical structural transformation.

Few sectors offer as many opportunities for vertical structural transformation in Latin America as agriculture. The most modern farms in the region are using advanced production methods, including state-of-the-art equipment, precision agriculture, cutting-edge genetics, and more. These advances mean that, at its leading edge, agriculture has become a technology industry. As *The Economist* put it in a June 2016 article: "Farms are becoming more like factories: tightly controlled

Few sectors offer as many opportunities for vertical structural transformation in Latin America as agriculture.

operations for turning out reliable products, immune as far as possible from the vagaries of nature." This is indeed true: the most modern farms really are turning into factories. Using drones, sensors, and satellite images, they optimize the amount of water, fertilizer, and pesticide required in each pixel of the terrain and at each moment to maximize productivity, like the "just in time" production processes used in manufacturing.

However, agrifood systems go far beyond the farm. They require a complex network of backward and forward links, as well as lateral links with specialized economic agents and institutions that enable producers to compete in national or international markets and respond to changing demand. These links include the input value chain (agrochemicals, agricultural machinery, seeds, biotechnology, and so on); the product value chain (processors, exporters, wholesalers and supermarkets, among others); and lateral services (financial services, transportation, logistics, information technology, etc.). Furthermore, all of this requires the support of public goods (research and extension, sanitary and phytosanitary services, opening of markets, infrastructure, and land-use and labor regulations). Producing with modern techniques and competing successfully in international markets requires investments and innovations in all elements of the system.

In the input value chain, for example, advances in the field of biotechnology have led to improvements in genetic material, generating plants and animals of better quality and more resistant to pests, giving rise, in turn, to products with specific attributes demanded by consumers. Genome editing tools like CRISPR promise to continue to revolutionize the industry. Downstream, in turn, processing plants have become increasingly sophisticated, with optimized layouts and sorting machines managed by artificial intelligence algorithms, making it possible to differentiate products for different markets. At the same time, modern logistics help keep products in top condition during transportation and reliably place them in increasingly demanding destination markets, with the shelf life required by buyers.

In addition to the increased use of technological knowledge in modern agriculture, major transformations on the demand side create considerable new opportunities for value creation. As incomes increase in developing countries, people change their diets, shifting from staple grains and starches to more diversified diets that include products like fruits and vegetables, meats, and dairy. In this context, demand is soaring for these products along with inputs like feed grains. At the same time, the greater ability to pay in developed countries induces consumers there to seek out the fruits and vegetables they want throughout the year, even in off-season periods, presenting excellent opportunities for those producing countries that can meet the demand.

As demand for these products increases, buyers (including end consumers) impose new and increasingly stringent requirements on the properties of the products they buy and consume. For example, supermarkets and processing companies demand food products that meet increasingly strict safety and quality standards, have a longer shelf life, and are produced while respecting labor rights and in an environmentally

friendly way. Consumers, meanwhile, want more detailed information about the way in which the products they consume are produced, including everything from sustainability (organic products, sustainable practices in the use of scarce resources such as water) to fair trade.

This new shape of global demand for food offers multiple opportunities for value creation, reverting the low income elasticity that historically limited the sector's appeal. At the same time, it poses considerable challenges to taking advantage of those opportunities. In this sense, not only does modern agriculture require new and increasing technological capabilities, it requires that these capabilities be aimed at meeting the requirements and demands of external markets. It is no longer about producing a commodity, but rather about building value chains that achieve systemic competitiveness, capable of customizing products based on the different requirements imposed by international markets.[1] Accessing international markets with these types of products—particularly when countries have comparative advantages in producing them—has become increasingly attractive. Furthermore, as will be seen in detail in this publication, in the spirit of the above-mentioned vertical structural transformation, the agriculture sector has the potential to generate very significant opportunities for small producers.

> This report is based on more than 30 case studies of successful integration of businesses into international agrifood markets. The case studies, carried out as part of a recent IDB project by interdisciplinary teams in 12 countries, are the basis of this publication.

However, the success of such a strategy is far from automatic. It requires new capabilities at the level of both the company and the country and its ecosystem. What explains successful integration into world markets in the modern agrifood sector? What types of strategies are required of the participating companies? How can governments support their companies in their quest for success? What can be done to make these successful experiences more sustainable, introducing practices that are friendlier to the environment and more inclusive, and incorporating small producers into formal value chains?

These questions are at the heart of a recent IDB project that includes more than 30 case studies of successful integration of businesses into international agrifood markets. The project was carried out by interdisciplinary teams in 12 countries and forms the basis of this publication. The project covers a broad range of cases including fresh foods such as fruits, vegetables and meats; infusions such as tea, yerba mate, and coffee (including a case of circular economy where value is extracted from each part of the coffee plant); and processed products, such as organic mango puree, lemon essential oil, and

[1] See the concept of customized competitiveness in Reardon and Flores (2006). See also Ardila et al. (2019).

gourmet chocolate bars. The cases also cover the production of knowledge-intensive inputs and services, such as the development of seeds adapted to local conditions in destination markets, genetics for new varieties of fruit, and agricultural technology services such as irrigation management systems for farms.

The project cases show that there is no single international integration strategy that companies must follow in order to be successful. Rather, companies use an array of strategies to access international markets. However, a basic initial strategy common to all successful cases involves meeting the basic requirements imposed by external markets—whether government requirements or the requirements of purchasing firms (supermarkets, processors) that frequently demand standards that are stricter than those of governments. From there, different firms adopt different value-adding strategies (understanding the term broadly) with the aim of differentiating their products and increasing revenues.

Some firms differentiate their products by obtaining certifications indicating certain unobservable attributes, either of the products themselves or the processes with which they are produced. These include organic and fair trade certifications, among others. Other firms are betting on products with certain attributes that are highly valued by the markets, such as easy-peel mandarin oranges, sweeter or larger blueberries, or products with a longer shelf life. Yet others base their strategy on taking advantage of temporary windows when there is little supply, either globally or in certain developed-country markets. This offers obvious price advantages—for example, the price of avocados in February is higher than in May—but it can also provide additional benefits on the marketing side.[2] Companies frequently combine these strategies, especially when it comes to fresh products.

Other firms add value by processing primary products, which usually enables them to obtain a number of byproducts that are complementary to primary production. For example, using lemons to make derivative products enables the use of fruit with cosmetic imperfections. While many of the firms that process primary products like conventional fruit juices or powdered milk obtain goods with few differentiating attributes, there are many others that adopt different strategies for differentiation. In some cases, firms that produce processed products try to differentiate themselves by producing specialty-products, as in the case of a firm in Argentina that develops varieties of essential oils from lemons, adapted to the requirements of each client. Other times, firms differentiate their products by adopting credence attributes—such as sun-dried mango produced with regenerative agriculture methods by a Nicaraguan company. Lastly, many companies pursue differentiation by developing brands, such as the mate-based drink called Guayakí, or Pacarí gourmet chocolate. Again, companies that make

[2] For example, the supply of blueberries in October—a very rare commodity in that time window in the United States—enabled one Latin American company to directly access supermarkets, bypassing middlemen.

processed products also often combine different strategies to compete in international markets. All of these value-adding strategies both for primary and processed products are discussed in detail and with numerous examples in Chapter 2.

In addition to addressing a wide range of sectors and internationalization strategies, the project also covers companies with very different business models in terms of the organization of the value chain. Some of the cases focus on vertically integrated companies that participate in producing, processing, and (frequently) marketing their products, working primarily with their own production rather than production by third parties. These companies routinely have high technological standards, secure a variety of international certifications, and use international best practices. Some of them are even world leaders in their respective sectors, such as Camposol in Peru (avocados and blueberries) and Citrusvil in Argentina (processed lemon products). The characteristics of these companies and the reasons why they are vertically integrated are discussed in Chapter 3, which also presents three success stories of this type of company: the two mentioned above, and Kekén, a leading Mexican firm that produces and markets pork.

The project's case studies, however, make it clear that, in Latin America, successful internationalization in the agrifood sector is not reserved exclusively for large, cutting-edge companies. The sector provides excellent opportunities to connect small producers with international markets. In fact, identifying success stories involving small producers was an important aim of the project from its inception. But to successfully participate in the international agrifood value chain, these producers cannot do it alone. The cases the project documents suggest that associativity—whether horizontal through small producer cooperatives or partnerships, or vertical through a close relationship with anchor firms—is an indispensable requirement for success.

The cases of vertical associativity discussed in Chapter 4 present models where anchor companies pack, process, and market products—avocados in Peru, different fruits in Nicaragua, and coffee in Central America—that they buy from thousands of small suppliers. They then provide those small suppliers with technical assistance, support for certifications (often in the form of group certifications), access to cheaper inputs, and financing.

Chapter 5 presents cases of horizontal associativity, through small producer cooperatives and partnerships—including table grapes in Chile, royal quinoa in Bolivia, and honey in Argentina—and discusses the determinants of success in these models. For its part, Chapter 6 focuses on a key aspect of the anchor company and cooperative models. It analyzes the substantial impact that integration into global value chains through these models has on the income and quality of life of small producers.

Agro-export companies integrated in global value chains, and the small agricultural producers that are part of their supply chains, face several environmental challenges. These include avoiding soil degradation—important as a strategy to adapt to climate

change—and dealing with the scarcity of water and other natural resources necessary for primary production. At the same time, they face changing demand, with an increasing portion of consumers demanding environmentally friendly products. Thus, Chapter 7 discusses the strategies that companies use—frequently in conjunction with the public sector and innovation systems—to address these environmental challenges and take advantage of market niches that value environmentally responsible production models. These strategies involve adopting organic, regenerative, biodynamic, and agroforestry production models (and certifications); charging (and in some cases paying) for environmental services; and employing circular economy models, which seek to transform the waste from other production processes into high-value products. Each of these strategies is illustrated with case studies demonstrating that there does not have to be a trade-off between development and protecting the environment.

So far, this discussion has emphasized the role of business strategies and different models of organizing production for successful integration into international agrifood value chains. It has also highlighted business strategies in terms of innovation (also see Chapter 8) and taking advantage of niches associated with consumers increasingly committed to socially and environmentally responsible production practices. However, successful integration does not depend solely on the efforts and strategic decisions of companies. The provision of public goods by the State also plays a fundamental role and was a central component of the case studies presented in this publication. For example, the success of agriculture along the Peruvian coast—documented in Chapter 3—would not have been possible without the large irrigation infrastructure projects that the government undertook starting in the 1980s that made it possible to grow crops on land that had previously been essentially desert. Mexican pork exports to Japan would not have been possible if the State had not contributed to opening this market by signing bilateral protocols with the destination country's sanitary and phytosanitary institution. Argentina would not have been able to export lemons to China if a public institute had not developed an effective quarantine treatment that eliminated fruit flies without compromising the quality of the product. Chapter 9 discusses these and other public goods behind the successful international integration of companies in the agrifood sector, including trade policy, animal and plant health services, policies to support compliance with foreign technical requirements, research and development, infrastructure provision, regulation, and producer support.

Even if one has a list of public goods and interventions that, in general, States should offer to support the internationalization of the agribusiness sector, how can the key public goods needed at each moment and for each value chain be identified? How can they be prioritized and sequenced? Once they are identified, how can it be ensured that they will be provided effectively? Chapter 10 seeks to answer these questions, and proposes two central objectives that should guide governments' actions to support the

sector. The first is to contribute to articulate agroindustrial value chains by providing public goods that help bring them together, strengthen them, and expand them. The second is to help these value chains become more inclusive, incorporating as many small producers as possible. Both objectives are complementary—and fundamental—in a strategy of vertical structural transformation such as the one proposed in this report.

Beyond the objectives, answering these questions requires close collaboration between public and private sectors. The private sector knows the main obstacles holding back its development, and cooperation is key not only to identify the obstacles and their potential solutions, but also to implement the solutions. Chapter 10 illustrates this with the case of the opening of the Chinese market to Argentine cherries, which involved close collaboration between the Argentine Chamber of Integrated Cherry Producers and the country's sanitary and phytosanitary authorities. But just as relevant as collaboration between the private and public sectors is coordination within the public sector itself. Oftentimes, the different public agencies responsible for providing the public goods that a sector requires are siloed and do not coordinate. Public-public coordination is a complex issue, requiring intentional mechanisms to make it effective. The chapter presents the example of the Peruvian *Mesas Ejecutivas* as a sector-level mechanism that facilitates both public-private cooperation and coordination between different public sector agencies, thus helping to align the State's actions with the sector's needs.

### Agribusiness: An Opportunity for Development in the Region

Latin America has a task before it: to establish a path for sustained and inclusive growth (IDB 2021). This publication, which is based on the experience of more than 30 cases of successful integration into global agrifood markets, shows that the sector has enormous potential to contribute to the region's sustainable development with differentiated high-value products, both fresh and processed. The sector also has great potential when it comes to incorporating hundreds of thousands of small producers into formal agrifood value chains and, at the same time, developing products and services that are knowledge-intensive. Both in developing countries, where the increase in income is changing diets, and in developed countries, where there are high-value niches to exploit, the demand for the types of products analyzed in this report is growing, and the region clearly has comparative advantages in them. This suggests a world of opportunity.

This book shows that the agrifood sector has enormous potential to contribute to Latin America's sustainable development with differentiated high-value products, both fresh and processed.

Taking advantage of that opportunity means companies must invest in innovation, engage in continuous improvement processes, and adapt their products to increasingly demanding requirements of buyers in destination markets in terms of quality, safety,

compliance with standards, etc. But it also requires that States respond to the private sector's needs by providing public goods, supporting the articulation of value chains, and resolving other coordination problems. Additionally, taking advantage of these opportunities in an inclusive way requires that States provide constant support, invest in technical assistance and extension programs, provide financing, and support cooperative efforts, both by strengthening small-producer cooperatives and partnerships and by attracting new anchor companies in order to be able to scale the models in a way that enables the inclusion of small producers. The success stories featured in this report—selected from hundreds of cases submitted in response to the project's call for submissions—show that all of this is possible. It is a matter of getting down to work.

2

# Opportunities and Challenges to Add Value to Exports

## A Review of the Different Strategies of Agrifood Enterprises in Latin America


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This chapter describes the main business strategies to add value to agribusiness exports, as well as the conditions of the agrifood system that foster their development.

Global food demand is becoming more and more sophisticated as consumers increasingly value certain characteristics of goods or the way in which they are produced. Among other considerations, consumers are paying greater attention to issues related to food safety, health, environmental protection, and decent working conditions. These values translate both into consumers making greater demands regarding the products they buy and a greater willingness to reward those characteristics in their consumption decisions. Gradually, investors are also demanding that the companies in which they invest comply with more requirements. Governments, in turn, are establishing mandatory compliance requirements to guarantee various safety standards—the level of which is also rising—along with plant and animal health standards.

This scenario poses new challenges to agrifood companies, but it also opens up new opportunities for upgrading and adding value. To take advantage of these opportunities, firms develop value-adding strategies for their products, aiming for the kind of "customized competitiveness" that will enable them to meet the new demands (Reardon and Flores 2006). However, firms operate in an agrifood system in which they interact

with suppliers of raw materials and services, and government institutions. Therefore, their value-adding strategies are conditioned by how these systems operate, while at the same time contributing to the systems' dynamics.

This chapter provides an overview of the main business strategies observed in the project's case studies to add value to agribusiness exports, as well as the conditions of the agrifood system that foster their development. A central component of these strategies is linked to the type of product that the company decides to offer to international markets and its innovation efforts to give its products the characteristics those markets demand. In order to adapt to the growing needs and demands of external markets, companies must innovate with their products to achieve the necessary upgrades. These innovations can be aimed at satisfying demands regarding the physical or symbolic attributes of the products, identifying who produced the products and how, and adjusting the time of year when the products are offered in order to achieve greater differentiation and, therefore, greater value. On other occasions, as in the case of goods with little differentiation—many of them commodities—companies simply seek to comply with the basic requirements imposed by international markets, which, even in these circumstances, entails product upgrading challenges.

Each type of business strategy to add value to exports requires support from different elements of the agrifood system. Standing out among these elements is public goods. In particular, the strategies used show that the State has at its disposal a wide variety of actions and instruments to enable and enhance business strategies to access export markets. For example, companies that export commodities will absolutely need a competent authority for sanitary or phytosanitary control, as well as the capability to negotiate international protocols in processes aimed at opening new markets. Thus, companies that base their internationalization on derivative products will also benefit from the proper functioning of institutions dedicated to technological innovation or marketing promotion. For this reason, in the analysis of the different strategic options open to enterprises, each strategy's need for public goods is identified. Understanding the types of strategies that agrifood enterprises can undertake to add value to their exports and identify the public goods necessary to enhance them makes it possible, from a public policy perspective, to prioritize resources, establish action plans, and build effective areas of interaction, both public-private as well as within the public sector, to coordinate their implementation.

Although defining the product to be offered is key to business strategies for internationalization and is emphasized in the next section, other components of these strategies are equally relevant to achieving success in international markets. The first of these is the choice of the marketing channel enterprises use to reach external markets. The second (although generally limited to larger companies) is investment abroad to produce the goods to be exported and to market them. These two components are discussed in the second section of this chapter.

## 2.1 Strategies to Add Value

Agrifood companies follow different strategies to add value to the goods they export. This chapter identifies six types of value-adding strategies:

**Value-adding strategies for fresh products:**

A. Complying with basic requirements of foreign markets
B. Obtaining credentials for product attributes
C. Developing products with attributes that are more highly valued
D. Taking advantage of a time window

**Value-adding strategies for processed products:**

A. Developing derivative products
B. Differentiating by brand

In practice, firms do not necessarily follow these strategies "purely," but rather tend to combine elements of several of them. However, the strategies discussed here are useful as stylized representations of the main actions that companies take to implement their actual strategies.

All value-adding strategies involve some type of innovation in the products—whether new or established—that companies offer on international markets. These innovations can include varying degrees of novelty. There are companies that introduce innovations worldwide, such as new varieties of fruits or unique industrial processes to produce derivative products. More often, however, companies only innovate for the local market. Sometimes this type of innovation needs to be accompanied by changes in the existing agrifood system—including the creation of public goods and the provision of new inputs—that these same companies are in charge of driving. Finally, the vast majority of companies simply adopt innovations that have already been introduced by local competitors. However, even this forces them to alter and professionalize their operations. Such is the case, for example, of companies that begin to use fruit varieties already present in the country, or companies that adapt modern cold storage systems for meats. Regardless of the degree of novelty of the innovation, all innovations entail the addition of value and prompt changes in how a firm operates.

All value-adding strategies involve some type of innovation in the products—new or established—that companies offer on international markets.

Depending on the case, implementing the six types of strategies can be more or less complex in terms of business capabilities. For example, a brand differentiation strategy requires certain skills—such as understanding the external market and managing

a communications strategy—that are often more complex than the skills required to adopt some certification protocols. More generally, it is common for there to be some degree of sequence to acquiring the capabilities to add value. The ability to comply with basic export requirements is without question a necessary condition for implementing any of the other strategies, and the professionalization of the organization that goes along with such compliance can be a crucial springboard for other types of innovation. Despite this, it is not possible to rank the strategies by complexity or amount of value-added they generate, as this is determined by the particular circumstances of each case.

### 2.1.1 Value-Adding Strategies for Fresh Products

This section identifies four strategies for fresh products: (1) complying with basic requirements of foreign markets; (2) obtaining credentials for product attributes; (3) developing products with attributes that are more highly valued; and (4) taking advantage of a time window. The elements that these strategies have in common are associated with the need to develop skills related to the primary activity—such as agronomic or livestock research—or the adoption of good practices in field work. At the same time, the strategies require a series of public goods that support production and export of these goods, such as agricultural research and extension, sanitary and phytosanitary control, international negotiations, and quality infrastructure.

#### *A. Complying with Basic Requirements of Foreign Markets*

Exporting forces the company to meet the basic requirements of foreign markets, even when exporting a commodity. The company must meet the mandatory requirements imposed by the authorities of the destination countries. The requirements are multiple and often vary by product, but generally include that the enterprise be registered and authorized as an exporter and that it follow specific production procedures, including limits on the use of certain inputs, quarantine treatments for fruits, and cold processing for meats. The company must also follow the commercial requirements of the clients in each market to which it exports, such as specifications regarding products (size, color, taste in fruits, or leanness and homogeneity in meats), production processes (such as good agricultural practices or International Organization for Standards requirements), or commercial standards (including the signing of contracts or after-sales service guarantees).

Companies whose strategy is to meet these basic requirements identify what is needed to export, including bureaucratic issues, quality requirements, and ways of communicating with customers. Based on this knowledge, they adopt new practices connected to, for example, relationships with suppliers, quality control of production, and forms of marketing. Likewise, reorienting the business toward exports usually

requires creating new roles on the company's organizational chart, adding employees with experience in foreign trade, or retraining staff.

Compliance with the mandatory requirements of destination countries requires that some public goods be provided sine qua non by the public sector, such as the opening of sanitary and phytosanitary markets, licensing facilities, and the certification of compliance with export requirements. Other public goods that support this strategy are also usually provided by public entities, such as agricultural research and development institutes and extension organizations, which work to find new varieties and methods of cultivation and animal management that are better adapted to the requirements abroad. However, in some cases, these public goods can also be provided by producer groups or technical working groups, such as the CREA (*Consorcio Regional de Experimentación Agrícola* – CREA) groups, which have done important extension work in Argentina and Uruguay. Another relevant example is the development of technical teams to improve production practices in the Argentine pork industry. Likewise, thanks to the export growth of this sector, a technical group composed specifically of export meatpackers (Grupo de Exportadores Porcino Argentino) was established to share good industrialization practices for export.

### Changing Operations to Grow Abroad: The Cases of Tutto Porky's and Corporación Agroindustrial Amazonas in Argentina

Tutto Porky's, an Argentine meatpacking firm that vertically integrates primary production of pork, is an example of implementation of the strategy focused on compliance with the requirements of foreign markets. Traditionally focused on the domestic market, this meat processor recently began to export to the Russian Federation and China. Tutto Porky's took this step because Argentina's agrifood system for pork began to shift toward exports, making essential public goods such as sanitary protocols available to the sector. To take advantage of the opportunity, the company made numerous changes to its operations. For primary production, it ensured that diets and veterinary treatments did not leave traces of antibiotics unacceptable to the destination markets. At the industrial stage, changes were made to the meatpacking plant facilities, including paving the roads on the company's land. At the packaging stage, the firm implemented processes to ensure that it complies with the label requirements of governments and its customers. Thanks to these actions, Tutto Porky's went from exports worth US$0.9 million in 2019 to exports worth US$6.5 million in 2020.

The case of the Corporación Agroindustrial Amazonas (CAA), a Bolivian company that processes and markets Brazil nuts, also illustrates the need to incorporate innovations in facilities and processes to meet the basic requirements of markets abroad. The company exports 95 percent of its production in bulk, with the European Union being its main destination market. To do this successfully, CAA had to make changes

to how it processed and marketed Brazil nuts. In terms of processing, the company intensified its quality controls. This included illuminating the nut sorting areas with ultraviolet lighting to detect aflatoxins, a type of mycotoxins that can have harmful effects on human health and for which the European Union has established maximum limits in food. In terms of marketing, in 2007 CAA opened a subsidiary in Germany, at that time its largest consumer market, which allowed it to better control distribution to its customers in Europe and manage quality complaints, as well as better understand its customers' preferences.

### Reorienting the Agrifood System toward Exports: Argenpork and the Cámara Argentina de Productores de Cerezas Integrados in Argentina—The Role of the Pioneering Firm

An agrifood system that is oriented toward supplying the domestic market may not be able to support companies that want to export. In this situation, taking advantage of the opportunities offered by external markets requires reorienting the agrifood system. This reorientation means that the State must establish and provide the public goods that are essential for export, such as sanitary protocols or a system to certify exports. Likewise, it also means that the private sector has to develop practices that work well with exports.

This reorientation does not happen automatically. On the contrary, it is common for a company (or association of companies) to play the role of pioneer, mobilizing the agrifood system to develop those goods and services without which exporting is not feasible. Thus, the pioneering firm plays a key role in convincing the public sector of the opportunity presented by internationalization of the sector so that it prioritizes the necessary actions. At the same time, the pioneering firm tends to become a "partner" of the public sector in the process of developing certain key public goods, such as sanitary negotiations or the implementation of export protocols. In this way, the pioneer company can help the government in ways such as setting an agenda of priorities in terms of markets and products to be negotiated. Additionally, it can help adequately assess the sector's capability to negotiate commitments with other countries that companies can then sign onto.

In cases where the agrifood system is oriented toward the domestic market, it is common for a company (or an association of companies) to play the role of pioneer, mobilizing the system to develop those goods and services without which exporting is not feasible.

Reorienting the agrifood system toward exports entails realigning the activities of a good part of the actors that make up the system. Once the feasibility and profitability of exporting are clear, and the public sector has decided to support an export agenda,

suppliers of inputs, technology, logistics, and storage begin offering their customers new products and services, or products and services with different characteristics than the ones they provided before. At the same time, the pioneer company can become a role model, encouraging other companies to export. An agrifood system reoriented toward exports also encourages the formation of technical groups that contribute to different aspects of the export process. In this way, it also prompts the reorientation of business associations toward exports, and those associations can become important interlocutors with the public sector within the framework of new areas of public-private interaction.

Argenpork, an Argentine pork export consortium, played this pioneering role. The consortium was established to promote Argentine pork—traditionally oriented to the domestic market—as an export product in the world's leading markets. To achieve this, Argenpork had to build a business large enough to break the inertia favoring the domestic market, shifting the entire value chain over to an orientation on exports. From the inception of the consortium, this vision led it to play a coordinating role in the value chain. Its clarity regarding its exporter objective allowed Argenpork to identify the public goods needed. Thus, it first worked with the health authority—the National Service of Agrifood Health and Quality (*Servicio Nacional de Sanidad y Calidad Agroalimentaria* – Senasa)—in the negotiations on opening the Chinese market, which was secured in 2019. As part of this activity, Argenpork contributed to the eradication of pork-related diseases in Argentina and provided information on the private sector's capability to comply with the points under negotiation. Once the Chinese market was opened, the company played an essential role in founding and operating the Argentine Pork Export Group (*Grupo Exportador Porcino Argentino*), which helped with the dissemination of information and know-how on compliance with the protocols. With the Chinese market consolidated, the sector was able to present the public sector with an agenda for future international negotiations consistent with its capability to take advantage of new opportunities. Thanks to this reorientation toward exports, the pork sector went from averaging US$13 million annually in exports during 2015–2018 to US$65 million in 2020, with Argenpork exporting 30 percent of the total.

A similar case featured the Argentine Chamber of Integrated Cherry Producers (*Cámara Argentina de Productores de Cerezas Integrados* – CAPCI). Cherry producers located mainly in the Patagonian region formed CAPCI to have an institutional actor to interact strategically with the public sector with the aim of opening export markets, especially China. CAPCI producers knew that for the negotiations to be successful, they had to work with Senasa to improve phytosanitary controls on their farms. Thus, CAPCI organized training sessions for producers and forums for transferring know-how between experienced and less experienced producers. In 2018, an agreement was signed allowing the first exports to China, a milestone that also prompted other companies not associated with CAPCI to reorient themselves toward exports. The hard work of the

producers and of Senasa led to Patagonia being recognized by Chinese authorities as a region free of the fruit fly plague, thus allowing Patagonian cherries to be exported without being subject to quarantine treatments that damage the quality of the fruit.

### *B. Obtaining Credentials for Product Attributes*

Another international integration strategy used by a large number of agrifood firms is innovation to obtain credentials for product attributes. These credentials are mechanisms that producers, processors, or marketers use to make buyers aware of unobservable characteristics in terms of how the products are produced, prepared, and manufactured, as well as how raw materials are supplied for the products and how they connect with the environment and engage with workers and the community (Alwang et al. 2021).[1]

Companies have several ways to obtain attribute credentials. One of the most common is by obtaining internationally recognized certifications, of which there are five broad groups:

1. Certifications linked to the primary production process (e.g., good agricultural practices, biodynamic agriculture, regenerative agriculture, organic production) and industrial processes (e.g., good manufacturing practices, British Retail Consortium)
2. Certifications related to the management of the company's human resources (e.g., Global Grasp, SMETA)
3. Certifications associated with ways of relating to actors in the value chain (e.g., Fairtrade)
4. Certifications associated with the form and intensity of the use of natural resources (e.g., Rainforest, FSA-SAI, ISO 14044, ISO 14046, ISO 14067, Spring), including those combining social and sustainability aspects (e.g., B Corporation)
5. Certifications associated with the specific requirements of cultural groups (e.g., Kosher, Halal, vegan).

Companies that follow this strategy often have certifications for multiple product characteristics. In general, they initially acquire the most in-demand certifications for primary production, such as the Global Good Agricultural Practices (GlobalG.A.P.) certification. Then, once they professionalize the practices and processes regulated by these certifications, they seek to obtain more specific ones, such as organic production or Fairtrade, valued by certain specific market niches. The company that adopts this strategy obtains the benefits not only of recognition of the credential, but also those derived from better organization of its productive, marketing, and labor practices,

[1] Global supermarket chains have played a key role in developing credentials. More details can be found in Henson and Reardon (2005).

professionalizing the organization and making it more willing to adopt more complex certifications.

The requirements to obtain internationally recognized certifications are standardized, allowing companies easy access to information about the processes they must implement to obtain them. In addition, most certifications can be obtained in the local market through global certifiers, which usually have local offices in charge of conducting audits. Obtaining attribute credentials requires developing a consistent and detailed work plan to successfully adopt the protocols associated with each of the certifications. Although obtaining a certification may require investments and changes in routines, following the protocols for a certain amount of time practically guarantees eventual certification. This process is facilitated by a well-developed market of consultants that specialize in this type of certification. An unusual case is that of the Nicaraguan firm Sol Orgánica, which was a pioneer worldwide in obtaining the Regenerative Organic Certification created by Patagonia Provisions, a specialized store in the United States.

Although obtaining a certification may require investments and changes in routines, following the protocols for a certain amount of time practically guarantees eventual certification.

Nevertheless, the strategy of obtaining credentials through certifications can present significant challenges for organizations that work with small producers such as cooperatives, small business groups or anchor companies. Companies that work with small suppliers must coordinate getting the certifications by establishing extension mechanisms, obtaining resources to finance the productive changes involved in the certifications, and even financing those changes, which is practically impossible for small producers. In some cases, group certification strategies are developed, generally led by anchor companies or cooperatives. In the cases where this works, the anchor company or the cooperative holds the certification. One of the most frequent arrangements is for the cooperative to pay for the certification while small producers handle some of the required investments, such as perimeter fences. In these cases, producers can only export the product as certified through the holder and not third parties, to whom they can continue selling without the label indicating the differentiating attribute.

Obtaining certifications requires that the quality control system works well together with the support infrastructure. For example, the existence of laboratories to carry out the required tests, and of accredited certifiers, makes it possible for firms to obtain globally recognized certifications. An organized national quality system can also make human resources available for company training and provide an effective information system on the changes required in the target markets. Likewise, agricultural extension programs are important to communicate the good practices required, and those

programs are in many cases provided by anchor companies or cooperatives, although the State sometimes also contributes by financing the certification.

### Attribute Credentials that Open Doors: The Cases of Corporación Fortaleza del Valle in Ecuador and Mi Fruta in Chile

An example of an organization that has followed this strategy is Corporación Fortaleza del Valle, an association of small organic cocoa producers in Ecuador. This association obtained organic and Fairtrade certifications through which it has managed to export to developed countries that value products obtained and marketed from settings that ensure protection of the environment, employ sustainable agricultural production methods and respect the need for decent working conditions.

Mi Fruta, a Chilean group of small family farms that produce table grapes and raisins, has also developed a strategy based on marketing its products that are certified with international credentials. Mi Fruta was created under a program financed by the Production Development Corporation (*Corporación de Fomento de la Producción* — Corfo) that sought to put small family farmers in contact with international fair trade marketing channels so that they could export without intermediaries. Thus, Mi Fruta managed to obtain the Fairtrade and GlobalG.A.P. certifications. Currently, it is seeking to certify Halal and is developing a new measurement of its carbon footprint in order to certify it.

Independent of the attribute credentials obtained through global certifications, there are certifications specific to countries or regions of a country that highlight particular local attributes . In contrast to global certifications, "national certifications," which include seals, appellations of origin, and geographical indications, are organized by both national and regional governments and by the private sector itself. In some cases, such as the Argentine Food Seal, this type of national certification can be a starting point for companies to gain access to global certifications in the future. These types of certifications also require a significant amount of work on positioning in destination markets, which means having specific resources to understand consumer preferences and how to respond to them, as well as an effective communications strategy to explain the differentiating attributes highlighted by the certification. National certifications include Uruguay Natural, All Lemon in Argentina, and the Denomination of Origin of Royal Quinoa in the Southern Altiplano of Bolivia.

### Traceability Systems versus Global Certifications: The Cases of Cotagro in Argentina and the Instituto Nacional de Carnes in Uruguay

Sometimes a company's attributes can be exhibited through mechanisms that do not involve the certifiers. Specifically, with the increasing affordability of "agtech"—used for obtaining, processing, and storing information on field characteristics and conditions

as well as on production, processing, and logistics—strategies are being devised to obtain attribute credentials that dispense with traditional certifiers. Within these solutions, traceability systems can play a central role by providing the customer with relevant information about the products to guarantee that they have the attributes the customers seek. Thus, the chickpea producers that are part of the Cotagro cooperative in Argentina are developing a traceability system that seeks to eliminate the use of global certifications.

Traceability systems can also complement certifications by providing buyers with all the necessary information about a product's journey, including where it was harvested, stored, and packed. More generally, they can be used as a platform to relatively easily include any information that may be of value to the markets.[2] With demand for environmental information increasing, traceability systems can be an effective way to for provide information showing, for example, that fields used for production are not the result of deforestation, or that water consumption is sustainable. These systems are also able to provide consumers with direct, fast, and reliable information at the moment of consumption. For example, Uruguay's National Meat Institute (*Instituto Nacional de Carnes* – INAC) has a traceability system for beef that allows consumers in China to know in which field the cow whose meat they are eating was raised by using a QR code brought with the plate on which it is served.

### *C. Developing Products with Attributes that Are More Highly Valued*

Companies can develop attributes in products that give them the differentiating attributes most valued by retailers and consumers, but which are not necessarily reflected in the attribute credentials discussed earlier. The innovations generating these new products may be related to their functionality (flavor, ease of peeling or juice content in a fruit, leanness in a meat), durability (shelf life prior to consumption, or resistance to cold), or other visible characteristics (size, color, aroma). To follow this value-adding strategy, the company must be aware of consumer demands—for example, consumer preference for varieties of seedless grapes, larger berries, easier-to-peel tangerines, more or less sweet blueberries, or smaller portions of animal meats. For fruits, providing consumers with products that have the most valued attributes can be achieved by importing and adapting species that do not naturally occur in the area. Also, the company can look for new attributes by improving its existing products, developing new varieties, or undertaking other innovations.

In agriculture, a number of steps must be taken to develop products with more valued attributes. These steps include researching different varieties of plants, understanding

[2] The usefulness of traceability systems goes beyond credentialing strategies, as they can be applied across all six types of product innovation strategy.

how plants adapt in different climates and soils, and having the know-how to conduct variety cross-breeding experiments or carry out adaptation and reproduction tests in nurseries. The efforts required for adaptation are minor in terms of investment and time when compared to developing improvements or novel characteristics. Adaptation is therefore a simpler process than improving existing varieties, which in turn is easier than developing new varieties, a process that can take more than a decade.

To undertake any kind of innovation, companies must work in both the laboratory and the field. Broadly speaking, research begins in the laboratory to obtain the seeds that have the desired characteristics. New varieties can be obtained using various techniques, including such methods as spontaneous mutation, genetic selection, and hybridization or gene editing. Once the new variety is developed or becomes available in the country, the next challenge is to seek the technological package that best suits the new variety. This requires having multiple fields set aside for testing the different productive options (sowing times, applications, irrigation) to establish which is the most efficient. Finally, the multiplication stage is carried out in nurseries, allowing for quick replication of the selected seedlings.

Due to their nature as a public good, public entities such as agricultural technology centers or research centers and universities usually provide the services involved in this type of innovation. In some cases, the support provided is limited to adapting varieties to local conditions, while in others it also includes improving and developing new varieties. However, companies have often resorted to outside technological support from domestic or foreign private universities or research centers. If public institutions do not function properly to support the private sector, large companies may be the only ones that have the capability to undertake such innovations, posing the risk of concentrating production in a handful of companies.

If public institutions do not function properly to support the private sector, large companies may be the only ones that have the capability to innovate.

### An Alternative to Researching and Developing Varieties: The Case of Consortiums

An alternative form of organization to carry out research and development on new varieties is producer consortiums. These are groups of companies formed to coordinate their activities with scientific research teams to develop new varieties or improve existing ones. There are different arrangements of consortiums in the world involving technology centers, universities, and companies of multiple origins. In Latin America, several companies participate in international variety development consortiums. One example is IFORED, an international consortium for the launch of new varieties. This consortium recently developed the range of Kissabel apple varieties that have an intense red-pink

color in the pulp and for which there is growing demand in the European market. The members of these consortiums hold the license to produce the newly developed fruits. At the same time, the consortium controls and limits marketing of the new varieties in order to keep them as niche products and maintain their price differential.

The Chilean company Hortifrut, for example, has developed the Mighty Blues varieties of blueberries (a trade name given to blueberries with a diameter over 19 mm) by working with various leading global research centers and universities. This has enabled the company to increase productivity and meet the requirements of the most demanding markets. Hortifrut has been working on genetics programs since 2001, developing its own varieties or licensing the use of varieties developed by others, particularly from abroad. Since 2005, it has had one of the largest genetics improvement programs for blueberries in the world, in partnership with Michigan Blueberry Growers, the largest blueberry grower cooperative in the world. As of 2019, this program had patented 13 proprietary varieties to which only Hortifrut producers have access. Thanks to these genetic improvements, Hortifrut sells the Mighty Blues in the United States, obtaining greater productivity and a 50 percent higher price.

### A Successful Case of Establishing Public-Private Consortiums in Chile

In Chile, there are several public-private consortiums. For example, participants in the Fruit Technology Consortium (*Consorcio Tecnológico de la Fruta*) include Chile's main fruit producing and exporting companies, the Pontificia Universidad Católica, and, from the public sector, the National Institute for Agricultural and Food Research and Technology (*Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria*). The consortium has multiple sources of public financing, including the Foundation for Agrarian Innovation (*Fundación para la Innovación Agraria*), an innovation agency of the Ministry of Agriculture; the Ministry of Science and Technology; and Corfo. Another consortium is Biofrutales, funded by Corfo, in which private companies, universities, and research centers also participate. The development of the Maylén table grape—classic flavor, no seeds, and a long post-harvest life—is an example of the development of a variety by Biofrutales. The Mi Fruta company benefited from the consortium's work when it was able to exploit this variety by paying the corresponding royalty to plant it. In Argentina, Patagonian Fruits, a producer and marketer of apples, pears, and kiwis, based its internationalization strategy on participation in IFORED and on obtaining licenses for varieties patented by several international consortiums (Feno, Better Fruits, the consortium of the University of Washington), including the Cosmic Crisp apple variety, a cross of varieties that can be kept in cold storage for up to a year.

It is also important to understand how to communicate the new attributes obtained and their benefits to customers. Here there may be a need for support from government agencies (particularly export promotion agencies) or groups of exporters with

experience in promoting products in dynamic markets. For example, Chinese consumers often do not look for the same attributes of beef that are valued in other markets such as the United States or Europe because of their long tradition of eating beef sliced and cooked in woks with vegetables. In response to this, Argentine and Uruguayan meat processing plants conduct promotional campaigns in China on how to cook and eat beef "Western style." In the case of Uruguay, these activities are usually coordinated by INAC. In Argentina, part of the effort is carried out by the ABC exporter group and the Institute for the Promotion of Beef (*Instituto de Promoción de la Carne Vacuna*).

### *D. Taking Advantage of a Time Window*

Fruits and vegetables have a natural window during the year to reach the destination market that depends on factors such as location (particularly latitude and altitude), production, weather conditions, varieties produced, and production techniques. This value-adding strategy involves placing fresh fruit and vegetable products on the market at times of the year when the supply is low. With this strategy, companies can take advantage of the higher prices paid during that time window. Sometimes, when the number of producers in the window is small and a company has sufficient scale, market dominance during that period of time results in greater bargaining power with supermarkets, making it possible to bypass intermediaries. At the same time, following this strategy frequently leads producer companies to extend the range of time during which they work with buyers, establishing stronger business relationships, since buyers prefer to deal with fewer suppliers.

Businesses looking to take advantage of time windows have a number of ways in which to do so. One is to investigate whether it is possible to grow crops in non-traditional time windows. For example, companies can look for different parts of the world or ecological layers in the same region with different biological, climactic, or even logistical characteristics to produce the fruit or vegetable in a way that allows them to reach the markets during relatively unoccupied time windows. Another way to pursue this strategy is to develop varieties that can be produced at the desired times and are adapted to the natural conditions (soil, climate, etc.) in the area where they are to be grown. Sometimes, companies that produce in a new time window are later able to expand it to the previous or subsequent weeks or months thanks to the know-how acquired, for example, in field work.

The knowledge that companies require to implement this strategy is similar to what is required for the strategy to develop products with more valued attributes . Thus, companies need to have a thorough knowledge of the varieties in different parts of the world and of their agronomic characteristics. At the same time, they need teams to constantly monitor the global market and the innovations of competitors. To develop this strategy, companies need to work in both the laboratory—to find the best possible

variety—and in the field—to develop the right technological packages to go with that variety. Companies must also ensure the availability of the necessary infrastructure (which is likely being used for other seasonal fruits), including transportation, warehouses, packaging, and the attention of the health authority. Finally, developing business skills to deal directly with supermarkets can enable companies to reduce middleman costs.

#### Organizing the System to Enter a New Time Window: The Cases of Camposol, Inka's Berries, and Westfalia in Peru

The needs for public goods of companies that follow this strategy are similar to those of companies that focus on the search for more valued attributes. In particular, the work of agricultural technology organizations, research centers, and universities is central. As with the most-valued-attributes strategy, companies can partner to develop varieties when the agrifood systems are not in a position to provide the necessary public goods. This was the case in Peru with the collaboration between Camposol, the largest agro-export company in the country, and Inka's Berries, the pioneer company in bringing blueberries to Peru and generating new blueberry varieties. Camposol's growth was based on taking advantage of time windows for various products (first avocado and then blueberry), thus achieving the ability to negotiate directly with supermarkets. Some experiences show that if public institutions are not functioning properly, large companies will probably be the only ones in a position to develop this strategy.

Westfalia is another large multinational company that used this strategy, in its case to market Peruvian avocados. The company saw that avocados grown by small producers in the highlands had significant growth potential because they are harvested before the traditional export window opens for coastal growers. This early harvest would allow Westfalia to get higher prices in external markets. However, to take advantage of the opportunity, the company needed to work with the small mountain producers who owned these lands on implementing the agricultural practices required abroad. Westfalia managed to get many of them to adopt the standards, securing certification under the group GlobalG.A.P. standard. To do so, it provided them with seedlings, technical assistance, and financing. Currently, 97 percent of Westfalia's exports come from mostly small producers in 14 regions of Peru.

### 2.1.2 Value-Adding Strategies for Processed Products

Although developing value-adding strategies for processed products requires some of the same productive and marketing capability as fresh product strategies, they also require capabilities specific to innovation in these types of products. Specifically, the necessary knowledge is linked closely to industrial processes and brand development. Thus, firms that work with processed products benefit from public goods intended to

support industrial processing, such as research and dissemination of industrial processes, as well as the establishment of technological links between public and private actors. Also particularly relevant are public goods that develop international marketing capability through trade promotion agencies or specific competitiveness support organizations.

### *A. Developing Derivative Products*

The processing of primary products for the domestic market is widespread and it is not uncommon for export, but there are still many opportunities to add value by manufacturing derivative products to the specifications of the global market. Although brand development is not an essential aspect of this strategy, these products usually incorporate differentiating attributes that are valued by the client—usually another company that uses them as an input. In terms of technology, companies can obtain derivative products using industrial manufacturing processes developed by the firm itself; by purchasing new technology abroad; or by adopting widely used technology. The latter is the case for fruits where, for example, widespread production processes are usually used across different types of fruits (drying, extracting juice, oils, aromas, pulp), but may require a certain degree of adaptation depending on the case. For other products, such as fish oils, firms can develop their own processes specific to their needs.

Derivative product strategies may involve competing with demand for the input as a fresh product. With fruit, for example, most production processes use fresh fruit as an input that could potentially be in demand as a final product—as in the case of juices or purees. However, the production of derivatives is often complementary to the marketing of fresh fruit, since derivative products are usually made from fresh products that do not meet the quality standards required by foreign markets (such as color or size) and are often discarded. There are other production processes in which the derivatives are obtained from parts of the fruit other than those constituting its main use. For example, some products derived from coffee are made from the pulp that covers the bean.

Derivative products can benefit from different levels of value addition. In the most basic case, the firm produces derived products by transforming the fresh product without adding any particular credence attribute or particular characteristic. There are, however, instances when the added value is greater. Sometimes the derivative product is made from fresh products that have credence attributes such as organic or Fairtrade certifications. In this case, the firm will need to ensure that its inputs have the required attribute credentials and that the customer is aware of them. Another way to obtain derivative products is by developing specialties—that is, products whose characteristics meet specific customer needs, such as lemon essential oils used as a raw material to produce different aromas and flavors, or dehydrated fruits added to a ready-to-eat mix. To develop specialties, the producer must be in fluid communication with clients so

that it can adapt its products to their needs. In these cases, the challenge is not only to meet the specifications but also to understand the latent needs of clients and develop products that meet them effectively. To achieve this objective, a direct and cooperative working dynamic must be established with the client through the organization's relevant areas, such as marketing, research and development, and other production areas.

### Maximizing the Value of Derivative Products: The Cases of Biofortune in Honduras, Gihon Laboratories and Citrusvil in Argentina, and Sol Orgánica in Nicaragua

One of the most interesting opportunities posed by this type of strategy is transforming waste into inputs for high-value products. This is the case for Biofortune in Honduras, which, thanks to the introduction of innovative industrial processes, now transforms coffee leaves and pulp—disposal of which contaminates water sources—into inputs for producing nutraceutical and related personal wellness products. Another case is that of Laboratorios Gihon in Argentina, which developed new industrial processes transforming fish meal waste into oils with Omega 3 and 6, used for functional and nutraceutical foods.

Another case in which derivative production does not use waste products but, rather, fresh fruit is that of Sol Orgánica, which produces derivatives of mango, dragon fruit, and other fruits in Nicaragua. The company's communications to consumers emphasize the attribute credentials of the fresh products it uses (that they are grown using organic and regenerative agriculture) and the social benefits. The Argentine company Citrusvil is another example of specialty derivatives production. Although it has traditionally exported derivatives made from fresh products such as lemon juices and essential oils, it has begun to focus on the development of specialty derivative products. To serve this new market niche, Citrusvil set up a research, development, and innovation area that allows it to interact with its clients by offering technical proposals, testing, and prototypes until it arrives at a final product that meets their needs.

Among the most important public goods for supporting companies that follow the strategy of maximizing the value of derivative products are public agencies that provide research, technology, and extension services.

Among the most important public goods for supporting companies that follow the strategy of maximizing the value of derivative products are public agencies that provide research, technology, and extension services. These agencies help companies develop new industrial processes and identify derivatives through basic research and by supporting its application to the companies' specific industrial needs. Given the importance of complementarity between companies and public entities, firms that follow

this strategy are usually connected to national technological or research systems even when they have their own research resources. Such is the case of Gihon Laboratories, which works closely with Argentina's universities, the National Council for Scientific and Technical Research, and the National Institute of Industrial Technology. The company developed and obtained natural biopolymers to produce Omega 3 using waste from fish production and organisms from the marine environment.

Other public goods relevant to supporting this strategy are trade promotion activities, generally organized by specialized agencies that tend to subsidize company participation in international trade fairs in different ways. However, it is less common for such agencies to help companies with early market research or with organizing networking activities with potential clients inside or outside the fairs. Nor is it common in Latin America for these agencies to contribute significantly by providing information that could facilitate product exports—for example, information related to the requirements that must be met for packaging and packaging labels in each market. More generally, in terms of derivative product strategies, it is the lack of support from these agencies that is frequently noted. They typically do not have the capability to identify the fairs or marketing spaces appropriate for promoting the internationalization of derivatives, many of which are intermediate products that do not reach the final consumer directly.

### *B. Differentiating by Brand*

The brand development differentiation strategy consists of a company building and positioning its own brand to market its products in foreign markets. This strategy is often used by companies producing end products. The companies use brand differentiation to communicate directly to consumers regarding both the salient aspects of their identity and the attributes of their products. The companies that follow this strategy invest in branding (visual expression and logos), protecting their intellectual property, and developing an organizational identity that they seek to communicate, often through their packaging. At the same time, they try to develop products or production processes with distinctive attributes. Companies that seek differentiation on the basis of brand must build partnerships with their distributors that allow them to jointly develop the brand in the markets where they operate. They are therefore usually in a position to move directly to the retail sales channel, improving their margins.

Companies that base their strategy on brand differentiation need to have a deep understanding of changing consumer tastes, habits, and preferences in their target markets. This means understanding customers from multiple perspectives related to consumer experiences, which include finding satisfaction from consuming a good from the Amazon or the Colombian jungle or an artisan product that contributes to the economy of vulnerable groups. It also involves knowing the certifications of product

attributes that consumers prefer (such as organic or Fairtrade) as well as the type of packaging that they value (practical use or sustainability of materials, and the information required and how to access it, such as web pages or social networks). These companies also frequently make efforts to evaluate and select the retailers with the potential to market their products.

Companies that base their strategy on brand differentiation need to have a deep understanding of changing consumer tastes, habits, and preferences in their target markets.

### The Advantage of Understanding the Destination Market: The Case of Pacarí in Ecuador

Because this strategy requires close understanding of external demand, it is no surprise that companies using it are frequently led by people who have acquired a tacit knowledge of the idiosyncratic characteristics of the market they are targeting from previous life or marketing experiences in these markets (Artopoulos et al. 2013). Such is the case for the aforementioned Sol Orgánica in Nicaragua and the Ecuadorian company Pacarí, a producer of chocolate bars whose founders used to live in the markets to which they were able to export.

The inherent complexity of this type of strategy explains the relative scarcity of agrifood firms in Latin America that deploy it successfully. As in the case of the derivatives strategy, some companies benefit from the support of public export promotion agencies that provide them with subsidies to attend international fairs. Sometimes the companies opting for this internationalization strategy benefit from training programs—for example, on good export practices, design management, or branding and corporate identity management. However, implementation of these types of programs is notably rare, and no such instances of them were found among the companies examined for this chapter. An essential public good to support this type of business strategy is the development of sector-specific brands and appellations of origin to broadly communicate the characteristics of a country's sector-specific production to export markets.

### A Brand to Achieve Product Differentiation in the International Market: The Cases of Establecimientos San Ignacio and Tealosophy in Argentina and Pacarí in Ecuador

In Latin America, there are cases of companies that use an international internationalization strategy that is based on brand differentiation. For example, Establecimientos San Ignacio produces *dulce de leche* that it sells under the San Ignacio brand in more than 20 foreign markets, thanks to widespread recognition abroad of the quality of the product. Another example is Pacarí in Ecuador, which manufactures its chocolate bars using organic and socially responsible methods and sells them under its own brand

in more than 40 countries. Other companies are targeting ultra-premium segments. Argentina's Tealosophy has positioned itself in high-end niches of the tea market based on its founder's experience with identifying and combining aromas and flavors, providing personalized blends to individuals, hotels, and luxury brands.

## 2.2 Other Components of the Internationalization Strategy

Companies' internationalization strategies include other components that are also relevant to achieving customized competitiveness in foreign markets. This section analyzes the two viewed as most relevant: the choice of marketing channels, and expansion through foreign direct investment.

### 2.2.1 Marketing Channels

The agrifood companies analyzed in this chapter use a variety of channels to market their products. Among the different determinants of company choice, two play a particularly prominent role: the company's stage of development in its internationalization process, and the production scale the company is acquiring in that process. Different forms of marketing entail different fixed costs (e.g., office and staff maintenance) that are justified only by significant export volumes. Therefore, it is to be expected that companies with higher export volumes are able to work with fewer intermediaries.

Along these lines, there is a first group of companies whose export volumes are low and that usually use national intermediaries as their marketing channel. This is often the case for small companies or cooperatives that work with an intermediary in the country of origin. A second group of larger companies—such as the Chilean firm Mi Fruta—manage to export directly, selling their production to international traders or wholesalers located in the destination markets.

A third group of companies is in a position to regularly supply considerable volumes to their buyers and, therefore, can access more direct marketing channels in destination countries in two ways: through receiver purchasing programs,[3] or via the spot market. The purchasing programs establish strict terms for volume, quality, and delivery dates. The main benefit of working with programs, as opposed to placing a product on the spot market, is that they provide more predictability and stability in terms of price and purchase volume, although at the cost of less flexibility in volumes and dates, as well as greater demands on quality. Likewise, with purchase programs, companies have greater certainty with regard to getting paid. In the specific case of supermarkets, access to this marketing channel means a more direct relationship with

[3] Receivers import and distribute the fruit. They can be distributors, wholesalers, or supermarket chains.

the customer and, potentially, greater marketing visibility. However, participation in supermarket programs also places financial requirements on companies, such as non-refundable payments to register as suppliers. Thus, for example, Camposol in Peru allocates around 65–70 percent of its production for sale through supermarket programs, and the rest is sold weekly on the spot market.[4] Argentina's Zamora Citrus, a smaller company, sold for some years exclusively through distributors and wholesalers that operate on the spot market. Now, though, it has managed to channel almost half of its external sales through supermarket programs.

The other determinant that affects the form of commercialization employed is the degree of product differentiation. The more differentiated the exported product, the more convenient it usually is for the producer to use more direct marketing channels. In this way, firms such as Sol Orgánica or Citrusvil work directly with companies that use their products as intermediate inputs to understand and address their specific demands and needs, and thus innovate to add value to their products. The greater the differentiation, the more likely the company is to seek out exclusive distributors to ensure that the product is marketed effectively.

The more differentiated the exported product, the more convenient it usually is for the producer to use more direct marketing channels.

To market its Omega 3 oil in Brazil, the Argentine firm Laboratorios Gihon found that it needed a representative there that could handle low volumes in an environment of multiple national and state regulations and with high logistics costs due to the country's size. Thus, it chose a strategic partner that mainly markets natural products for human and animal nutrition and that also has a network of warehouses approved by the regulatory authorities in strategic locations in Brazil.

In the case of branded end-products, a company must strive to identify and select the right partner to develop its brand in the market. For example, the Argentine firm Establecimientos San Ignacio offers its line of premium *dulce de leche* in specialized stores, protecting and promoting the already established image of a quality product.

Commodity producers tend to work with intermediaries—such as traders or wholesalers—that are not as close to the end customer but achieve greater efficiency in distributing this type of product by transacting in large volumes. In such cases, the producers earn market prices for their products, so proximity to the customer adds little value. However, even when working with traders or wholesalers, export companies must adopt established international market practices. For example, in order to export a commodity like pork, Tutto Porky's had to make improvements to take advantage of

[4] Thanks to its volume, Camposol was also able to open marketing offices in destination markets, establishing a presence with marketing offices in the United States, the Netherlands, and China to market and distribute the products.

the opportunity to expand abroad. The Argentine firm created a specific unit to respond to the demands of traders and government regulations by developing, among other things, technical product fact sheets and labels that include relevant information about the product and its compliance with sanitary requirements. Likewise, it implemented processes to ensure that commercial commitments were aligned with the production process and could thus be met.

### 2.2.2 Foreign Direct Investment as a Means of International Expansion

Companies can invest abroad in primary production, industrialization, or commercialization. Such expansion can involve producing the same product abroad that they already produce in their home market or diversifying into other products. In any case, expanding through foreign direct investment is not necessarily tied to a particular type of strategy in terms of product, but rather involves the alternative or complementary choice of several such strategies. The motives identified in the cases studied vary from reaching economies of scale and scope to improving market access conditions.

Among the companies studied, CAA, the Bolivian processor and marketer of Brazil nuts, has been making foreign direct investments for 15 years. CAA has established subsidiaries in Germany (2007), Peru (2010), and the Republic of Korea (2018). While the subsidiaries in Germany and Korea are commercial, CAA founded a company in Peru to expand its processing capability. The motives for investing in Peru were several. First, CAA sought to reduce risk, given the perception of political instability and lack of legal certainty in Bolivia. Second, the company set out to access foreign markets with better conditions under the free trade agreements Peru had signed with multiple countries. In 2018, in response to the growing consumption of dried fruits in the Republic of Korea—and of Brazil nuts in particular—the firm opened a commercial subsidiary there. CAA's Korean subsidiary is fully supplied by the Peruvian subsidiary and pays no tariffs. From this hub in the Republic of Korea, the company distributes its products to other destinations in Asia, while it manages distribution to Europe from its subsidiary in Germany.

Gestión de Exportación de Frutas S.A. (Gesex), a Chilean producer, processor, and marketer of fresh fruits, has also used direct foreign investment to increase its international presence. It made its first investments in improving marketing of its products in Europe in 2009. In partnership with another Chilean export company, Gesex established Fruit Grower Alliance BV for distribution in Europe, opening offices in the United Kingdom and the Netherlands. As the company consolidated as an exporter, it opened commercial subsidiaries in the United States in 2011 (Summit Produce, Inc.) and in China in 2015 (Fruit Color). Gesex opened all its commercial subsidiaries in order to learn more directly about each market's dynamics, the fruit receiving business, quality

controls at the destination, and the requirements of its customers. Once these subsidiaries began operating, Gesex was able to improve its distribution and logistics in foreign markets. The company was also able to invest in developing agricultural operations in Peru and the United Kingdom. The Peruvian investment in 2017 allowed Gesex not only to increase its volume of fruit but also to expand the time window during which it could provide it. Likewise, Gesex's investment in 2020 in fields in the United Kingdom through its subsidiary Fruit Grower Alliance BV aims to expand production of cherries for the European market and China.

Taking advantage of a new time window has been one of the main reasons for the international expansion by the Peruvian firm Camposol. As will be discussed in detail in Chapter 3, largely motivated by customer requests, the company expanded to Colombia (avocado), Mexico (blueberries), and Uruguay (mandarins) to extend the time windows during which those products have a presence in their markets. For its part, the Chilean company Hortifrut expanded internationally to increase the scale of its blueberry production. Hortifrut started producing in Peru after recognizing the country's importance in the world blueberry market, given the proper functioning of its agrifood system. Hortifrut found high levels of productivity in Peru—well above those of Chile—due to good weather conditions. In addition, in Peru Hortifrut can take advantage of large amounts of good land with water available thanks to public irrigation projects, such as the Chavimochic project. More recently, Hortifrut has also expanded its blueberry production to Argentina, Mexico, and China.

The Argentine company San Miguel has made investments abroad, but each with a different purpose. Its foreign investment began in 2000 in Uruguay, where it sought economies of scale by acquiring a lemon-producing farm. However, the company also expanded its product offering with the addition of sweet citrus. In response to the growth of South Africa as one of the main lemon-producing and lemon-exporting countries, San Miguel began to produce lemons there in 2008, motivated by lower tariffs and logistical access to the European Union market. The company's activity in South Africa also improved its access to Arab countries. Subsequently, San Miguel made additional investments to acquire fields with citrus orchards, packing plants, and industrial plants in order to produce derivative products. In 2017, the company made investments in Peru, acquiring fields and a mandarin packing facility, as well as farms with table grape vineyards and avocado orchards.

3

# Vertically Integrated Companies


• Piero Ghezzi
• Andrea González
• Ernesto Stein


The case studies on which this report is based included a variety of firms with very different characteristics. Several are large, vertically integrated companies that are among the largest national or even global producers of certain products. Others are anchor companies that work with hundreds or thousands of small producers, provide them technical assistance, and help them connect with international markets. Still others are cooperatives or partnerships formed by small producers to take advantage of economies of scale to compete in these markets.


This chapter focuses on vertically integrated companies—that is, companies that participate in multiple links in the agribusiness value chain. Their production is primarily their own, they manage packing or processing plants, and they have their own commercial channels.


While Chapters 4 and 5 will look at cases involving small producers, this chapter focuses on vertically integrated companies—that is, companies that participate in multiple links in the agribusiness value chain. Their production is primarily their own, they manage packing or processing plants, and they have their own commercial channels.

Companies decide to vertically integrate for a variety of reasons. The first and perhaps main reason is that it allows for greater control over the production and commercial process, with the end customer in mind. Globally, the environmental, labor, social, quality, safety, and other product and production standards required by buyers have grown increasingly strict. For some companies, this means that the transaction costs of dealing with third-party suppliers of raw materials—particularly if the companies

are small—have been rising. This has resulted in a natural tendency for them to deal with fewer suppliers and increase their own production.[1]

All three companies studied in this chapter consider having control over the process to be an advantage. Camposol, the largest agro-export company in Peru, is an emblematic case of vertical integration. The firm has absolute control over its production and commercial process, with all production coming from its own farms. In addition, in recent years, Camposol has integrated forward: 100 percent of its sales to supermarkets are direct. In this way, the company avoids the middleman in the target market and substantially increases its profit margins.

Citrusvil is an Argentine firm that is the largest producer of lemon-based products in the world. Partly for climatic reasons—mainly winds and rains that affect the appearance of the fruit—70 percent of its production is not sold fresh but processed. A good part of it is processed into lemon essential oil, 95 percent of which is purchased by Coca-Cola. Although most (70 percent) of the lemon used for essential oil comes from Citrusvil's own farms, Coca-Cola is asking the company to vertically integrate even further (to 80 percent) to increase control over quality and traceability.

The third company studied in this chapter is Kekén, the largest pork exporter from Mexico to Japan. Kekén is also a vertically integrated company. The only link in the chain in which it allows the participation of third parties is the fattening stage, for which it contracts both peasant-community-owned as well as other businesses.

A second reason for vertical integration is the ability to react quickly to changes in market and demand conditions. For example, working only with its own fields has allowed Camposol to switch out crops very quickly. Thus, whereas in 2011 it had 50 hectares of blueberries, by 2016 it had 1,600 hectares of them. Pulling off this dizzying switchover would have been virtually impossible had it required coordinating the changing out of crops with hundreds of third parties, particularly if they were small producers who are naturally averse to change.

A third reason for vertical integration is related to the "appropriability" problems of buying from third parties. Companies must coordinate closely with suppliers to meet the required standards. If the suppliers are small farmers, it becomes essential to provide them with technical assistance and, potentially, financing. However, in a world where contract enforceability is limited (as in most Latin American countries), at harvest small producers may be tempted to sell to whomever offers the highest price, regardless of who provided technical assistance or financing. This potential appropriability problem incentivizes large companies to work with their own farms—that is, to integrate vertically.[2]

[1] This conclusion is consistent with the literature discussed in Swinnen (2014), which finds that stricter agribusiness standards mean both increasing exclusion of small farmers (when sourcing from large companies is an option) and increasing vertical integration.

[2] As will be addressed in the next chapter, however, there are mechanisms that anchor companies can use to retain their suppliers and mitigate this problem.

Of course, there are reasons why other companies choose not to be fully integrated—for example, lack of access to sufficient financial resources. As will be seen in Chapter 4, companies with broad financial backing tend to vertically integrate, while those with relatively more limited resources tend to work more with third parties. In fact, freeing up financial resources for more strategic purposes is one of the reasons why Kekén subcontracts the fattening stage, which is also the least demanding stage from a technological and strategic point of view, although the company still plays a significant role in the process.

Another reason companies sometimes avoid vertical integration is an emphasis on shared value (or stakeholder capitalism) or image and social responsibility, which can be prized both in the communities where they carry out their activity and by end consumers. Kekén, for example, subcontracts fattening in order to incorporate other actors into the production chain, including peasant communities, which improves its relationship with them.

In general, the trend in recent decades has been towards "vertical dis-integration." Companies in different countries and different sectors specialize in different segments of the value chain. In conjunction with globalization, this has resulted in the emergence of global—or at least regional—supply chains.[3] This also happens to some extent within agriculture, and several companies examined for this report (including Citrusvil, Sol Orgánica, and others) sell inputs to other food processing companies.

Going forward, in the agri-food sector, this trend towards vertical dis-integration observed in many industries will need to be weighed against the challenges faced by independent producers to reliably supply raw materials that meet strict and changing requirements. The evidence suggests that in the absence of public policies to help small producers overcome the "quality hurdle" through anchor companies (as in the vertical associativity model of Chapter 4), or through cooperatives or other horizontal associativity arrangements (Chapter 5), the "market" solution in agribusiness may result in greater vertical integration than in other industries. Chapters 9 and 10 will analyze the types of public goods and policies needed for greater participation of small producers in these value chains.

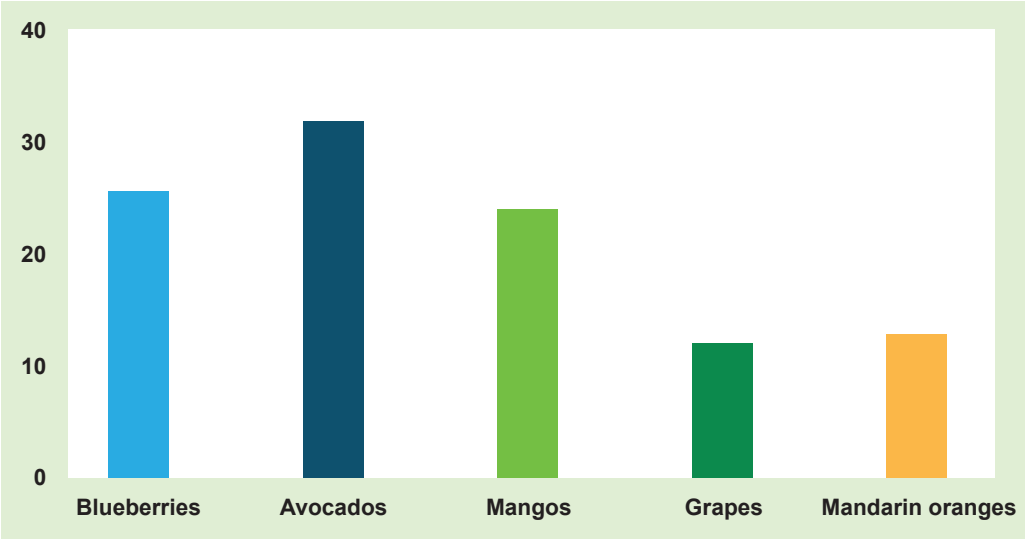
## 3.1 Camposol's Vertical Integration Model: A Strategy for Crop Conversion

Camposol is the largest agro-export company in Peru and one of the largest producers of avocados, blueberries, mangos, and mandarin oranges in the country. It also has a presence in Colombia, Uruguay, Chile, and Mexico. Camposol was founded in 1997 with headquarters in La Libertad, a region in northern Peru. It has benefited from irrigated

[3] Vertical dis-integration is explained, among other things, by the need to specialize in the most essential activities and avoid large fixed investments that could become obsolete due to changing technology, as well as to prevent less efficient units within a company from being subsidized by more efficient areas, among other factors. See Herrigel and Wittke (2004).

lands there thanks to the construction of the Chavimochic Special Project.[4] Among the countries where it operates, Camposol has more than 18,000 employees distributed in the areas of production, processing, administration, and trading, and has about 20,500 hectares of land (with 9,900 hectares planted as of the end of 2020). In 2020, it had sales of more than US$300 million and sold more than 31,900 tons of avocados, 25,600 tons of blueberries, 24,000 tons of mangos, 12,800 tons of mandarin oranges, and 12,000 tons of grapes, all from its own fields (Figures 3.1 and 3.2).

**Figure 3.1 • Camposol Exports by Product in Thousands of Tons, 2020**




Source: Prepared by the authors using data provided by Camposol S.A.

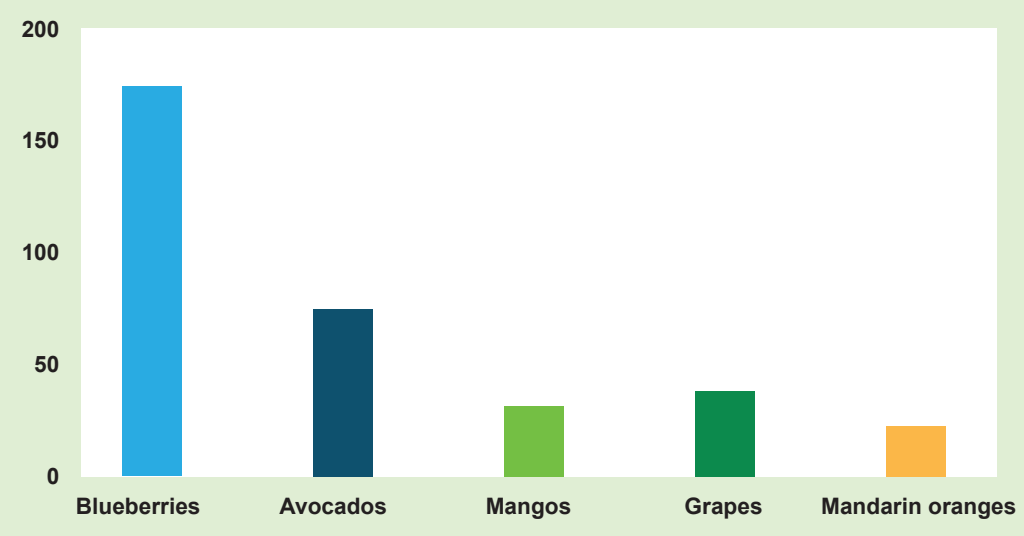
Camposol was founded mainly as a producer of canned and fresh asparagus, the first product of the Peruvian agro-export boom. Producing two annual harvests made it possible for the country—and, in particular, Camposol—to position itself as the world's leading exporter of asparagus, mostly for the European market.

### 3.1.1 Betting on Avocado: Diversification into Crops with High Potential

In 2007, the Peruvian group Dyer Coriat bought Camposol and gave it new life. The 2008 financial crisis revealed the risks of excessive dependence on a single product (asparagus) and a single market (Europe). In response, Camposol began to diversify, expanding both its range of products and number of markets. Additionally, demand for asparagus was

[4] The Chavimochic Special Project is an irrigation megasystem that began in 1967 with Law No. 16667. Its aim is to use the waters of the Santa River to irrigate the Chao, Virú, Moche, and Chicama valleys (hence its name), as well the land between the valleys that was originally desert.

**Figure 3.2 • Camposol Exports by Product in Millions of U.S. Dollars, 2020**




Source: Prepared by the authors using data provided by Camposol S.A.

stagnant. As it was sold mainly canned, it was a non-perishable product, with a low degree of differentiation and small margins. Switching to other products would make it possible to exploit underserved time windows leading to better profit margins.[5] At the same time, many of its asparagus fields were on the downward phase of their yield curve, and it made sense to replace them.[6] Thus, the company decided to expand its product portfolio into fresh products and take advantage of the U.S. market in view of implementation of the free trade agreement between Peru and the United States in 2009.

Initially, the company diversified into avocados, a product with growing demand and insufficient supply. Camposol had started testing avocado in 1999. It was not a natural choice for the desert, next to the ocean, where Camposol's lands are in Peru. Traditionally, avocados were grown at higher than 1,500 meters above sea level and closer to the tropics than to the equator. But with a combination of technology and micro-irrigation, Camposol was able to adapt avocado trees well to the Peruvian coast, with peak yield between May and July.

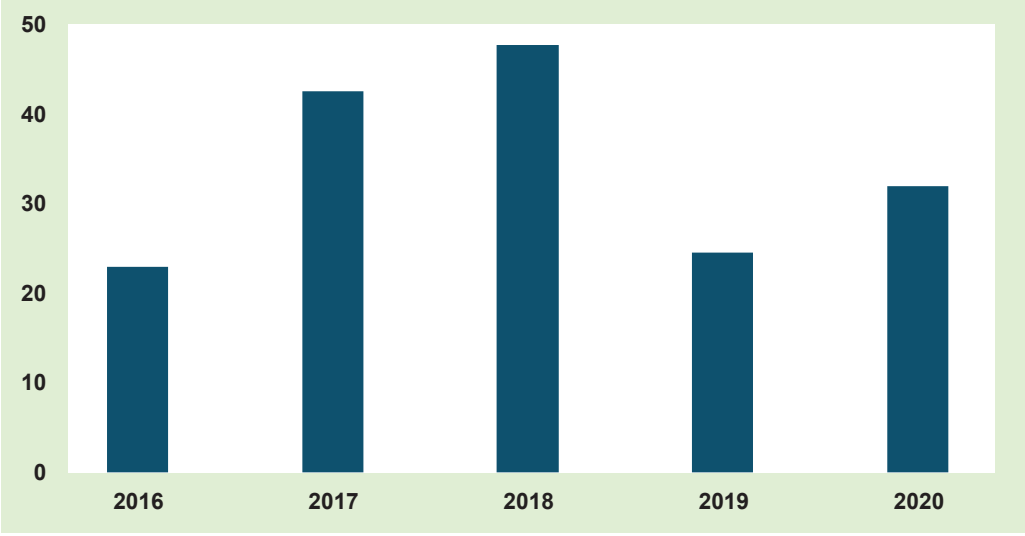
Planting moved forward at a dizzying speed. Between 2008 and 2010 alone, Camposol planted 1,660 hectares of Hass avocado, anticipating the opening of the U.S. market for exports of Peruvian avocado thanks, in large part, to the work Peru's National Agrarian Health Service (*Servicio Nacional de Sanidad Agraria*). Prioritizing the U.S. market made sense, given the shorter transport time (eight days versus three weeks for

[5] Chapter 2 provides more detail on the strategy of fresh producers to take advantage of off-season windows to enter markets abroad.

[6] The asparagus cycle in Peru is typically 10 years, with peak yield in year 7.

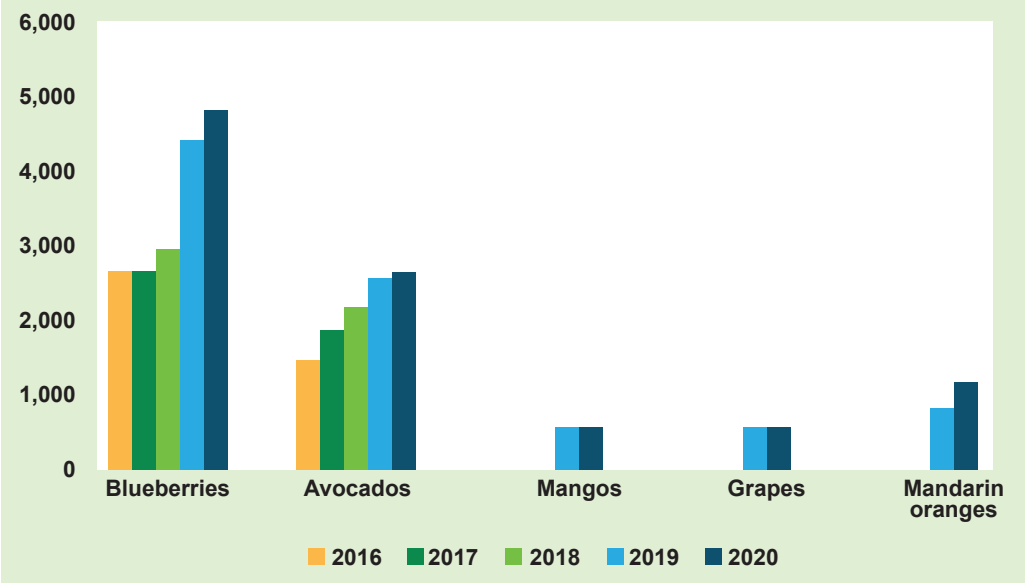
Europe) and higher per capita consumption (roughly four kilos in 2018, almost double European consumption).[7] In 2010, Camposol became the largest avocado producer in

**Figure 3.3 • Camposol's Annual Export Volume of Avocados from Peru in Net Weight (thousands of tons)**




Source: Prepared by the authors using data provided by Camposol S.A.

**Figure 3.4 • Hectares Planted by Camposol by Type of Crop**




Source: Prepared by the authors using data provided by Camposol S.A.

[7] See Pérez and Gomez (2021) for a study of Camposol and avocados.

the world, and by 2011 it already had approximately 2,500 hectares of avocado trees planted. By the end of 2020, it had 4,816 hectares planted of avocado trees, 2,125 of them in Colombia.[8]

### 3.1.2 Seizing Market Opportunities: An Aggressive Crop Conversion to Blueberries

The avocado story was repeated a few years later with blueberries. Starting in 2009, Camposol began researching and developing new products, particularly berries, including blueberries. Inka's Berries, a company that developed alongside Camposol (and that will be examined in Chapter 8), had established protocols for four blueberry varieties. In December 2009, Inka's Berries planted a hectare of these varieties in Camposol's fields, and one of the varieties (Biloxi) thrived.

The opportunity was obvious. In the Northern Hemisphere, blueberries were consumed in summer (May to August) and again in December and January, months when Chile had positioned itself as a key player. But between September and November, the blueberry supply was insufficient. Although Argentina was positioned in that window, it exported much more limited quantities (Aggio 2021).

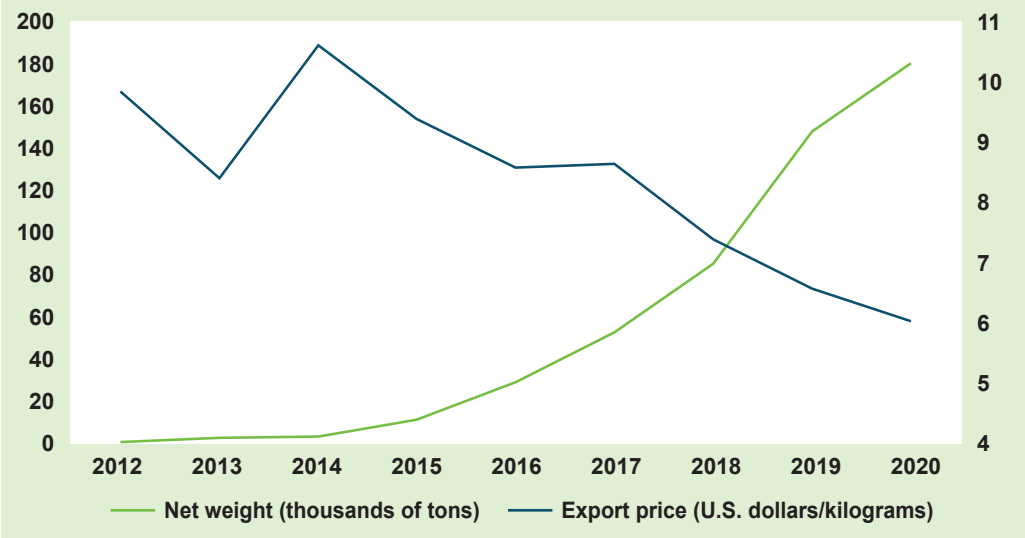
Because of the supply deficit, there was a large difference in price between Northern Hemisphere summer months and the months of September and October. This presented excellent potential returns (at least as long as the supply was limited). And while Biloxi could be harvested year-round, it was at its peak precisely during the months of low supply in the Northern Hemisphere.

The decision to switch from asparagus to blueberry seemed obvious. The yield from the asparagus fields continued to decline and their profitability was much lower. Whereas asparagus had the potential to produce US$6,000 per hectare, the initial tests found that blueberries (although at much higher cost) had the potential to generate US$100,000. Additionally, Camposol had the technology to do it, as well as the prior experience of switching to avocado. The limiting factor was plant availability, which is why Camposol worked with Inka's Berries to breed the plants as fast as possible. At the beginning of the process, the internal rate of return was very high—above 50 percent per year—thanks to prices of up to US$15 per kilo in that export window.

Of course, an aggressive crop conversion like this one was not without risks. Perhaps the main risk was not knowing whether there would be sufficient demand. Camposol was betting that supply would generate its own demand. The high potential profitability made it attractive to try. To do this, however, the blueberries had to be grown very quickly. Camposol knew that, despite the high costs of growing blueberries

[8] Of the latter, only 360 hectares had entered production by that time.

**Figure 3.5 • Peru: Inverse Correlation of Blueberry Export Volumes to Prices**




Source: Prepared by the authors using data provided by the Ministry of Agricultural Development and Irrigation of Peru.

and limited financing, copycats would soon emerge, and that the price would fall, as it did (Figure 3.5).[9]

In 2011, Camposol planted its first blueberry fields on 50 hectares, and by 2016 it already had 1,600 hectares planted (a number that rose to 2,650 in 2020). There have been so many imitators that, despite growth in its blueberry exports—the company went from earning US$8.6 million in 2013 to US$174.4 million in 2020—Camposol's share of Peruvian blueberry exports fell from almost 60 percent to less than 20 percent over that period (Figure 3.6).[10] However, the substantial drop in price came after Camposol had already acted in anticipation of it.

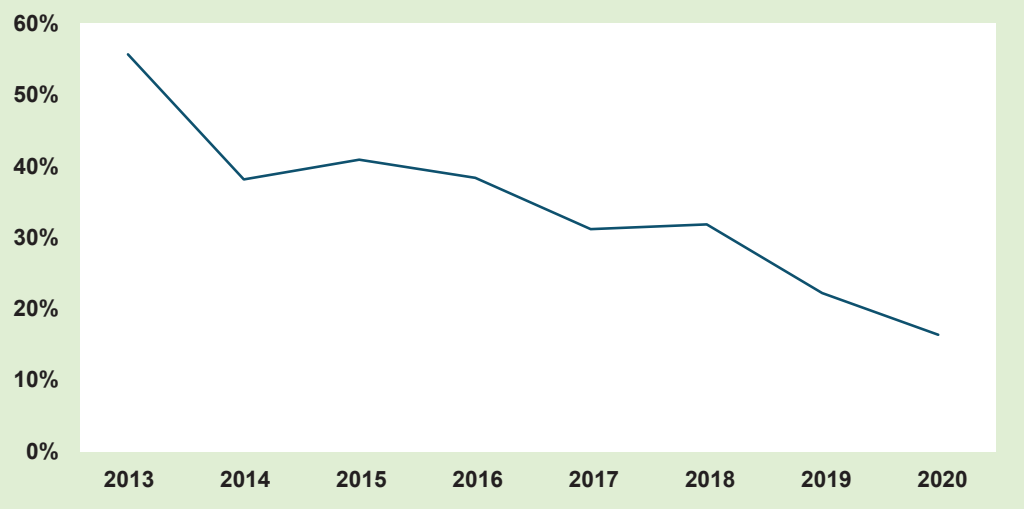
### 3.1.3 Scale and Crop Diversity: Camposol's Commitment to Growth

One of Camposol's most salient characteristics is its large scale of production—unusual for a fruit and vegetable producer—and its total vertical integration. Not only does the company own its own fields, and relies solely on its own production, but downstream it owns processing and packing facilities in Peru (Chao) and has international commercial offices in the United States (Fort Lauderdale), the Netherlands (Rotterdam), and China (Shanghai), which are in charge of marketing and distribution. Its priority is opening

[9] While an avocado tree has a genetic cycle of eight years until it reaches maximum productivity, the blueberry cycle is one year, meaning other producers would be quicker to respond.

[10] Peru went from producing less than a ton in 2012 to producing 162,000 tons in 2020.

**Figure 3.6 • Camposol's Share of Total Peruvian Blueberry Exports (percent)**




Source: Superintendencia Nacional de Aduanas y de Administración Tributaria de Peru (SUNAT).

commercial channels to be able to sell directly to the leading supermarkets in North America, Europe, and Asia. Upstream, it has biological control and plant propagation centers. The company is therefore involved in the entire value chain.

The vertical integration model implies that it depends less on third parties and commercial relationships with suppliers, helping it reach 100 percent traceability. Currently, the company is considering investing downstream in ripening chambers in destination markets to go after the growth of the "ready to eat" market.[11] This service, which would allow the company to capture a greater portion of the value, is the next step in the vertical integration strategy.

The strategy of diversifying into new products to take advantage of new windows of opportunity is in Camposol's DNA. The company's executives attribute this flexibility to the fact that neither its owners nor its management come from the agricultural sector. They do not have the kind of attachment to a crop that farmers who have been working the land or a single product for generations might have. They therefore recognized that asparagus was not the business of the future and had no problem walking away from being the world's largest asparagus producers, abandoning asparagus in favor of other products with better potential.

The vertical integration model facilitates this necessary and aggressive crop conversion. If Camposol depended on third parties such as fruit suppliers, it would have to make sure that they also switch over quickly, or else look for other suppliers already producing

[11] Through this process, the fruit is exposed to ethylene to accelerate its ripening. Although this reduces the fruit's shelf life, it allows the consumer to eat the fruit immediately (without waiting for it to ripen), expanding demand.

the new crop. Additionally, this would be impossible for crops for which the company is essentially introducing production in certain areas, such as avocados and blueberries.

Flexibility plus size is therefore key for this strategy. Camposol's financial backing and business acumen have allowed it to secure most of the benefits of investing in new crops in the short term, as it can lead the way and sell on a large scale before the inevitable arrival of copycats. This was clearly the case with avocados and blueberries. Spillovers are therefore not enough of a reason to limit the speed of innovation.

### 3.1.4 Direct Sales to Supermarkets: A Strategy to Secure Better Profit Margins

The move to produce blueberries on a large scale led to an additional opportunity on the commercial side. U.S. supermarkets rely on a marketing middleman to organize the scattered and disparate U.S. blueberry producers. Thus, the key counterpart for supermarkets is the middleman, not the producer. Because of its land holdings, which were much more extensive than those of a traditional producer, Camposol had the capacity to reach sufficient scale to cut out the middleman. Having blueberries during a time window when there was no fruit in the Northern Hemisphere was key to achieving this.[12]

Direct sales to supermarkets enable increased margins (by approximately 5 percentage points, which is the difference between 8 percentage points of margin from the middleman minus the 3 percentage points in direct sales costs). But it also takes advantage of the Camposol model: vertical integration, quality assurance, compliance with standards, and complete traceability.[13]

Selling in supermarket programs is also more profitable than selling on the spot market.[14] For one thing, during the regular season, the retail price agreed upon beforehand with the supermarket is higher than that of the spot market, which also has lower quality standards. For another, it provides greater revenue predictability. Normally, Camposol aims to allocate the fruit to supermarket programs first, maximizing the ones with the greatest volume and profitability up to the point at which it believes it will be able to meet the orders. The remaining fruit is placed on the spot market.

### 3.1.5 The Need for Continuous Improvement

Camposol's strategy has been changing throughout the product cycle. Initially, the primary objective is to increase production volume quickly to maximize profits, given the

[12] The company had never held such a relatively dominant position with other fruits. Dominating the blueberry market also enabled it to gain a better bargaining position with supermarkets for other products, and sell them directly as well. Thus, Camposol's sales went from 14 percent to supermarkets in 2013 to more than 50 percent in 2020.

[13] Full traceability means that if there is ever a problem with any fruit, it is possible to precisely determine the field from which it came and make the necessary corrections.

[14] Supermarket programs require orderly planning of purchases with each supplier. The suppliers must be able to meet the quality standards set by the supermarket on the agreed-upon date and in full. For example, Walmart's Supplier Quality Excellence Program must be completed "accurately, on time, and in full."

very high returns from the crop. When prices start to fall, it becomes more important to make productivity improvements and reduce unit costs.

As a complement to cost-reduction efforts, Camposol has used a differentiation strategy for its organic blueberry product. For example, of its 2,650 hectares of blueberries, about 160 hectares involve organic production. The advantages of organic blueberries are clear: their price is 50 percent higher, and cross-sales with conventional blueberries are possible (for example, requiring the client to purchase conventional blueberries if it wants the organic ones). This more than offsets the 15 percent increase in costs as a consequence of the lower yield per hectare and the price of the sanitary treatments needed because pesticides cannot be used. Additionally, organic blueberries are better protected from the price reductions associated with the entry of other companies into the segment. This is because Peru's National Agrarian Research Institute (*Instituto Nacional de Innovación Agraria* – INIA) has not provided solutions for the biological control of pests, which avoids the use of pesticides. However, Camposol has developed significant capacity in this area.[15]

Of course, organic production is not without risks. If biological control is insufficient to eliminate pests and pesticides are required, the product must be sold as non-organic for three years (with lower prices, but with the higher production costs associated with organic production). In general, however, the bet is a profitable one with manageable risks.

Likewise, although the Biloxi blueberry variety adapted very well to country conditions despite the lack of support from the public sector (with higher productivity, longer shelf life, and larger size than in other countries), varietal crop conversion is inevitable for producers if they want to remain competitive, and some competitors have already begun that process (Ghezzi and Stein 2021).

Another challenge is that, as the supply grows, the percentage of "rejects" has been increasing. This is not a result of declining product quality, but rather the fact that buyers are becoming more demanding with the products they accept, posing a challenge to maximizing value added with the rejected fruit. One alternative is to venture into nutraceuticals, which take advantage of the health benefits of blueberries.

### 3.1.6 Beyond Peru: Expanding into Other Markets to Diversify Presence

As a natural consequence of Camposol's increasing presence in supermarkets in the Northern Hemisphere, the company has been attempting to expand the export window beyond what Peru provides. Supermarkets prefer suppliers to have a presence all year round, not just for three or four months.

[15] In other countries, biological pest control is provided by the State because of positive externalities that result in higher social returns than private returns. Camposol has the scale to be able to make the investment profitable even if it is used only by the company.

A clear opportunity arose with avocados in Colombia. The peak avocado production months on the Peruvian coast are from April to July, when the country exports around 150,000 tons each month. In the highlands, Peru produces from the end of February to mid-May. But Camposol does not produce in the highlands, where land ownership is highly fragmented, there are problems with ownership, and the company would not have been able to acquire land on a sufficient scale to take advantage of its vertical integration model.[16]

Colombia, on the other hand, presents a clear opportunity with obvious advantages: ample water resources, a rapidly expanding agrarian frontier, and shorter transportation times to the United States and Europe (Pérez and Gómez 2021). Furthermore—and crucially—the first Colombian harvest is between October and January, complementing the Peruvian window.[17]

Thus, Camposol has acquired 4,100 hectares in the coffee region (*Eje Cafetero*) and the Cauca Valley. The *Eje Cafetero* has very good transportation infrastructure and formal property titles, facilitating the land acquisition process. Still, there are also a series of challenges associated with the expansion into Colombia. Producing avocados in a desert at sea level is not the same as producing them at 2,000 meters above sea level, in the rain forests on the slopes of the Andes. To address this challenge, the company has developed binational teams that can identify and implement solutions. Pest management will be key. This risk is more limited on the land in Peru (previously desert) than in Colombia, where insects and fungi are more abundant due to the higher humidity. The pest control capabilities developed by Camposol in Peru will be useful, but there is much contextual knowledge that must be developed (Pérez and Gómez 2021).[18]

In addition to its move into Colombia, Camposol's most recent international forays are in Chile and Mexico, where it has planted 150 hectares of cherries and 50 hectares of blueberries, respectively (Figure 3.7).[19]

## 3.2 Export and Specialization: The Keys to Citrusvil's Successful Strategy

Hand-in-hand with Coca-Cola, its main client, the Argentine firm Citrusvil has managed to become the largest lemon processor in the world, competing globally on the basis

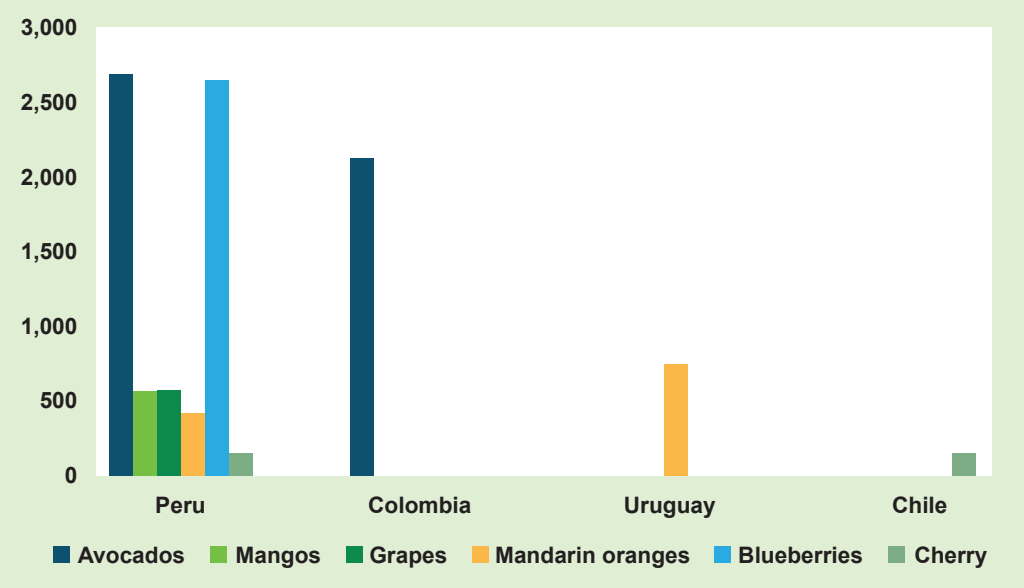
[16] These problems have not prevented other companies, such as Westfalia Fruit Peru, from taking advantage of this window, although with a very different organizational model, as will be seen in Chapter 4.

[17] Chile's window also complements the Peruvian one, but with lower growth potential and higher entry costs.

[18] Camposol used a similar international expansion strategy for mandarin oranges in Uruguay, where it has planted about 750 hectares and acquired another 400 hectares for future expansion. The citrus production window on Peru's coast is between June and August. Uruguay can produce between May and November, enabling Camposol to double the size of its window.

[19] In Peru, Camposol recently planted 40 hectares of dragon fruit.

**Figure 3.7 • Hectares Planted by Camposol by Country and Crop, 2020**




Source: Prepared by the authors using data provided by Camposol S.A.

of compliance with standards that require the most stringent guarantees of traceability, quality, safety, and sustainability. Although the company has based its growth on producing and exporting commodities since its creation 50 years ago, Citrusvil has more recently launched a complementary export strategy based on developing lemon-derived products (specialties), offering solutions tailored to the needs of its clients. This case illustrates a different, more complex form of adding value to agribusiness exports that is based on developing the ability to move from exporting commodities to exporting specialties.

### 3.2.1 Industrial Processing as the Key to Fully Utilizing All Production

Citrusvil is a family business created by Vicente Lucci in 1970 and today managed by his two sons, Daniel and Pablo. The company began as a lemon producer and then gradually vertically integrated. In 1977, it invested in a packing plant, and in 1988 and 1999 it built industrial plants. In 2014, it opened a new packing plant. The company produces fresh lemons, as well as lemon-derived products such as essential oils, juices, dehydrated peel, and other subproducts. In addition to being the largest lemon processor in the world, Citrusvil is Argentina's second largest lemon exporter.

The company, along with its packing and industrial plants, is based in Tucumán, a province in the north of Argentina where almost all of the country's lemon production, packing, and processing takes place. The packing plants—which are 80 percent

automated—handle 50,000 tons of lemons per year. The processing plants, which are equipped with state-of-the-art technology, handle 350,000 tons of lemons per year, producing 1,780 tons of essential oil, 23,000 tons of juice, and 15,000 tons of dehydrated peel. The company obtains 70 percent of the lemons destined for processing and 90 percent of the lemons destined for export as fresh fruit from its own farms. Citrusvil employs 1,230 people directly, as well as 5,000 people indirectly during the harvest period.

Citrusvil is strongly oriented toward exports. In 2019, its sales abroad came to US$117.5 million, or 19 percent of total Argentine lemon exports. That same year, its exports of processed lemon products came to US$99.1 million, while exports of fresh lemons amounted to US$18.3 million. Currently, 90 percent of its processed products are exported, almost exclusively to Organization for Economic Co-operation and Development (OECD) countries. In 2019, the main export destinations were Ireland, Germany, and the United States. In terms of its fresh lemons, in 2019, 49 percent of exports went to OECD countries, mainly the United States, Germany, and Italy.

Through industrial processing, Citrusvil makes full use of fruit that does not have the cosmetic qualities necessary to be exported as fresh lemons. Its main processed product is essential oil, which is an important ingredient in beverage production because it gives beverages flavor and aroma. Coca-Cola is its main essential oil customer, purchasing 95 percent of production. The other 5 percent goes to companies that create the aromas and flavors used as inputs for producing food, beverages, perfume, cosmetics, and personal care items. Its main clients include multinational companies Firmenich, IFF, and Givaudan.

Other industrially processed products that Citrusvil manufactures and markets include lemon juice—concentrated cloudy and clarified juices—and dehydrated peel. For juices, 90 percent of production is exported to companies that produce food additives—with clients including Wild and Döhler—and that make beverages, such as Coca-Cola, Schweppes, and Kagome. The dehydrated peel is exported in its entirety to pectin producers, which use it as a gelling and stabilizing agent to make food products.

The company also produces fresh lemons and markets them in foreign markets. Like most Argentine companies that export fresh lemons, Citrusvil exports conventional lemons to wholesale customers and supermarkets. The company does not produce or market fresh lemons with additional added value, like natural lemons without post-harvest treatments or organic lemons.

By obtaining international certifications, Citrusvil guarantees food safety and quality in its primary production, packing and processing activities, as well as compliance with standards of environmental care, occupational safety, and employee well-being. Certifications obtained by the company include the GlobalG.A.P., British Retail Consortium (BRC), ISO 9001 and 14001, U.S. Food and Drug Administration, Sure Global

Fair, Global GAP Grasp, OHSAS 18001, and FSA-SAI. In addition, Citrusvil meets the private standards of its international clients.

Citrusvil is a pioneer in implementing a zero effluent policy and has developed a system to generate renewable energy from lemons. It has an effluent treatment plant to generate biogas for producing the thermal energy used in the boilers at the processing plants, in addition to compost and treated effluents for fertigation, both used on its own farms.

Citrusvil uses, and at the same time strengthens, the lemon agrifood system in Argentina. On the one hand, its commercial diversification is possible thanks to the ongoing work to open (and reopen) markets by Argentina's National Food Safety and Quality Service (*Servicio Nacional de Sanidad y Calidad Agroalimentaria* – Senasa) and Ministry of Foreign Affairs. At the same time, the Obispo Colombres Agroindustrial Experimental Station (*Estación Experimental Agroindustrial Obispo Colombres* – EEAOC)—the sector's leading research and development center—plays a key role in the development of phytosanitary protocols, advising Senasa on possible quarantine treatments that meet the conditions to access export markets and ensuring that the lemons are of the highest quality possible. For example, the station tests the different temperatures to which the fruit should be exposed, or the optimal doses of synthetic products. In addition, through its laboratory testing capacity, the EEAOC and other prominent centers like the National Institute of Agricultural Technology (*Instituto Nacional de Tecnología Agropecuaria* – INTA) and the Center for Research and Technical Assistance to Industry (*Centro de Investigación y Asistencia a la Industria* – CIATI) are pillars of good-quality infrastructure that not only certifies the required standards but also conducts research and transfers knowledge to producers. Finally, Citrusvil benefits from private associativity initiatives such as All Lemon, an entity created by the leading exporters that is recognized for contributing to the good positioning of Argentine lemons in foreign markets by managing a quality seal that certifies the cosmetic aspects of Argentine export lemons. There are also public-private initiatives like the one carried out by Federcitrus, the national citrus chamber, which works with Senasa to manage the citrus traceability system for exporting lemons to the European Union, the United States, and other markets with similar quarantine restrictions.

Additionally, the company contributes to strengthening the system by actively participating in business associations and holding management positions in them. These associations enable companies to coordinate on setting priorities to increase the sector's international competitiveness, while maintaining good dialogue with the public sector (González et al. 2021). For example, Citrusvil participates in the Asociación Citrícola del Noroeste Argentino (Acnoa), the regional chamber that sets the sector's internationalization strategy; the Asociación Fitosanitaria del Noroeste Argentino, the technical arm of the agrifood system that coordinates with Senasa on the inspection

and monitoring tasks to certify fresh lemons for export and combat pests and diseases; and the aforementioned All Lemon and Federcitrus.

### 3.2.2 Seeking Complementarity between Fresh Lemons and Industrially Processed Derivative Products

The climate in Tucumán strongly encourages complementarity between fresh lemons and industrially processed derivative products. Argentine lemons have high juice content, making them better for industrial use. In addition, branch damage caused by what is called *ramaleo* from the rains and winds degrades the appearance of the lemons, reducing the proportion of fruit that can be exported fresh. For this reason, in Argentina, 70 percent of lemon production is destined for industrial processing. Like nine other vertically integrated Argentine companies, Citrusvil combines the production and export of fresh lemons with that of lemon-derived products. Its industrial activity uses the lemons that do not have the quality attributes required abroad for exporting fresh fruit—mainly the cosmetic appearance—thus reducing commercial risks and production costs.

The combination of these two activities poses a significant challenge to Citrusvil when it comes to adapting how primary production is managed in response to both the phytosanitary and safety requirements of destination markets for fresh lemons, and to the demands of its international clients that buy its processed products. These demands do not always pull in the same direction. For example, given industrial product customers' increasingly stringent limits on pesticide residues, depending on the weather conditions at harvest, the doses of agrochemicals applied in sprays may be insufficient to prevent the development of some diseases like black spot, which affect the cosmetic quality of the fruit. The company's vertical integration from primary production to industrial processing gives it better control when it comes to managing this balance.

Citrusvil's production of fresh lemons for export is also vertically integrated, from primary production to packing. Ninety percent of the lemons destined for export as fresh fruit come from its own farms. External suppliers must have good agricultural practice quality certifications, although Citrusvil itself also monitors their fields and harvests their production. Its packing plants are equipped with state-of-the-art technology to automatically classify, pack, and palletize the fruit.

In addition to its ability to supply itself with lemons, Citrusvil has its own nursery and seed bank to supply genetic material.[20] By having a nursery, the company controls

[20] Lemon cultivation requires a combination of plants used as rootstock and plants used for the fruit-bearing branches of lemon trees.

the structural quality and varietal certainty—aspects that significantly impact the quality and health of the lemons grown. It also develops innovations in rootstocks to obtain higher productivity, and identifies the varieties to be used by focusing on the ones that enable higher density in orchards with higher yields per hectare, and better production management.

### 3.2.3 Coca-Cola and Vertical Integration Requirements

Coca-Cola has played a leading role in developing lemon production and its industrial processing in Argentina. Given that lemon essential oil is a strategic input for producing its beverages, Coca-Cola has promoted the cultivation of lemons and their industrial processing in Tucumán since the 1980s by signing supply contracts with the largest citrus companies in the province. The multinational's quality requirements have progressively promoted the adoption of good quality-control practices, professionalizing the entire sector. Coca-Cola is the world's largest buyer of this product, with Argentina being its main supplier. Although nine companies currently supply essential oil to Coca-Cola from Argentina, Citrusvil is one of three that have been in business for more than 30 years.

Initially, Vicente Lucci sold to Coca-Cola on the spot market. However, early on, the commercial relationship was formalized with long-term contracts, establishing annual quotas for the supply of essential oil. As a result of this relationship, Citrusvil secured production stability and processing predictability, and added cutting-edge technologies for oil extraction. In addition, Coca-Cola always required compliance with very high production and efficiency standards. For this reason, Lucci professionalized Citrusvil by adopting quality and efficiency controls in its processes and a zero-tolerance policy for defects. At the same time, Citrusvil has responded to Coca-Cola's growing demand for essential oil by expanding its processing plants and orchards, and adopting new technologies. The experience of working with Coca-Cola has from the start enabled Citrusvil to learn the productive and commercial practices necessary to manage relations with top-level multinationals.

Coca-Cola's rigorous enforcement of quality standards for this strategic input has required Citrusvil to vertically integrate. Although 70 percent of the lemons the company currently uses to make derivative products come from its own farms—it owns 23 farms totaling 7,800 hectares—Coca-Cola is pushing for 80 percent vertical integration to increase control over the quality and traceability of the industrially processed products it acquires. For this reason, each year Citrusvil is expanding its orchards to reach this percentage of vertical integration. One of Coca-Cola's central requirements is compliance with the maximum residue limit. Citrusvil therefore rigorously monitors primary production, especially controlling the use of agrochemicals in spraying. For quality control of its industrially processed products, Citrusvil has its own laboratories

for conducting organoleptic, physical-chemical, microbiological, and chromatographic tests. For tests that it cannot perform in its laboratories, Citrusvil turns to CIATI, the aforementioned independent laboratory.

### 3.2.4 The Challenge of Adding Value to Increase Market Share

After more than three decades of focusing on exports of industrially processed lemon products marketed as commodities, Citrusvil has made the strategic decision to turn to adding value in its industrially processed lemon exports by developing specialties tailored to the specific needs and requirements of its customers. Following this strategy, in recent years, Citrusvil has developed specialties in oil, juice, and dehydrated peel subproducts.

In the case of essential oils, differentiating the product is an extremely challenging task because it has many components that require a tricky thermal separation process. There is a very high risk of "burning" the oil and not meeting the specifications. The differentiation in this product comes from the aroma. There are more intense oils, oils with a note more of peel, and oils with a more floral note. Through a process that removes terpenes from the oil, the company has managed to develop concentrated lemon oil with more intense aromatic characteristics for producers of flavors and soft drinks. It can then offer the extracted terpenes to manufacturers of cleaning products, which use them as an aromatic additive, as well as to manufacturers of resins, paints, and solvents, which use them for the synthesis of their products.

For juices, Citrusvil has begun to market non-concentrated pasteurized natural juice and "low acid" juice. Manufacturing the non-concentrated juice requires microbiological studies and sensory analysis to ensure the pasteurization process does not cause evaporation, which would diminish the aroma and flavor. Other special requirements of juice customers have to do with acidity levels and the addition of preservatives. In dehydrated peel, the company has managed to differentiate its basic product by lowering sugar content, using specific seeds, or modifying pH.

Citrusvil's main challenge to increase its share of specialties is developing internal capacity to offer new products and solutions to customers. The company's ability to understand the specific needs of its clients is the key to innovating by producing products to meet those needs. This means understanding and interpreting those needs with a view to the long term, understanding the product that customers ultimately want, and gaining their trust to co-develop new products. Having its own laboratories for industrially processed products enables Citrusvil to prototype new products and acquire more direct knowledge about raw materials and the development of specialties.

In order to expand this capacity, Citrusvil created a research, development, and innovation (R&D&I) team in 2017 that works with customers to formulate new products.

Currently, the team has nine professionals and advisory support from internationally recognized external professionals, one of them specializing in juices and the other in oils. Since its formation, the R&D&I team has participated in international trade fairs to further strengthen the company's ties with its customers. It is the company's main team responsible for interacting directly with customers, establishing cooperative working dynamics to properly understand and interpret customers' current and future needs, and developing successive prototypes until new products that effectively meet the clients' needs are ready. Only by maintaining fluid communication through these direct interactions with customers does Citrusvil manage to develop innovations that add value through specialty products.

As Citrusvil pursues its specialty development strategy, it also seeks to add value to its exports. It does this by better positioning its industrial products through the development of branding of essential oils, juices, and subproducts that is internationally recognized and valued—that is, ensuring that the products are recognized as authentic and distinctive for being produced in Argentina. Given the failure of the regional chamber Acnoa to prioritize this issue on its agenda, Citrusvil is for now approaching this branding effort as its own project by hiring CIATI as a technical counterpart, given that that entity has international recognition and experience.[21]

The case of Citrusvil illustrates how an agribusiness company that started with the successful internationalization strategy of working hand-in-hand with a multinational as its main client for commodity products and anchored in the good functioning of the lemon agrifood system in Argentina (González et al. 2021), can then move on to an independent value-adding strategy based on developing specialties. This strategy is underpinned by professionalization and the capabilities the company has developed over the years. But it also requires the development of new capabilities, including research and an understanding of external demand. The scope of this new and more ambitious value-adding strategy will therefore depend on successfully developing these more complex capabilities.

## 3.3 Kekén: Combining Public and Private Sector Initiatives

Pork is one of the agricultural products with the fastest-growing demand across the world. Until recently, Japan was the main importing country, accounting for around 15 percent of imports worldwide. No country in Latin America has been more successful in accessing this demanding market than Mexico, the source of nearly 11 percent of Japanese pork imports. In 2018, Mexican pork exports reached US$562 million, and 77

[21] CIATI, located in the Argentine province of Río Negro, has already made a similar effort to brand Argentine apple and pear juices.

percent went to Japan. This boom was possible thanks to a combination of complementary initiatives by the public and private sectors.

Mexico is the world's 15th largest producer of pork, producing around 1.3 million tons per year (Sagarpa 2018). However, it is even more prominent as a consumer. In fact, Mexico exported 105,000 tons of pork in 2016, while it imported seven times that amount. Why would a country import the same product that it exports? The answer lies in the different consumer preferences. Pork comes in a wide variety of cuts, with different characteristics. While Mexicans tend to consume the meat of the hind leg (ham), other cuts such as loin, ribs, and bacon are more valued in export markets such as the United States and Japan. Thus, pork exports complement local sales very well. For this reason, most of the companies serve both the domestic and export markets.

Mexican pork exporters are large, vertically integrated companies that use state-of-the-art technology. The entire process, from breeding and fattening to processing and distribution, is closely controlled by these companies. The genetic material is imported from highly specialized producers in the United States and used for artificial insemination carried out at these firms. Production is separated into breeding and fattening stages. Breeding farms are climate-controlled covered enclosures with very strict sanitary standards, which is important for avoiding high mortality rates during the first weeks of life. Feedlots are less technologically complex and tend to be independent, but only provide lodging services. All aspects of their work, including food and medicine, are standardized and closely supervised by the vertically integrated firms.

The efforts of Mexico's pork industry to enter the Japanese market began in 1993, when a market study conducted by producers in Sonora revealed the market's significant potential. Exports increased rapidly until 2001, but then stagnated until the Japan-Mexico Economic Partnership Agreement (JMEPA) signed in 2005 gave them new impetus.

Within Mexico, the largest exporter of pork to Japan is Kekén, a KUO Group company located in the Mérida area in the state of Yucatán. It began operations in 1991. The company has two strategic reasons for this location. First, Yucatán is an area with high consumption of pork.[22] Second, the absence of pork production in neighboring states provides isolation that protects producers from diseases that affect pork production in other regions of the country.

Over the last decade, Kekén has seen remarkable growth thanks to changes in its business model to incorporate state-of-the-art technology (including climate control in breeding farms), implement stricter sanitary controls, and explore new export markets. These changes are reflected in Table 3.1, which shows, in addition to the growth in the

[22] For example, *cochinita pibil,* a marinated pork stew traditionally cooked in underground earthen ovens, is native to the Yucatán peninsula.

**Table 3.1 Size of Kekén and Its Efficiency Metrics**

| Metric | 2010 | 2017 |
|---|---|---|
| Sow stock | 31,200 | 71,000 |
| Pigs sold | 813,000 | 2,035,000 |
| Weaned pigs per mated sow per year | 25.5 | 30.1 (compared to the average in the United States of 23.6) |
| Feed efficiency in the finishing stage (kg of weight gain/kg of feed, with less being better) | 2.44 | 2.31 (compared to the average in the United States of 2.54) |
| Number of retail stores in Mexico | 140 | 446 |
| Volume sold in Mexico (tons) | 34,000 | 88,000 |
| Volume exported (tons) | 13,000 | 48,000 (65 percent to Japan) |

Source: Prepared by the authors using data provided by Kekén.

scale of the operation, notable gains in technical efficiency in such areas as feeding, mating, offspring per mother per year, and mortality rates. These improvements have raised Kekén's efficiency to the level of leading producers in the United States.

Like the other Mexican exporters, Kekén is a vertically integrated company involved in production, processing, and trading. It has its own feed production plants, breeding farms, and processing plants, as well as sophisticated marketing and distribution operations. Only the fattening services are contracted to third parties. Although the genetic material is imported, the company also has specialized genetics farms with the highest health standards that produce the young mothers sent to the breeding farms after being artificially inseminated.

The breeding farms, 100 percent owned by the company, are very sophisticated. Each of them involved an investment of US$14 million. They are climate-controlled and have automatic feeders and very high sanitary standards.[23] The air conditioning uses a system that circulates air that enters the plant through a "wet wall" and is pushed out by exhaust fans. This and a drip system that dampens the animals keeps them cool despite the high temperatures in Yucatán, something that is crucial because the animals' comfort affects the quality of the meat and productivity. The facility's floor is slotted to minimize the animals' contact with their waste, which is carried away by water and pumped into a biodigester system.

These biodigesters—basically, effluent treatment plants—are artificial lakes covered with plastic sheeting where organic matter is digested. The process produces methane gas, which is used to produce part of the energy that the farm consumes, thus capturing greenhouse gases. Part of the treated affluents, rich in nitrogen, is used to irrigate

[23] For sanitary reasons, the trucks that transport the food do not enter the plant. Instead, they load the silos from outside, and from there the food is transported to the animals via an endless screw system.

green areas around the farms, which are surrounded by a total of 10,000 hectares of protected environmental areas that function as a biosecurity cushion and at the same time produce environmental services.

In the feed production plants, a nutritionist notes the dietary requirements (percentage of protein, fiber, fat, etc.) required for each stage of the animals' development. Small piglets require a lot of protein and dairy. Later, the main ingredients are corn and soybeans. This information—plus raw material prices, which change every week—is used with linear programming techniques to finalize the diets.

The case of Kekén has been included in this chapter on vertically integrated companies because all of the most strategic and technologically demanding elements of the operation are controlled by the company. Yet Kekén contracts out fattening to third parties, both peasant community farmers and businessmen.[24] Why? An initial factor has to do with the corporate image and community relations. In a context in which the population is sensitive to social and environmental issues, incorporating other local actors into the production chain—sharing the benefits of the activity—changes the perception of the firm in the community. Additionally, outsourcing the fattening stage frees up capital for more strategic investments in technology, genetics, and processing plants, among other areas.

The arrangement is an interesting one in that the community peasant farmers and small entrepreneurs provide the land and labor, but the pigs still belong to Kekén. The pig is delivered (outsourced) at 20 days old (weighing 5.5 kilos) and the finishing farms are provided with food and medicine and given technical assistance. The feedlots, which are standardized at between 6,000 and 12,000 animals per farm, return the animals after almost five months, weighing approximately 130 kilos, and the farms charge for lodging services.[25] The payment includes a fixed component per kilogram gained, plus a variable component based on the feed conversion rate. In addition to rewarding efficiency (which saves on feed), Kekén gives constant feedback on the conversion obtained, and the standard size of the feedlots facilitates benchmarking. The farms are filled all at once, and all the animals leave at the same time at the end of the grow-out cycle. This "all in, all out" system makes it possible to sanitize the facilities when they are empty and avoid transferring diseases between cohorts. Like breeding farms, all feedlots have their own wastewater treatment systems.

In addition to providing technical assistance, the company helps the family farmers and small entrepreneurs who engage in fattening obtain financing. Kekén signs long-term contracts with them (the first for 10 years), which the farms use as collateral to access credit. Each feedlot costs around US$1 million (for 6,000 pigs). For most

[24] The finishing farms are not air-conditioned. They have open ventilation, meaning their technology is simpler.

[25] This model is the same as the one used in the United States and Europe.

entrepreneurs and peasant communities, accessing this amount of capital would be unthinkable without these contracts. Kekén helps them manage their loans and pays the banks directly, acting as a withholding agent. Furthermore, the payment arrangement means the entrepreneurs and peasants are not exposed to risk in the form of pig or input prices. All this, plus the partial funding from Fideicomisos Instituidos en Relación con la Agricultura (FIRA)—a public institution that functions as a second-tier bank to facilitate credit to the sector—makes the fattening farms attractive to banks, which know that the returns on investments in them are high. Banks are therefore willing to lend even in the case of peasant community farms on *ejido* (communal) lands.

Although most of the feedlots are owned by small entrepreneurs, the network includes 22 establishments managed by peasant communities that include a total of 166 families.[26] For these family farms, pigs represent an alternative to the traditional crop, henequen or sisal fiber, a plant of the agave family used to make bags but that has been replaced by synthetic fiber over the years. Raising pigs has enabled these families to escape poverty. Although they are still lower-middle class—according to company officials, the families' income amounts to around five minimum wages—they are generally better off than other families in their communities. They have been able to build homes with indoor plumbing and many send their children to study in Mérida. Some work in the Kekén plants.

From the feedlots, the pigs are moved to the processing plants. The slaughter is done using anesthetics, a more humane method in which the animal is not stressed, generating better quality meat. Some of the processing plants have obtained an FSSC 22000 food safety management certification. At the time of the visit to Kekén for this project, the company's main plant, built in 1994, had been gradually expanded to a processing capacity of 30,000 animals per week. Since then, the company has opened a new plant—the largest in Mexico—with more modern technology and a processing capacity of 45,000 animals per week.[27] The plant produces different cuts for both the domestic market (which accounts for around 65 to 70 percent of sales) and export markets that include Japan, South Korea, Hong Kong SAR, and the United States.

In addition to efficient technical production, exporting requires a good understanding of market requirements in order to adopt a customized competitiveness strategy. Pork comes in a variety of cuts that are sold to different markets depending on preferences. For example, Kekén exports loins to Japan and ribs to the United States. Both in Mexico and abroad, Kekén tries to minimize sales to supermarkets, since the margins are small. In Mexico, it sells mainly through its own retail chain, the Maxicarne

[26] The data are from 2018, when the interviews were conducted at Kekén. The company planned to add 12 more peasant community farm facilities in 2019.

[27] The new plant has since been damaged by a major fire and is in the process of being rebuilt.

stores, oriented toward the middle-income segment. In Japan, it sells mostly through distributors, which in turn sell to end customers such as restaurants. The company has recently gained entry to the 7-Eleven chain—with more than 20,000 points of sale—where prepared meals made with Kekén pork are sold. In the United States, Kekén sells St. Louis-style ribs to the Hormel company, and is seeking to supply niche markets for consumers of Asian descent in California, instead of selling to chains like Walmart or Costco, which results in much lower profit margins.

Although most exports end up as commodities, there are interesting cases of product differentiation in the Japanese market, in particular, which is the most sophisticated in the world. One example is the sale of fresh pork that is vacuum-packed (instead of frozen), a product for which the market pays exceptional prices.[28] Of course, selling pork fresh comes with a number of challenges. From a logistical point of view, it requires a transport system to reach the market with a shelf life of 30 days, which is what Japan requires. This means shipping from the Port of Manzanillo on the Pacific coast, which is faster, rather than from Progreso in Yucatán through the Panama Canal, which is cheaper. On the production side, it requires new vacuum-packing machinery and much stricter sanitary standards in the processing plant so that the product can reach the market with a microbiological content within acceptable limits.

Another example of product differentiation is special products for niche markets for which Japanese customers are willing to pay higher prices, such as ready-to-cook pork belly skewers, which are sold to restaurants through distributors. Each piece, cut to precise specifications, is carefully selected for its fat and meat pattern. The pieces are also quite thin, so that the task of inserting the skewer is not easily mechanized. The product is therefore highly labor-intensive, giving Mexico a clear advantage over exporters such as the United States, Canada, and the European Union, which have much higher labor costs.

One important development in the pork market is the rise of China as a destination market. Up until fairly recently, China accounted for only 1 percent of global imports. But by 2016, the year Kekén began exporting to China, the country had become the second largest importer in the world. Since 2018, China has been impacted by an epidemic of African swine fever, an incurable disease with a high mortality rate among pigs. The virus spread quickly across the country, leading to supply shortages and rising prices. In this context, in 2019 China became the world's number one importer of pork, with about 18 percent of the global total. Mexican exports to China grew by nearly 300 percent, and many companies were trying to secure permits to export to this market. However, China's demand is for some of the same cuts that are valued in Mexico. Given the extent of local demand, it is possible that once the African swine

[28] According to Kekén executives, the price of fresh pork is US$1 higher, increasing profit margins by $0.50. Since pork sells for about US$4.50 a pound, that is a significant difference.

fever epidemic is over, China will be less of a priority destination market for Kekén and other Mexican producers.[29]

### 3.3.1 The Contribution of Public Goods, Including Trade Agreements

Beyond the business strategies of Kekén and other companies in the sector, successfully exporting pork to Japan would not have been possible without the support from the public sector. Specifically, in addition to the FIRA financing mentioned above, two other public goods made this success possible: the negotiation of the Japan-Mexico Economic Partnership Agreement (JMEPA), implemented in 2005; and the existence of an efficient sanitary and phytosanitary institution (the National Service for Agrifood Health, Safety, and Quality (*Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria* – Senasica) to address sanitary problems and negotiate the lifting of sanctions against Mexican agricultural products.

Under the JMEPA, Japan granted preferential access in the form of quotas for sensitive products of interest to Mexico, including pork, which pays a tariff of 2.2 percent instead of the original 4.3 percent. However, the main protective mechanism is a complex system (known as a gate price system) that imposes a minimum price on shipments of pork, and this system is not affected by the JMEPA.[30] Perhaps more important than the quotas is the fact that the JMEPA created the Subcommittee on Sanitary and Phytosanitary Measures, a bilateral forum that helps ensure that the measures are applied transparently, with the aim of promoting and facilitating trade.

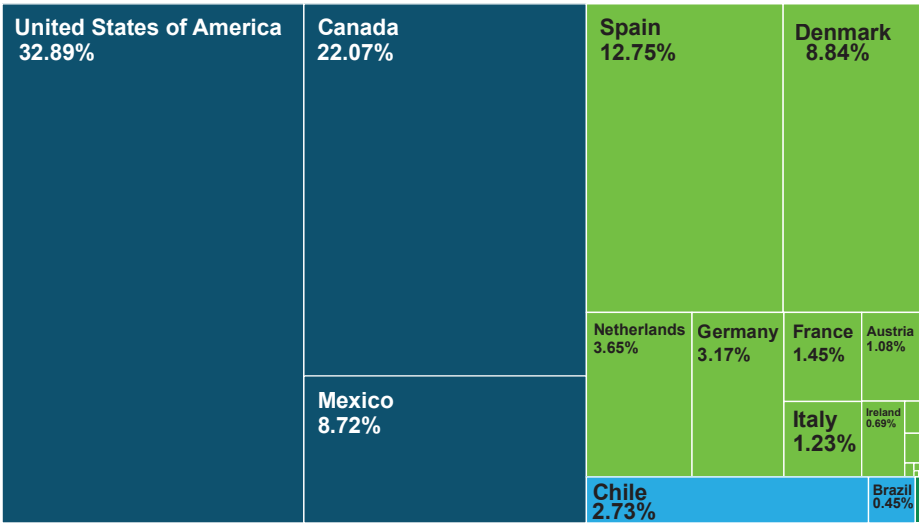
The importance of trade agreements is clear when comparing Japan and South Korea as destinations for Mexican pork exports. Unlike the case of Japan, Mexico's trade negotiations with South Korea were unsuccessful, so Mexican pork exports to that market pay a 25 percent tariff, whereas exporters from the United States, Canada, and Chile pay 5 percent. As a result, while Mexico accounts for about 9 percent of Japan's pork imports (Figure 3.8), it accounts for only 2 percent of South Korea's imports (Figure 3.9). In contrast, while Chile supplies almost 8 percent of South Korea's imports, it accounts for less than 3 percent of Japanese imports.

Senasica is the national authority responsible for the health and safety of agricultural production. In addition to participating in international trade negotiations, it engages in activities related to animal health, including:

[29] Another factor that limits exports to China is that the country does not allow the use in food products of ractopamine, a growth-promoting feed additive that is allowed in the other markets. As different cuts are sold to different markets, removing ractopamine from the whole pig to sell to China means increasing production costs for the other markets. At the time of the visit to Kekén in 2018 for this project, the company was producing without ractopamine in only one of the 6,000-pig feedlots.

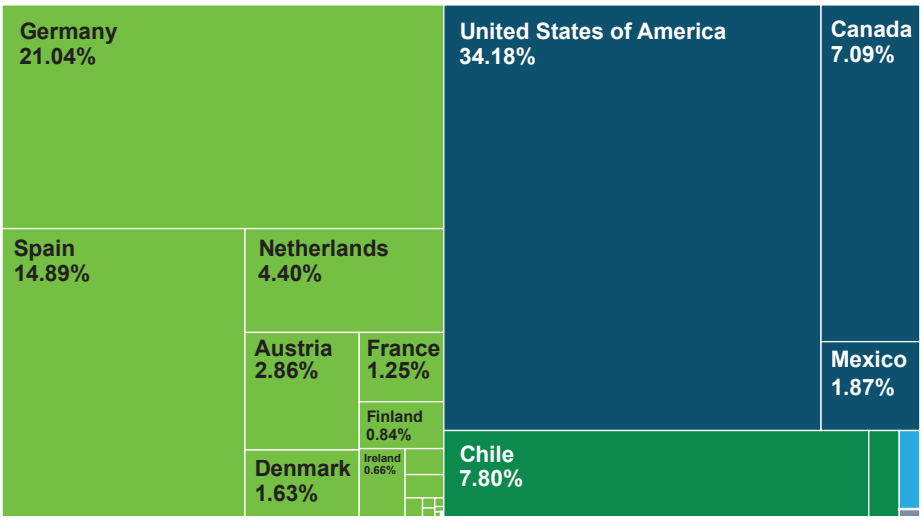
[30] Importers overcome these restrictions by including higher-value cuts in each shipment to reach the threshold.

**Figure 3.8 • Origin of Pork Imports to Japan, 2019**




Source: Atlas of Economic Complexity by the Growth Lab at Harvard University. https://atlas.cid.harvard.edu/.

**Figure 3.9 • Origin of Pork Imports to South Korea, 2019**




Source: Atlas of Economic Complexity by the Growth Lab at Harvard University. https://atlas.cid.harvard.edu/.

- Managing a network of laboratories that specialize in animal health
- Conducting quality control for agricultural and food imports and certifying export quality in accordance with the requirements of the importing country
- Managing national campaigns to eradicate animal diseases
- Managing an animal health epidemiological surveillance system to identify risks and control the movement of infected animals
- Regulating the use of veterinary pharmaceutical products and conducting quality control checks on animal feed
- Creating a network of public slaughterhouses with a Federal Inspection Type certification (*Tipo Inspección Federal* – TIF).[31]

In the specific case of pork exports to Japan, Senasica was in charge of the long process of securing recognition of the different Mexican states as free of classical swine fever. The process began in 2000 in the states of Sonora, Chihuahua, and Yucatán, and ended in April 2015 with official recognition of the entire country as free of classical swine fever.[32] The JMEPA's Sanitary and Phytosanitary Subcommittee was instrumental in this achievement.

In terms of infrastructure, Kekén officials believe that certain projects could further enhance the sector's development. Modernizing the Port of Progreso to accommodate ships with a larger draft would reduce the cost of accessing imported grain, a key feed input. In addition, building highway bypasses around area towns would reduce the time and cost of truck transportation to the fattening farms, which are scattered throughout the peninsula, while at the same time preventing the nuisance to the local population of the coming and going of the trucks.

[31] No Mexican meat product can be exported without a TIF certificate. The TIF certification involves strict control by specialized veterinarians from public agencies, as well as the adoption of complex management systems to address health problems.

[32] The importance of Senasica's work is made evident by the fact that Brazil, a much larger exporter of pork products, has been unable to enter the Japanese market in any significant way due to sanitary problems.

4

# Anchor Companies

## A Door to Global Agrifood Chains for Small Producers


• Piero Ghezzi
• Ernesto Stein
• Jorge Cornick
• Romina Ordoñez


The previous chapter discussed the cases of several large, sophisticated and vertically integrated firms on the technological cutting-edge in their respective sectors. This chapter and the next will show that opportunities for integration into global agrifood chains are not limited to large enterprises. Rather, there are many examples of small producers—including peasant family farms—that have successfully integrated into modern global chains and substantially increased their revenues.


This chapter and the next will show that the opportunities for integration into global agrifood chains are not limited to large enterprises. There are also many examples of small producers that have done the same.


In practically all cases, the successful integration of small producers involves some type of associative mechanism, which can take two different forms. The first is vertical in nature, where a medium-size or large anchor company does the processing and trading, but sources production from many small agricultural producers, to whom they provide technical assistance and sometimes financing.[1] The second is horizontal in the form of cooperatives or small producer partnerships, as will be discussed in the next chapter. This chapter will look at three successful cases of anchor companies: Westfalia Fruit Perú (WFP), Mercon, and Sol Orgánica.

WFP, which is South African-owned, is the second largest avocado exporter in Peru. Some 97 percent of its sales come from external suppliers, most of them small.

[1] Anchor companies frequently also have their own production.

Mercon is a global company originated in Nicaragua that participates in all phases of the coffee chain and handles training, technical assistance, and financing for small and medium-sized producers. Sol Orgánica, also in Nicaragua, produces organic sun-dried fruits and ingredients such as purees and fruit juices, working with more than a thousand small farmers to whom it provides technical assistance. Before delving into these case studies, a brief conceptual framework is provided below.

## 4.1 The Relationship between the Anchor Company and Small Producers: A Conceptual Framework

Why productive arrangements arise in which an anchor company sources production from a large number of small producers is an interesting question. To answer it, one must first understand why an anchor company would primarily purchase third-party production, rather than opting for backward vertical integration. The reasons may be purely economic or involve other factors.

Among the economic reasons, one might be that relying primarily on one's own production can be inefficient due to various factors. The company may lack access to land, which may be highly fragmented or simply not available for purchase or lease. Additionally, having its own production may involve using more working capital for inputs, salaries, etc., which can result in an inefficient use of relatively scarce resources. This is particularly true in the case of medium-sized anchor companies with limited access to working capital. Other reasons may be related to economies of scale in processing and packing. For example, companies that have packing plants may need more production to make the investment profitable, so they add to their own production with third-party production. And, again, using resources to increase their own production (instead of using resources to strengthen distribution channels, among other purposes) may not be efficient or possible. Likewise, it may be that an anchor company has more experience and knowledge in processing, packaging, logistics, and trading, and less in the purely agricultural aspects of the product or products it is selling.

Among the non-strictly economic reasons that can discourage vertical integration is that companies may have a clear social responsibility objective. Some anchor companies are explicitly created with that goal, such as Nicaragua's Sol Organica (see Chapter 2), while others have made a deliberate decision to take the approach of sharing their prosperity with suppliers and workers, such as WFP and the Mercon Group.

The reasons to have a social responsibility objective—economic and otherwise—are increasingly intertwined. First, having business relationships with surrounding small producers can help improve the company's image and relations with the community, and reduce the risk of potential social conflicts. Second, offering products with social and environmental responsibility attributes is often integral to companies' business

strategies, enabling them to expand the customer base in sophisticated markets with socially and environmentally responsible consumers who are willing to pay more for products with these attributes. All of this can ultimately have a positive economic impact.

### 4.1.1 The Value of Associativity for Small Producers

As mentioned previously, from the perspective of small producers, participating in an associative mechanism is essential to enter modern agro-export markets, since these are producers that do not have the scale to access these markets individually. This entry requires complying with safety, environmental, and labor standards, obtaining certifications, and/or reaching certain productivity levels, to give a few examples. In other words, it requires getting over what Sabel and Ghezzi (2021) have called the "quality hurdle ." This means making expensive and risky investments and having access to knowledge and financing that are often not available. In modern production of certain crops (like avocados), producers must have access to high-tech irrigation (should abundant water not be available naturally) and be able to wait several years for the crop to mature and generate a positive cash flow.

From the perspective of small producers, participating in a cooperative mechanism is essential to enter modern agro-export markets.

Well-implemented associative arrangements allow small producers to share many of the fixed costs associated with getting over the quality hurdle. For example, it makes it easier to obtain group certifications, diluting the administrative costs and the required investments. It can also help with securing better input prices and spreading knowledge of best practices more quickly. The opportunities and challenges associated with horizontal associativity (through cooperatives or small producer partnerships) will be discussed in the next chapter. The examples discussed in this chapter clearly show the potential of the vertical associativity model to connect thousands of small producers with international markets.

For small producers, the complementarities with anchor companies are clear, since small producers have access to land and rural labor, while the anchor company has not only productive or technological know-how but also knowledge regarding the demands of end customers, as well as contacts with these customers, familiarity with logistics channels, and greater access to financial resources. In this associative model, as will be clear in the cases discussed in the next section, the anchor company typically provides technical assistance, access to certifications, and partial financing, and helps establish and coordinate the value chain.

As will be seen in the three case studies presented in this chapter, financing is key in the relationship between the anchor company and its smaller suppliers, and it is highly complementary to technical assistance. Smaller producers require working capital,

but typically do not have access to formal financial markets. The anchor company not only has a certain level of access to financing, but also has insider information on the business of each supplier, to which it provides technical assistance, and can directly collect repayments from suppliers at harvest time. Thus, the supplier-customer relationship reduces the typical information asymmetries in the financial sector, allowing the arrangement to function well.

An important element of this model is that the anchor company imposes market discipline on small producers—for example, by excluding those that do not make the required investments or fail to meet the necessary quality standards. In the horizontal associativity model, imposing discipline is not always easy to accomplish, particularly when cooperatives or small producer partnerships are not managed based on business criteria.[2]

### 4.1.2 An Arrangement Not Without Its Challenges

Despite the advantages of vertical associativity, this arrangement is not without its challenges. The relationship between anchor companies and small suppliers is not always simple. A frequent problem is that of appropriability, associated with the issue of supplier loyalty. In a market characterized by the existence of multiple potential buyers, standardized products, and legal and enforcement limitations for contract farming, small producers can always sell to a third party—generally a middleman—that opportunistically offers a higher price at the time of the harvest, without having had to deal with the cost of providing technical assistance and certifications. Because of this risk, anchor companies tend to be reluctant to provide all the financing for planting or productive reconversion or for the technical assistance needed by small producers. As a consequence of not being able to "appropriate" the benefits of technical assistance and financing, anchor companies offer much less than what is socially optimal. Thus, if this problem is not adequately solved or mitigated, many potential vertical associativity projects never get off the ground.

Fortunately, there are mechanisms to mitigate these issues. One that has played an important role in the cases discussed in this chapter (e.g., Sol Orgánica)

Fortunately, there are mechanisms to mitigate the challenges of vertical associativity. One that has played an important role in the cases discussed in this chapter is group certifications.

[2] The horizontal and vertical associative models are sometimes complementary: the anchor companies can be supplied not only by individual producers, but also by cooperatives of small producers. However, some of the companies studied for this report seem to prefer individual providers. Also, although anchor companies sometimes negotiate with groups of producers that are members of cooperatives, they sign contracts bilaterally with each producer.

is group certifications. Anchor companies typically obtain the certifications for their supplier network and bear the administrative cost, which is beyond the reach of individual producers. The anchor companies are therefore the "holders" of the certification, so producers that decide to sell their production to third parties must do so without the price premium provided by certification. This reduces—although it does not eliminate—the risk of opportunistic selling. As a result, appropriability problems are mitigated.

The appropriability problem is also reduced or even eliminated with the passage of time. A long-term relationship helps strengthen the bonds of trust between the anchor company and the small producers. It also helps small producers internalize the costs of ignoring contracts (when they exist). They may realize that by selling to third parties, their products are no longer certified, or that they run the risk of losing access to technical assistance, as well as the financing provided by the anchor company. Long-term relationships also in some cases allow the anchor company to offer multi-year purchase contracts, sometimes at preset prices, which small producers value, particularly for products with high price volatility.[3]

Beyond the problems of appropriability, articulating value chains is not an easy task, since there are multiple coordination problems and numerous preconditions small producers need to meet to take part in them. For this reason, only a subset of producers that could potentially be integrated into modern value chains opt for it. For example, to be part of the WFP avocado supplier network and benefit from the technical assistance and connection with international markets provided by this company, producers must have abundant water or modernized irrigation and must have good access roads. It is also important for them to be part of producer clusters that meet WFP's productivity and quality requirements, which reduces WFP's cost of accessing the product. An excellent producer in the "wrong" valley may be less attractive to an anchor company than a mediocre producer in the "right" valley, since the marginal cost of working with that producer is lower.[4]

Also, in some cases, the financial resources available to anchor companies are limited, which sometimes explains why they work with small producers rather than being fully vertically integrated. Therefore, producers must have a certain capacity to finance the required investments, such as crop switchover and obtaining certifications. Although anchor companies can sometimes contribute to partially solve these problems, State support in the form of irrigation or road infrastructure and access to financing can

[3] Appropriability problems are also reduced when the product is more specific to the anchor company. When it is not a standard product, sales opportunities to third parties decrease. In these cases, the anchor company tends to assume or finance a greater portion of the technology transfer costs and financing.

[4] Naturally, the agglomeration requirement creates a coordination problem (private-private) between the different small producers. The return on investment increases when other producers on nearby plots have the same crop. There are positive spillover effects. The anchor company can help (partially) solve this coordination problem.

substantially increase opportunities for small producers to integrate into value chains through the anchor companies. Although international cooperation can also help—for example, two of the three companies discussed in this chapter received financing from IDB Invest or IDB Lab—it cannot always make up for the absence of public policies.

How to design and implement such public policies is not obvious. Although these policies often exist on paper, they are frequently isolated and disjointed interventions and lack a common aim. Most do not have the scale to achieve a meaningful macroeconomic impact, and do not address the small producers' productive reality, or their need to make the quality and productivity leap required to be included in value chains. Chapter 9 will return to this topic of the role of the public sector in international integration into export value chains.

## 4.2 The Importance of Anchor Companies: Three Case Studies

### 4.2.1 Westfalia Fruit Perú: One of the Largest Avocado Exporters in Peru

Westfalia Fruit Perú SAC (WFP) is one of the largest avocado exporters in Peru, which exports more avocados than any country in the world except Mexico.

WFP was founded as Camet Trading SAC,[5] a medium-sized producer with 70 hectares of leased land and an innovative business plan. The large exporters of avocados in Peru depend predominantly on production in their own very large orchards in the coastal regions. The owners of Camet Trading were convinced that they could compete by buying from third parties if the company could help these suppliers meet the standards required for export.

#### *Avocado from the Highlands and the Coast*

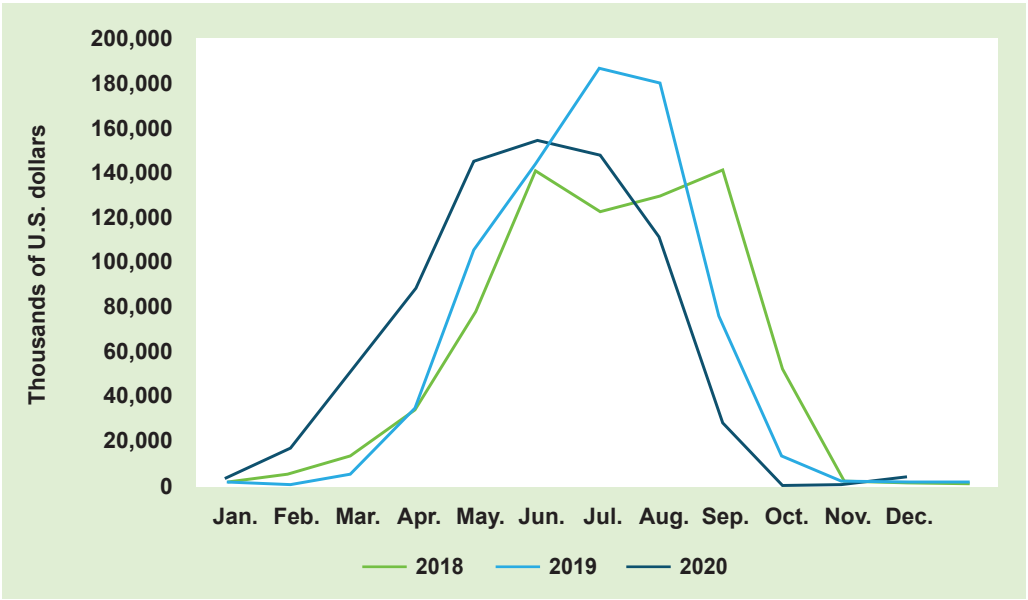
The company's owners also realized that buying from producers in the highlands regions (up to 2,800 meters above sea level) offered enormous potential for growth. Avocados grown in these regions could be harvested from February to April, just before the opening of the export window for Peruvian coastal producers at the end of April, and thus fetch substantially higher prices.[6] For example, while Peru exports approximately 7,000 tons of avocados in February and 20,000 tons in April, that quantity increases to around 90,000 tons in the peak months of May to July (Figures 4.1 and 4.2). In this way, producers that harvest in this early window can fetch very attractive prices (Figure 4.3).[7]

[5] In 2017, WFP was formed after Camet Trading was acquired by Westfalia Fruit, a multinational with a large global presence in the avocado market.

[6] One of the problems is that for altitudes higher than 2,800 meters, production is delayed until May due to the weather, which puts the region up against production from the coast. WFP is helping these highland growers obtain organic certifications to get better prices.

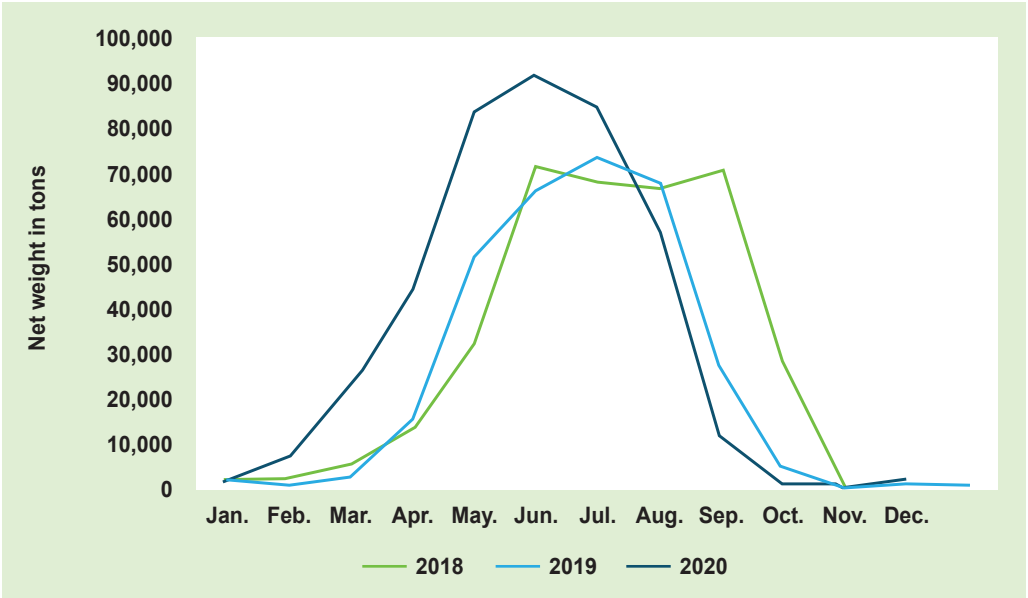
[7] According to information collected from the small avocado producers with which WFP works in Ayacucho, in March 2021, they received 7.80 soles per kg of avocados, compared to less than 5 soles per kg at the end of April.

**Figure 4.1 • Peru: Monthly Avocado Exports (thousands of U.S. dollars; free on board value)**



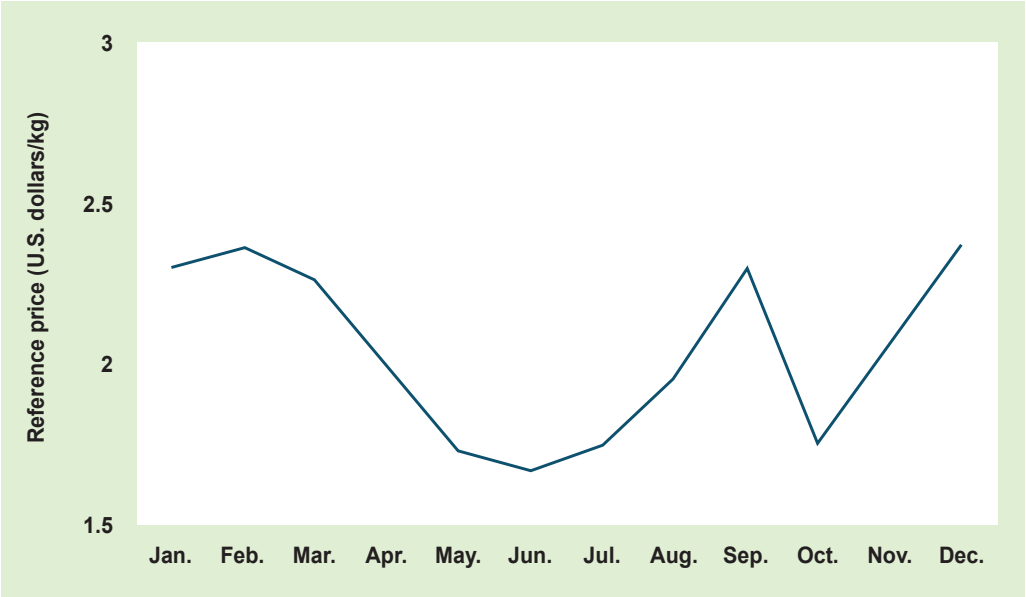

Source: Prepared by the authors based on figures from the National Superintendency of Tax Administration in Peru (SUNAT).

**Figure 4.2 • Peru: Monthly Avocado Exports in Tons**




Source: Prepared by the authors based on figures from the Ministry of Agricultural Development and Irrigation (MIDAGRI).

**Figure 4.3 • Peru: Average Export Price of Avocados**




Source: Prepared by the authors based on figures from the National Superintendency of Tax Administration (SUNAT).

Unlike the coast, where large producers predominate,[8] land ownership in the highlands is quite fragmented, with farm size averaging 1 to 1.5 hectares. For this reason, in the highlands it is essentially required to group producers into associative arrangements to achieve the minimum scale to operate profitably in crops like avocados.

Currently, approximately 97 percent of WFP's sales are of avocados purchased from external suppliers located in 14 regions in Peru, many of them small producers. WFP's main competitive advantage is the efficiency with which it can increase its production by integrating these suppliers. Other firms are emulating its model.

To ensure that its suppliers reliably deliver high-quality products in sufficient quantity, and that they remain loyal, WFP helps them earn the Group GlobalG.A.P. (Good Agricultural Practices) Certification option 2. This certification establishes procedures to guarantee quality and safety. WFP normally finances the seedlings (which are repaid over a multi-year period following the first harvest, which occurs three or four years after planting), provides technical assistance, and pays some of the costs necessary to obtain certification. For example, GlobalG.A.P. requires certain infrastructure and facilities for workers such as toilets, rest areas, or cafeterias, which are paid for by the producers. In

[8] The large irrigation projects, particularly Chavimochic and Olmos, have made it possible to cultivate large tracts of land that were previously desert, enabling the existence of large producers, some of which even exceed 1,000 hectares. For example, Camposol has 2,350 hectares of Hass avocado planted relatively contiguously in Chavimochic.

addition to technical assistance, WFP pays for travel and administrative costs associated with obtaining certification, as well as travel for GlobalG.A.P inspectors and for harvesters (to reduce the risk of errors during harvest, since it requires experience that is difficult for small producers to gain). Also, if smallholders run out of money before harvest, WFP can provide some bridge financing. Then, one of the entities locally accredited by GlobalG.A.P. inspects a random sample of small producers to verify on the spot if they meet the requirements. The certification is issued to WFP, its "holder."

The benefits of working to get certified are mutual. Small producers benefit because they have access to a certification that would be very expensive on an individual basis and that, in addition, allows them to export to more demanding and lucrative markets and therefore obtain better prices. WFP benefits because it guarantees certain standards and strengthens the loyalty of small producers—if small producers sell to a third party, they must do so without certification. Beyond working together to obtain certification, WFP commits to buy all avocados bigger than 100 grams at market price,[9] depending on the outcome of the certification process.[10] The producers, in turn, agree to sell WFP these avocados.

The benefits of working to get certified are mutual. Small producers benefit because they have access to a certification that would be very expensive on an individual basis. WFP benefits because it guarantees certain standards and the loyalty of small producers.

WFP's presence encourages associativity. The company requires a certain minimum scale in a cluster of producers in order to work with them, and in general prefers to negotiate the terms of the contracts with a producer association or cooperative—de facto or de jure. However, WFP signs individual contracts with each producer or family group of producers. The relationship is therefore bilateral.

### *Most Small Producers Are Successful*

In WFP's experience, approximately 80 percent of the small producers they engage with are successful. The remaining 20 percent are those that do not reach the expected production, do not carry out the work required to achieve certification, or simply do not honor their commitments to WFP and sell the production to third parties at harvest time.[11]

[9] Typically, the number of buyers at harvest time is substantial due to the high demand for avocados during the early months of the harvest in Peru.

[10] If producers are not certified, WFP can always buy the production from them to sell without certification on the spot market.

[11] These risks exist especially with seasonal middlemen who, for various reasons, may offer a price significantly higher than the market price to induce producers to sell to them. Typically, this offer is not sustainable, and risks are reduced as WFP's relationship with small producers is consolidated over time.

The reasons for failure are associated more with attitude than with a producer's intrinsic inability.

The probability that producers will sell to third parties in a country like Peru—where contracts are often not enforceable—is one of the reasons why WFP, aware of these risks, only finances or covers a percentage of the costs for the producers it works with. This appropriability problem means that there will be cases—presumably frequent—where social returns exceed private returns. In other words, there will be investments that have positive externalities or spillover effects that accrue to society, not just to the enterprises. By investing only when private returns exceed its costs, WFP will stop investing in cases where social returns (but not private returns) exceed its costs.

These situations in which the social returns presumably outstrip private returns go beyond the problems of appropriability. For example, WFP requires that small producers be in a relative cluster, such that there are 200 tons of avocados available per year in a specific location, the minimum scale for WFP to cover the fixed costs of establishing reliable marketing logistics, as well as local support services.[12] Likewise, it asks that each producer provide at least six tons of product, to be able to cover the costs of differentiating each farmer's production in the packing plant. This is because WFP—as a trader, not a middleman—must individualize production to ensure complete traceability for each producer. This kind of individualization is only profitable with certain minimum volumes.[13] That volume also requires obtaining a minimum amount of productivity per hectare. Thus, for example, a half-hectare smallholder farmer should have a minimum yield of 12 tons per hectare, a production level that a percentage of producers, especially those with structural problems—such as with the irrigation system or with the genetic quality of plants—may not reach.

These conditions (totally reasonable from WFP's perspective to meet its profitability goals) will tend to exclude producers that are located in remote areas, poorly connected, and who do not meet the individual productivity and cluster production requirements, all of which can also make the cost of transportation to packing houses prohibitive. The conditions likewise will tend to exclude those that do not have easy access to water. In some cases, when producers have enough water and are located at high elevations, WFP can work with those that have access to gravity irrigation. However, when water is a limitation, those producers will require access to technified solutions (without structural design problems).[14] Those that cannot self-finance investments will

[12] Until 2021, WFP did not have packing plants, so it contracted the services of third parties in various packing plants strategically located in different regions. Only recently did it begin construction on its own packing plant in Cañete, approximately 130 km south of Lima.

[13] The minimum volumes required are associated with certain fixed costs, such as picking up production from the farm, establishing bilateral contracts, assigning a time slot at the packing plant, and so on.

[14] This is a fundamental point. Avocado is highly dependent on irrigation, and errors in this area usually lead to failure. Oftentimes, the installation of technified irrigation is subsidized for small producers who have little

also be excluded. And naturally, WFP will not invest in public goods, such as road connectivity infrastructure. Therefore, there is a clear need for public policies that complement (and leverage) the efforts of companies like WFP.

### 4.2.2 Mercon Group: A Central American Multinational in the Coffee Industry

The Mercon Group is a unique case in the Central American coffee sector: a modest family coffee-growing and export operation in the 19th century that has become a global supplier of green coffee that participates in all phases of the coffee industry's production, marketing, and commercialization chain. It is comprised of export companies in Guatemala, Nicaragua, Honduras, Panama, Brazil, Viet Nam, and Ethiopia, and import companies in the United States and Spain. It also has its own nurseries and plantations in Nicaragua and a corporate headquarters in Holland. The group, however, is of interest for reasons that go beyond its business success.

The sustainability of coffee production in Central America is threatened by sometimes low coffee prices, low productivity, and the meager incomes of most producers, as well as their limited access to credit, training, and technical assistance. In its operations in this region, the Mercon Group has made the decision to directly offer training, technical assistance, and financing to small and medium-sized producers within a framework of environmental and social sustainability and support for the educational development of coffee communities, something normally offered by the public sector. The strategy has proven to be viable and successful. What has made this possible is changes in coffee demand due to the increasing concerns of customers and consumers about environmental and social sustainability in the industry.

The company's origins date to 1870, when the Baltodano family began to grow coffee in Diriamba, in Nicaragua's Pacific region. The transformation of a small family business into a professional and ambitious operation began 82 years later, in 1952, when CISA Exportadora was created, a company that by the 1970s had become Nicaragua's leading coffee exporter.

Business growth stalled with the nationalization of Nicaragua's foreign trade following the triumph of the Sandinista revolution in 1979. However, in the long run, that interruption proved fortunate. José Antonio Baltodano, who ran the company at that time, emigrated to the United States and, together with a small group of partners, founded a company dedicated to the purchase and export of coffee from a variety of origins. When CISA Exportadora restarted its operations in Nicaragua following the electoral victory of Violeta Chamorro in 1991, the business was no longer exclusively

understanding of how to operate it. Reservoirs generally require pumping equipment to deliver sufficient pressure to the field, but often there is no pumping equipment, so filters are removed to get around the problem, and then the hoses end up blocked.

that of a Nicaraguan coffee producer, but that of a global operator in the coffee market. From there, the company's international expansion proceeded quickly: It launched operations in Viet Nam in 1998, in Honduras in 2000, in Europe in 2003, in Guatemala and Brazil in 2013, and in Ethiopia in 2020.

The Mercon Group's business strategy has two facets. To its customers—the large roasting companies worldwide—it offers coffee from a broad portfolio of origins, consistent quality in each delivery, logistics and storage services, guaranteed replacement if necessary, and compliance with environmental and social standards for the higher-value market segments. For producers—especially in Nicaragua, where more progress has been made in certain processes—Mercon offers a structured program that combines technical assistance and financing.

### *Three Transformative Decisions*

Starting in 1997, three decisions transformed the future of the company and the producers that supply the coffee it exports. By 1997, CISA Exportadora's financing operations had reached US$9 million, and it was decided that it was not prudent for a portfolio of that size to be managed as a secondary business by a company that exports coffee. It therefore needed a company specialized in finance that, at the same time, had in-depth knowledge of the coffee industry. So Mercapital was launched to take over the entire loan portfolio in Nicaragua and provide technical support in the financing provided to the export companies in other countries, where the business volume did not yet justify the creation of a separate finance company.

By mid-2021, the short-term credit portfolio for producers had reached a volume of approximately US$25 million, while the long-term portfolio—launched recently and aimed at the renovation of coffee plantations—stood at around US$8 million. What is remarkable about this expansion is that Mercapital has developed a business model that allows it to offer credit to small producers—many of whom would not be eligible for bank credit—at interest rates that commercial banks offer to larger agricultural enterprises.

The second decision was made between 2003 and 2005. Cafés Solubles—a business belonging to the family but independent from the Mercon Group—briefly ventured into the cultivation of Robusta coffee in the New Guinea region of Nicaragua. After selling its instant coffee brands, Cafés Solubles lost interest in the project, but Mercon took it over and expanded it. Based on a number of studies, Mercon concluded that production of this variety was viable, the product had better qualities than that of other Robusta-producing areas, and the crop had significantly better profit margins than the cultivation of cassava or cattle ranching (the traditional activities in New Guinea region). Mercon then launched an expansion process that by 2021 saw CISA operating a 1,300-hectare plantation from which it expects a harvest of 50,000 quintals. It also has a network of approximately 600 suppliers, from which it expects to acquire 80,000 quintals.

Not only has this project made it possible to expand the production of Robusta coffee, it is also transforming an impoverished region where productive activities had caused great environmental damage into an increasingly prosperous community that uses environmentally responsible production practices.

The third decision was the transformation of the technical assistance and training offered to producers, which, like financing, began as something handled by the export companies in each country. In 2016, Mercon decided to formalize these activities into a three-year training program built around the pillars of productivity, environmental sustainability, and social development. The program was called LIFT. According to the data provided by the company, for the 2019–2020 harvest, producers that graduated from the LIFT program produced 1,446 kilos per hectare, compared to 978 kilos per hectare for non-graduate suppliers and a national average of 780 kilos per hectare. As of the 2020–2021 harvest, the program had a total of 2,900 graduates in Nicaragua, 396 in Honduras, and 707 in Guatemala, and it is supported by a syndicated international loan whose interest rate is linked to environmental and social performance indicators.

### *The Limits of Private Initiative*

Public services, including training, technical assistance, development of good environmental practices, and the provision of financing for small coffee producers, are clearly insufficient in Nicaragua. The experience of the Mercon Group shows that, within fairly wide margins, leading agro-export companies can compensate for weak public services and contribute to social and environmental sustainability. However, this case also highlights the limits of private action when it does not have proper financial and institutional support from the public sector.

The experience of the Mercon Group shows that, within fairly wide margins, leading agro-export companies can compensate for weak public services and contribute to social and environmental sustainability.

Facing up to the challenge of climate change requires implementing a large-scale program for the development of genetic material that is resilient to climate change and productive practices that make it possible to handle sharp changes in temperature and precipitation. Such a program requires a scientific and technological effort that is likely beyond the capabilities of any individual company. And even should a company try to develop it, it is unlikely do so at a scale that is socially optimal due to problems of innovation appropriability and positive knowledge externalities.

In the same way, the massive and accelerated expansion of training and technical assistance programs required could not take place without the injection of adequate public, national, or international cooperation resources.

The Mercon Group shows how much progress a visionary and successful business strategy can make toward overcoming the social and environmental sustainability challenges associated with coffee production. It also suggests that, in this and other agro-export activities, achievements can be multiplied by developing modern public-private cooperation arrangements.

### 4.2.3 Sol Orgánica: Successful Export of Organic Fruit from Nicaragua

Sol Orgánica is an excellent example of an anchor company that manages to connect small producers with international markets. Beyond marketing its products, it provides financing and technical assistance to its suppliers and helps them obtain certifications that allow them to get over the "quality hurdle" and access sophisticated markets. The company, which began by drying mangoes and other tropical fruits using solar dryers and exporting them to retail markets in the United States, today produces other ingredients such as organic fruit purees, and has managed to integrate into the global value chains of leading companies like Innocent Drinks (from Coca-Cola) and Happy Family (from Danone). Sol Orgánica's strategy focuses mainly on competition based on credence attributes, such as protecting the environment (with organic and regenerative production) and social responsibility.

#### *A Constantly Evolving Business Model*

During their visits to Nicaragua, Will Burke, the founder of Sol Orgánica and a U.S. citizen, along with his Nicaraguan wife, noticed the mangoes spoiling on the sides of roads. Knowing the value that those mangoes would have in Boulder, Colorado, where he grew up, Will Burke decided to set up a social enterprise that would connect small fruit producers with international markets. Coming from Colorado, where organic production is prized, he always expected his venture to be based on environmentally friendly agricultural practices. Thus, social responsibility and sustainability were present from the very founding of Sol Orgánica in 2007. Today, the business group consists of three companies: Sol Orgánica, which processes and exports fruit; Sol Orgánica, which distributes it in the United States and serves as the commercial brand; and Burke Agro, the group's agronomic arm, which provides technical assistance and financing to small producers. However, the reality of the company today is quite far from its original vision.

Burke wanted to raise donor capital and work with different nongovernmental organizations (NGOs) to help a group of single mothers grow mangoes and other fruits organically. He planned to use that capital to install small solar dryers on the farms and drive a truck to pick up the finished product. Then, he would handle packing and export to the United States. The product would be placed in cooperatives and independent supermarkets.

As his project progressed, Burke discovered that his original idea had several drawbacks. First, processing (drying) the fruit in the fields of the suppliers—who did not have the necessary capabilities—raised food safety issues. Although he was not planning on owning his own processing plant, he had to use his savings and invest US$56,000 in a fruit dryer and solar panels from Canada. Second, Burke wanted a local NGO to provide technical assistance to small farmers to help them move from traditional to organic farming. However, he could not find anyone who could or would do this, so he had to do it himself, forming a team of agronomists.

The case of Sol Orgánica illustrates the importance of being flexible and adapting the integration strategy as needed as it moves forward.

Burke began to realize that there was sufficient fruit production and interest on the part of the farmers to make the transition to organic production. There also was clearly a market for their products. However, the prices from selling in bulk were not high enough to cover the costs. So he had to differentiate the product by developing his own brand. The original plan did not involve the company having its own processing plant, team of agronomists, or brand development, illustrating the importance of being flexible and adapting the business strategy as needed as it moves forward.

All of this meant a need for more resources. Burke turned to his family first (one of his sisters partnered with him two years after the business launched) and, after five years, he was able to access resources from private equity funds. During the first six years, the business operated at a loss. It reached the break-even point by year seven. In 2016, the company received a non-reimbursable technical cooperation grant from IDB Lab for US$250,000 for a project to strengthen producer capabilities, develop a strategy for climate change mitigation and adaptation, and establish productive infrastructure in the field (e.g., collection centers).[15]

### *Word of Mouth: How Sol Orgánica Developed Its Supplier Network*

In the beginning, Burke would go out in his truck to find suppliers. Later, a number of rural development NGOs such as Technoserve and Catholic Relief Services, which worked closely with producer cooperatives, introduced their members to him. From there, the rest was through word of mouth: the producers themselves introduced him to their neighbors, relatives, and friends.[16]

[15] The project also included a US$1 million loan to build a new "green" processing plant with biodigesters and solar panels. In the end, the financing was not disbursed due to the 2018 sociopolitical crisis and then the COVID-19 crisis, which impacted the company's performance.

[16] In some cases, Sol Orgánica works with producer cooperatives, but in general, it has worked better for the company to engage directly with individual producers.

As mentioned earlier, Burke had to assemble his own team of agronomists to provide technical assistance to growers. He hired the first with a donation from a Canadian institution (MEDA). Today, Sol Orgánica has 18 agronomists who tour the fields on their motorcycles every day.

A central element of Sol Orgánica's strategy is organic certification, which it achieved in 2010 for its mango, pineapple, and banana producers; in 2012 for its dragon fruit producers; and in 2019 for its coconut producers.[17] The company pays US$20,000 a year for the group certification, of which it is the holder, although the cost of maintaining the team of agronomists and providing the technical assistance that allows the small producers to access the certification is much higher, as reflected in Burke Agro's budget, which is about US$400,000 per year. Although producers do not pay for certifications, they are responsible for covering the costs of some investments that may be necessary for certification, such as windbreaks or warehouses. In addition to providing technical assistance, agronomists monitor compliance with the agricultural practices required by the certification. The fact that the firm holds the certification does not prevent producers from selling to other customers, but it is only through Sol Orgánica that they can sell certified fruit, with its better margin.[18]

The certifier (Mayacert, a Guatemalan firm) performs an annual audit, including a physical inspection of 10 percent of the randomly selected farms. They inspect inputs and check for neighboring conventional farms that may compromise organic production. If major infractions are detected, the producer's certification is suspended or revoked. If there are minor infractions, an action plan is developed to resolve them.

Each producer is assigned to a collection center (Sol Orgánica has 18 of them) and is in contact with other producers in the area. The company also organizes workshops with producers from each area and brings in producers from other areas to share experiences. Agronomists design specific plant nutrition programs for each producer. The company buys inputs in large quantities and on credit, and passes this credit on to the producers. Even though Sol Orgánica adds 10 percent to the cost of these inputs, producers access them at highly discounted prices compared to what they would pay if they procured them on their own. Typically, inputs are provided four months before the season begins, and costs are deducted when the produce is purchased after harvest. Payment is by weight, not by unit, which increases the incentives for producers to implement the plant nutrition programs recommended by agronomists to produce larger fruit.

Before working with Sol Orgánica, farmers had to get to the road, get on a bus with their bags of fruit, and take them to the market. Now they take them to the collection

[17] See Chapter 7 for a discussion of Sol Orgánica's most recent foray into regenerative agriculture.

[18] The premium for organic production ranges from 10 percent for dragon fruit (previously much higher) to 30 or 40 percent for mangoes and bananas. Fair trade certification adds an additional 15 percent premium, which producers must invest in projects of their choice.

center, which is much closer. Each center has computerized systems that generate receipts, and the company deposits the corresponding payment (after discounting the value of the inputs) in the bank accounts of the producers within seven days of receipt of the fruit. To date, the company has facilitated the opening of more than 800 bank accounts for producers in its network.

All of this—the connection with sophisticated international markets and organic certification that generate higher prices for the producer, technical assistance, credit and the joint purchase of inputs, the time saved by not having to travel to the market, and the opening of bank accounts—results in more income and a higher quality of life for producers. Burke estimates that prior to joining the Sol Orgánica chain, a small dragon fruit producer with one hectare could generate an average of about US$1,000 per year, whereas today that same producer can generate between US$2,500 and US$3,000.[19]

According to information provided by the company, in 2019, Sol Orgánica worked with 1,079 small producers, more than 70 percent of them with organic certification. The farms have an average size of 0.8 hectares, and 30 percent of them are managed by women. The value of the organic fruit purchased in 2019 amounted to US$1.48 million, or US$1,944 per grower.[20] The network of producers has grown rapidly in recent years, increasing fivefold between 2013 and 2019.

### *Commercial Strategy*

Initially, Burke traveled to California—which he considered the most promising market—and visited several independent supermarkets and cooperatives. Emphasizing sustainability and social responsibility, he managed to enter 25 points of sale. He established a warehouse in San Francisco and from there distributed the solar-dried fruit in bulk.

In 2010, looking to expand his clientele, Burke made two key decisions: to actively participate in trade shows, and to work with a broker.[21] At his first trade show, *LAC Flavors* in Cartagena, Colombia, Burke met a broker seeking to represent organic products and began working with him. At his second trade show, through the broker, he got his first big client: Whole Foods, a supermarket chain specializing in natural and organic products, acquired by Amazon in 2017. Whole Foods remains to this day the company's most important retail customer, although it also sells products—including solar-dried dragon fruit, mangoes, bananas, and pineapples—to other consumers through a large network of natural supermarkets in the United States, Latin America, Asia, and Europe. The wording

[19] Burke reports that many more producers are now using motorcycles, and that some producers have been able to buy a truck or improve their homes. Some have been able to buy more land and send their children to college.

[20] As a point of reference, Nicaragua's GDP per capita in 2019 was US$1,912. According to Burke, around 70 percent of these farmers' income comes from sales to Sol Orgánica.

[21] The strategy of participating in fairs is still in place. Between 2014 and 2020, Sol Orgánica has participated in 17 events, including Anuga and Biofach in Germany, Sial in France, and Expo East and Expo West in the United States).

on the packaging (simply fair trade, small farmer grown, organic, nurture your planet) makes clear the importance of credence attributes as a sales pitch and business strategy.

### *From Dehydrated Fruit to Ingredients, and from Retail to B2B*

Although Sol Orgánica first ventured into the world of retail through its solar-dried fruits, it has diversified into natural fruit-based ingredients (mainly purees and juices, but also frozen fruit and bulk solar-dried fruit as an ingredient for processed foods). This diversification also implied changes in the nature of customers, from retail to business-to-business (B2B). The change in focus has been so substantial that Whole Foods now only accounts for 5 percent of Sol Orgánica's sales.

The drive to diversify into ingredients had multiple motivations, both on the production side and the demand side. On the production side, the dryers have long cycles, up to 15 hours, and take up a lot of space. A plant to process puree has a much smaller footprint, and works much faster. Therefore, it is easier to scale and process in large quantities. The change required new investments in pulpers, freezers, and packaging equipment. On the demand side, the momentum originally came in demand for dragon fruit (*pitaya*) and, in particular, a single customer, Pitaya Foods, for which organic production was key.[22]

From its foray into ingredients, Sol Orgánica established relationships with important corporate clients such as Innocent Drinks, Patagonia Provisions, and Happy Family. The relationship with these corporations has contributed to the company developing new capabilities.

Innocent Drinks is a UK manufacturer of smoothies and juices that was acquired by Coca-Cola. The firm has sales of more than US$500 million, mainly in coffee shops and supermarkets. For this company, organic is not crucial, but it does seek to connect its customers with Sol Orgánica's history of social impact. Innocent Drinks invests heavily in developing its suppliers. For Sol Orgánica, it sent technicians to train company personnel on topics including post-harvest practices, plant health and safety, and required quality thresholds. While it does not require aesthetically perfect fruit, Innocent Drinks is very demanding in terms of the consistent flavor and aroma of its ingredients, and it tests samples on every shipment. Additionally, Coca-Cola conducts two audits per year at the company's facilities.

Through Patagonia Provisions, the food division of the company Patagonia, Sol Orgánica was certified in regenerative agriculture, a new agronomic system that not only seeks to avoid land degradation, but also to regenerate it.[23] It now produces food with multiple ingredients for Patagonia Provisions, such as solar-dried mango combined with

[22] Pitaya or dragon fruit is native to Nicaragua and Costa Rica. Its production was promoted in the 1980s by the Sandinista government. Currently, Sol Orgánica buys 80 percent of the dragon fruit produced in Nicaragua. It is, in fact, the fruit that the company processes the most, having overtaken mango in 2013.

[23] See Chapter 7 for more detail on the concept of regenerative agriculture and Sol Orgánica's experience with these agricultural practices.

organic lime juice and organic ground chili. It also sells regeneratively produced mangoes in bulk, which Patagonia then uses to produce snack bars (e.g., mango and almond bars). Patagonia Provisions is a global leader in the regenerative movement, so the ability to produce using these methods is a key element of the lessons Sol Orgánica has learned through its relationship with this client. In fact, Sol Orgánica was one of the first 22 companies in the world—and the only one in the fruit sector—to obtain this certification.

Happy Family is a company that produces organic food for babies, children, and nursing mothers. Its mission is to "change the trajectory of children's health through nutrition." Happy Family belongs to the Danone group. Specifically, Sol Orgánica sells organic fruit purees as an ingredient for Happy Family's organic baby food in pouches.

How did Sol Orgánica connect with these new clients? One essential element was networking with NGOs such as Sustainable Food Lab, Technoserve, and Catholic Relief Services, and with government agencies such as the U.S. Agency for International Development. From there, through participation in fairs, seminars, and other events, the company became involved with other like-minded producers, with other donors, and with clients that sought to establish ties with suppliers clearly branded as socially and environmentally responsible.

As is evident, this brand was fundamental for these clients, making obvious the importance of credence attributes in the company's competitive strategy. Without these attributes, Sol Orgánica would not be selling to any of its B2B clients, which seek to connect their own clients with Sol Orgánica's history of sustainability and social impact. The clearest example is that of Patagonia Provisions, which not only invited Sol Orgánica to participate in the regenerative agriculture pilot project, but also included a video of Sol Orgánica and its suppliers on its own website.[24]

### *Sol Orgánica's Next Steps: Fresh Fruit?*

Sol Orgánica is now entering the fresh fruit market, particularly by exporting dragon fruit to Costa Rica. This has significant complementarities with processed fruit: exporting top-quality fresh dragon fruit provides better prices for the producer and, in turn, reduces the price of fruit with cosmetic defects that the company can use for processed fruit, thus becoming more competitive.

The challenge with fresh fruit is that the phytosanitary requirements are stricter. To address this challenge, Nicaragua would need better phytosanitary controls, better public-private coordination (e.g., with the Institute for Agricultural Protection and Health), and a more developed cold chain. Despite these shortcomings, Sol Orgánica has started the process of exporting fresh pitaya to the United States. Toward this end, it has undergone a virtual inspection by the Animal and Plant Health Inspection Service of the U.S. Department of Agriculture and is hoping for an in-person inspection soon.

[24] See https://www.patagoniaprovisions.com/products/regenerative-organic-chile-mango.

5

# Associativity as a Strategy to Enter High-value International Agrifood Markets

## Smallholder Producer Cooperatives in Latin America

• Lilia Stubrin

This chapter analyzes five small agrifood producer cooperatives in Latin America that have developed successful international expansion strategies in market segments that value credence attributes such as environmentally friendly production, the ability to leverage social benefits for local producers, and health benefits. The first section develops the conceptual framework by examining the horizontal associativity model as a strategy for small agrifood producers to enter international markets. The second section presents the five case studies: Coopsol, a cooperative of 600 organic honey producers in Argentina; Mi Fruta S.A., a Chilean company made up of 28 small table grape and raisin producers from the smallholder farm segment; Corporación Fortaleza del Valle (CFV), a partnership of 1,000 high-quality cocoa farmers in Ecuador; Asociación Nacional de Productores de Quinua (ANAPQUI), one of the oldest smallholder producer organizations in Bolivia, made up of 12 regional organizations with 1,800 members focused on producing and exporting organic royal quinoa; and Asohass, an avocado producer and export cooperative in Colombia. The final section presents the main lessons learned from the case studies.

This chapter analyzes five small agrifood producer cooperatives in Latin America that have developed successful international expansion strategies in market segments where differentiation and quality are key, and where credence attributes are valued.

## 5.1 Horizontal Associativity as a Model: Conceptual Framework

Small agrifood producers face significant challenges in marketing their products through modern agrifood chains. At a minimum, these systems require complying with high standards for quality, health, environmental impact, and working conditions; reliably and efficiently meeting the demands of increasingly sophisticated customers controlling supply chains; and having the ability to continuously learn as standards and market conditions change. Small-scale producers with little or even no access to financing, and with limited production capability and practices that fall far short of the new production standards, find themselves in an unfavorable position for successful entry into today's markets. The "quality fence" found in domestic markets is even more demanding when producers seek to integrate reliably and permanently into international markets (Sabel and Ghezzi 2021). These markets also require compliance with stricter traceability, safety, and quality regulations, as well as having special certifications such as those associated with certain credence attributes such as organic production, carbon-neutral and carbon-sequestering production processes, and fair trade. Small-scale producers must also meet more demanding product specifications and address significant bargaining power asymmetry with large global food marketers that control the value chain (Dolan and Humphrey 2004; Fernandez-Stark et al. 2011; Henson and Humphrey 2010).

Associativity between small producers is a key element for successful entry into modern agrifood markets and, in particular, into the international market. The previous chapter analyzed vertical associativity, which is when small agricultural producers partner with a lead company (of medium or large size) as suppliers. This chapter analyzes horizontal associativity that takes the form of ass or partnerships (Heyder et al. 2011; Bretos et al. 2018). This conceptual section discusses the benefits that the horizontal associativity model can offer to small producers to export, the challenges of these types of models in practice, and the success factors that mitigate or offset the challenges.

### 5.1.1 Advantages of the Horizontal Associativity Model

The literature highlights how horizontal associativity between small producers enables them to reach economies of scale and increase their bargaining power. This is essential to overcome many of the barriers to accessing today's agrifood markets. First, reaching economies of scale through associativity gives small producers several advantages, including sharing the fixed costs associated with investment in infrastructure and equipment; obtaining and processing information on export markets that is otherwise done individually; building and preserving brand equity; and complying with certifications and export standards. This last point is key for accessing markets, where the credibility of

the product is valued and where complying with the respective certifications requires paying fixed fees and even making investments and securing training (e.g., in group organic certifications). When formed collectively, cooperatives drastically reduce barriers to entry for small producers. Particularly with regard to training, collaboration between producers enables them to share and reduce the individual cost of acquiring good practices and monitoring their application.

Horizontal associativity also provides greater marketing power and negotiation capability than each producer would be able to attain individually. Thus, the associativity or cooperative model enables small producers to access better prices for inputs and services, as well as better terms and sales prices with their clients. In addition to the individual economic benefit for producers, joining a cooperative brings other advantages beyond the economic elements. For example, the literature indicates that the social fabric woven by cooperatives helps develop group capabilities in terms of resolving conflicts and empowering small producers to defend shared political and environmental interests (Gutiérrez 2014).

### 5.1.2 Weaknesses of the Horizontal Associativity Model

The aforementioned advantages notwithstanding, the cooperative model also poses some challenges. Traditionally, its weaknesses are related to how the model operates, and they include free riding, conflicts of interest, control problems, lack of a sense of community, and management problems.

**Free riding.** This problem arises when a cooperative treats members the same way as non-members (e.g., offering the same prices) and when all cooperative members receive the same benefit, regardless of their individual efforts. In the first case, it is not necessary to join the cooperative and financially support its strategy to enter international markets, undermining producer motivation to make the necessary individual investments. In the second case, producers may have an incentive to make less of an effort or not meet the required quality standards, which can significantly impact brand equity and the success of the cooperative itself.

**Conflicts of interest.** Members of a cooperative do not all necessarily pursue the same objectives or have the same outlooks. The greater the heterogeneity within a cooperative, the more costly it is to make decisions collectively, making it difficult to react and make strategic decisions in a context of markets undergoing transformation.

**Control problems.** The “one person, one vote” principle makes it very difficult for individual members to influence strategic decisions that involve a change in orientation or

direction. For example, it could be difficult to make changes to strategies for international expansion without the support of a certain number of members or administrators who may be reluctant.

**Lack of a sense of community**. When cooperatives emerge as a result of State transfers and subsidies, their efficiency is usually lower than when an organization's objective is community-driven. Having a sense of community is key to the proper functioning and survival of the cooperative model in the longer term. Therefore, promoting associativity through tax benefits or grants in the absence of community elements will very likely produce cooperatives that do not function as they need to or that only last as long as the benefits do.

**Management problems.** The lack of human resources with management and leadership skills is a central problem for the proper functioning of cooperatives. Cooperative leadership often has little management know-how and is not very focused on it, which negatively impacts strategic decision-making.

### 5.1.3 Success Factors

The different levels of capability of small agrifood producer cooperatives to handle the challenges of the model explain the different trajectories they take in terms of both their operation and in developing international expansion strategies. However, international evidence indicates that a significant number of the world's agrifood cooperatives have found a way to handle these challenges by devising corporate governance mechanisms and new organizational forms, leading to increased international expansion of their activities (Ebneth and Theuvsen 2005; Heyder et al. 2011; Bretos et al. 2018; Bijman 2016). Even smallholder producer cooperatives have been able to develop business models that allow them to be highly innovative in developing products or varieties tailored to the new consumer (e.g., through the implementation of sustainable production practices), creating a brand strategy, managing quality control standards, and implementing traceability models (Fayos et al. 2011).

For international expansion by smallholder producer cooperatives to go smoothly and successfully, it is essential to have bonds of trust among members, good governance, and professionalized management.

For international expansion by smallholder producer cooperatives to go smoothly and successfully, it is essential to have bonds of trust among members, good governance, and professionalized management. A professionalized management team can

more efficiently perform a number of key tasks, including the following (Marí Vidal et al. 2013; Calderón et al. 2013):

i. *Developing a value strategy for products.* Traditionally, agrifood cooperatives have focused on selling their members' products without considering other elements that provide added value to them—that is, focusing on how to bring the harvest to market rather than on how to orient it to the market to give the consumer and customer what they want and need.
ii. *Understanding and staying up to date on changes in demand.* The distance between the primary producer and the consumer is great, and it can be difficult for producers to receive the signals being sent by consumers.
iii. *Addressing producer risk aversion.* Barriers resulting from size and corporate culture can cause risk aversion when it comes to investing in an international strategy.
iv. *Having the capability to negotiate.* The cooperative must face growing competition in the market from large agrifood companies that can offer more competitive prices and that are more flexible commercially. They also must deal with the concentration of the distribution sector and the subsequent weaker market power of cooperatives vis-à-vis their clients.
v. *Solving free rider problems* arising between members of the cooperative and even between members and producers outside the cooperative.
vi. *Reducing dependence on middlemen* by exporting directly to foreign distribution chains.
vii. *Being able to connect with other organizations* to access financing, market knowledge, or technological know-how, among other things.

Another success factor is the connections that cooperatives make with other public actors (national and international) and private actors (mainly nongovernmental organizations). In many cases, these actors play a crucial role in providing information and analysis on foreign markets, technical assistance, infrastructure, and financing to implement actions that support cooperatives in their strategies to grow internationally and enter markets abroad.

## 5.2 Five Cooperatives that Successfully Expanded Internationally: Case Studies

### 5.2.1 Coopsol: Honey Producer and Exporter in Argentina

The Coopsol cooperative, which produces and exports conventional and organic honey, was founded in 1989 by 10 producers from Santiago del Estero, one of Argentina's more

economically trailing provinces. With a production model based on good environmental and social practices, the cooperative has grown significantly in recent years to become one of the largest and most inclusive organic honey production chains in Argentina. Between 2010 and 2019, the cooperative expanded from 130 to 600 member producer families, with sales reaching US$1.6 million.

Coopsol's successful growth and export model is based on three elements:

- *Early entry to the Brazilian market.* Coopsol began exporting to Brazil just five years after it formed, first directly and then through a subsidiary there. This experience was central to learning about the commercial, marketing, logistics, and financial issues involved in the export business. In 2001, in the context of a very adverse economic situation in Argentina, Coopsol faced one of the most significant crises in its history and had to close its subsidiary. However, the crisis drove it to seek other foreign markets and establish a business model that would be more sustainable in the long term.
- *Certifications for organic and fair trade production in order to enter higher-value markets.* Coopsol began seeking organic agriculture certifications for its producers in 2005 and fair trade certifications in 2006, allowing it early entry into high-value global market niches. Organic honey production is worth at least 20 percent more than conventional honey production. In the case of fair trade, producers receive a "social premium" of between 5 and 15 percent of the value of the product to reinvest in the business. The cooperative, which has an office dedicated specifically to monitoring its members' production practices, has increased fair-trade-certified organic production every year. Of the 130 producers associated with the project in 2011, fewer than 20 had organic certifications, while by 2018, of the 600 producers involved, 200 had organic and fair trade certifications. Thus, in 2018, of the 25,000 member hives, almost a third (8,000) were organic. This made it possible to export 210 tons and nine containers of honey with this certification. Coopsol's provision of financing and technical assistance to producers to help them obtain certifications is essential for the process.
- *Market diversification and direct marketing.* Unlike most Argentine honey exporters that orient production toward the United States, Coopsol has diversified its international markets and exports directly to its clients abroad. Its main clients are European countries such as Germany and France. In addition, its status as a direct exporter gives it an advantage over small and medium-sized conventional producers that face unfavorable conditions compared to the large exporters that dominate the Argentine honey market.

In order to enhance its international growth, Coopsol is strengthening its traceability system and developing a value-added strategy that will help it enter the functional

food market. Regarding traceability, 10 years ago, the cooperative implemented the system required by Argentina's National Service of Agrifood Health and Quality (*Servicio Nacional de Sanidad y Calidad Agroalimentaria* – Senasa) in order to export. The system documents the product's journey from its supplier through to final production. As a result, each drum of honey processed in the Coopsol plant has a record identifying the batch producer and the type of honey (organic, conventional, multifloral, or unifloral). Coopsol recently began developing a complementary traceability system in collaboration with a local university (Universidad Católica of Santiago del Estero) and IBM, based on the company's blockchain technology. This tool consists of a collaborative platform in which different actors (producers, processors, wholesalers, distributors, manufacturers, and retailers, among others) connect through a non-modifiable registry accessed with exclusive permission. The registry provides information on the origin of the food, transaction data, and processing details. It is Coopsol's understanding that the use of this traceability system will enable it to add value to its product, offering consumers who are willing to pay a premium for environmentally and socially sustainable products real-time access to information on the cooperative's production practices and standards.

Coopsol is also engaged in research projects, enabling it to scientifically identify the nutritional and medicinal properties of one of its unifloral honeys. Specifically, it is working in association with the Universidad Nacional de Tucumán and with the support of Argentina's Ministry of Science, Technology and Productive Innovation to establish the properties of honey from the atamisqui, a flower native to Santiago del Estero, thus enabling it to sell its products on the nutraceutical market. According to the local residents, the atamisqui flower has unique nutritional and healing properties and has been used for centuries in the area for these purposes. The anti-inflammatory analgesic effect of atamisqui monofloral honey was recently confirmed, with the results published in 2019. This initial finding and its publication are valuable to the cooperative because it can begin publicizing the properties of honey to help enter higher-value markets.

It should be noted that Coopsol can be understood as a social enterprise that, in addition to its economic objectives, has environmental and social goals and has succeeded in making these goals an important part of its business. In social terms, Coopsol works proactively with nongovernmental organizations (NGOs) such as Gran Chaco and El Futuro está en el Monte, with which it collaborates to support small farmers in the diversification of production into complementary activities such as animal husbandry, artisanal activities, and agroforestry, given that beekeeping is by itself insufficient to secure the economic income their families need. This work involves providing support to access financing programs and advice on production and trade issues. Thus, the cooperative ensures the viability of its project (which depends on the supply of honey from its region), contributes to regional development, and positions itself as a socially responsible enterprise.

In 2012, the cooperative joined the farmers of the Gran Chaco (organized into the association known as the Asociación de Productores Orgánicos del Norte Argentino – APONA[1]) to found an association consortium called the Consorcio Bio del Norte Argentino (WAYRA), based in the province of Santiago del Estero. This consortium is key to producing and disseminating skills, production practices, standards, and even financing for initial capital without which small producers could not be part of the value chain and Coopsol would not be able to reach the necessary production levels. This consortium enabled Coopsol to secure an organic certification and a fair trade certification—both collective—with the certifier Foodsafety. This type of certification was the first of its kind in Argentina and was made possible by Coopsol's early cooperative work and its commitment to operating as an intermediary organization to ensure its small producers comply with procedures and standards.

Similarly, the cooperative's investments in collective environmental assets in the Chaco countryside serve the dual purpose of contributing to environmental goals and laying the groundwork for a value-capture strategy that targets green markets. Beekeeping promotes stewardship of nature because it uses its resources by preserving them. Bees can only produce honey in environments rich in flora. Thus, just by promoting beekeeping in the Gran Chaco, Coopsol makes a significant contribution to the environment. This contribution becomes even more clear given that the productive alternatives in the area involve clearing land for large-scale agriculture or, for small producers, producing charcoal, which also destroys the forest.

A central element driving Coopsol's strategy is its ability to build networks. These partnerships have been especially important when it comes to financing and technical issues, research and development (R&D), territorial work, and promotion. Coopsol started with support from funders and donors including the Italian NGO Fondazione Sipec, the Institute for Peace, Development, and Innovation, Christian Associations of Italian Workers (IPSIA, ACLI), and the European Community. In 2007, Coopsol formed ties with the Inter-American Foundation (IAF) of the United States, and in 2008 it began to work with the aforementioned IPSIA foundation, two foundations that grant funding to support activities that contribute to economic, social, and community development. With funds from these institutions, the cooperative established the apicultural credit program and technical assistance for small producers, consolidated the WAYRA network, and expanded it to Bolivia and Paraguay. It also built the production plant that the enterprise now owns in La Banda, in Santiago del Estero.

Over time, the enterprise became profitable. However, it continues to use different donors to expand the impact of its activities and introduce changes and innovation.

[1] Established in 2009, APONA is made up of small producers and peasant families who started organic beekeeping working closely with Coopsol.

For example, in 2016 it again obtained funding from the IAF to expand its network of honey producers and its business. Starting in 2020, it began working with funding and technical cooperation from IDB Lab to support a farmer connectivity program enabling Coopsol to get involved in the traceability project. Thus, the cooperative takes advantage of these institutions' resources and capabilities to improve and expand its impact.

Regarding State support, Coopsol has successfully used public programs that have enabled it to acquire equipment. Such is the case for a machine for making molasses (*caña de miel)* financed by the Social Technologies Program of the Ministry of Science, Technology and Productive Innovation, and a machine to portion honey and print QR codes, financed by the Ministry of Social Development. However, Coopsol has been less successful at finding public support for developing training programs for farmers on production, technology, and management, and for financing R&D activities, such as the aforementioned research on atamisqui honey.

Coopsol sees a variety of barriers to its growth. Internally, one of the challenges is to develop its own brand that would allow it to reduce bulk sales, which account for most of its sales. The cooperative currently holds a minority stake in the Bees for Hope brand, together with a French strategic partner. The initiative aims to sell organic honey from France directly to northern Europe, using a sustainable commerce approach. Not only is Coopsol the primary supplier to Bees for Hope, it also participates at all levels of the firm's decision-making process and on its board of directors. Engaging in more of this type of activity is one of the challenges facing the cooperative. Other challenges are more related to external barriers: keeping natural areas free of pesticides and GMOs, as Coopsol members are threatened by the advance of the agricultural frontier and deforestation in the region; and connectivity problems faced by producers, most of whom are located in regions with very poor telephone and digital infrastructure. This directly affects some of the cooperative's initiatives such as the implementation of traceability programs, which require producers to upload data on their production in real time.

### 5.2.2 Mi Fruta S.A. in Chile: A Company Focused on Table Grapes and Raisins

Mi Fruta S.A. is a Chilean company made up of 28 small table grape and raisin producer partners who correspond to the smallholder farm segment in the Valparaíso region. Mi Fruta's partner producers own a total of 180 hectares, with an average of 6.5 hectares per farmer. The company stands out as one of the few small farmer ventures in Chile that has been successful at entering international markets. The enterprise emerged in 2008 from a public program called "Precompetitive Innovation Node on Fair Trade Products Produced by Small Producers and Small Family Farm Agriculture," with financing

from the Corporación de Fomento de la Producción (Corfo).[2] This program sought to narrow technological and production gaps so that small producers could meet the standards required by the Fair Trade Labeling Organization (FLO) and export directly. With support from this public program, the 28 small raisin and table grape producers were able to receive the technical support and financing they needed to secure the fair trade certification in 2009. They made their first fair-trade-certified export that year. Since then, the Mi Fruta producers have followed a strategy of maintaining their fair trade certification annually, as that certification has become a strategic asset for them to gain international market share.

Initially, Mi Fruta exported under its fair trade certification to the United Kingdom, securing prices that were on average of 35 percent higher and reduced payment times for its producers (from 210 days for traditional exports to 75 days, on average). Since then, it has increased both the volume sold and the array of destination markets, with sales of almost US$1.4 million in 2018. More recently, it has entered the Chinese table grape market, which accounted for 83 percent of sales abroad in 2019.

The lessons learned by the farmers of Mi Fruta while securing the fair trade certification were key for subsequently obtaining other certifications. They include adopting the British Retail Consortium (BRC) standards for dehydrated products; obtaining GlobalG.A.P. certifications, which ensure compliance with environmental protection standards; measuring their carbon footprint in order to fulfill the company's environmental plan; and beginning the Halal certification process toward compliance with the requirements of Islamic law in countries with Muslim populations. These certifications have resulted in more sustainable practices and higher-quality and more differentiated products. But they have also required investment. In terms of agricultural practices, the producers of Mi Fruta have incorporated state-of-the-art irrigation measurement equipment that has enabled efficient water use management and reduced the incidence of diseases associated with excess water in their vineyards. The partner farmers also have two of their own packing plants that meet the requirements of the international market and operate efficiently and with special packing (thermoform), adding value to the product.

Another key element of Mi Fruta's successful entry into international markets has been its ability to respond to changes in international demand. In 2016, the company began a process of changing over to more productive varieties in greater demand than the products its partners traditionally produce (Flame, Red Globe and Thompson grapes). This has led to adding 20 hectares of a new closed royalty cultivar called Maylen. The Maylen grape is the first cultivar of Chilean origin and was developed after more than three decades of research within the framework of a public-private partnership between the Instituto de Investigaciones Agropecuarias (INIA) and the BioFrutales

[2] Corfo is a Chilean public agency whose mission is to support entrepreneurship and innovation.

technological consortium. This grape variety, which has a bluish color, good size, and intense classic flavor, can be stored for up to 90 days, enabling it to reach distant markets with a longer time window. Exports of the Maylen grape from Chile began only recently and only account for 0.35 percent of total Chilean table grape exports, so Mi Fruta can be considered one of the pioneer companies in this regard. Membership in the club of those who grow this variety requires payment of a royalty of US$8,000 per year. Producers hope that this investment will allow them to increase their productivity and grow their markets.

Mi Fruta's strategy of good quality and product differentiation is grounded in solid managerial practices and the benefits of partnering for access to infrastructure, knowledge, financing, and public goods. The company is managed by a board of directors and has a stable structure made up of a general manager, a general administrator, and two export managers. This simplified structure allows the exporter to pass most of the value generated through the trade process on to its producing partners. At the same time, it enables Mi Fruta to access skilled human capital for managing the export process. The general manager's leadership and the staff's abilities have been key to analyzing marketing strategies, establishing fluid and close relationships with clients—including by traveling to destination markets and receiving clients in the production area—and incorporating innovations such as the adoption of more sustainable production practices, which have made it possible to obtain certifications and external financing. Mi Fruta's producer partners also receive advances against future exports and have access to bank financing.

In addition, Mi Fruta has received an array of public policy support, including technical and credit support for small agriculture from the Instituto de Desarrollo Agropecuario (INDAP) of Chile; financing for association enterprises from Corfo's Development Program (Profo), which was key for Mi Fruta to consolidate its export process between 2010 and 2016; support from Corfo's Supplier Development Program starting in 2017 to improve quality and secure certifications; and financial support for visits to foreign markets and to obtain training and information on new markets from the Fondo de Promoción de Exportaciones Silvoagropecuarias, administered by ProChile. In 2019, 15 of Mi Fruta's partner farmers participated in a trip to Murcia, Spain organized and cofinanced by the Fundación para la Innovación Agraria (FIA) under one of its grant programs, during which they had a chance to learn about irrigation and soil management systems, as well as new varieties.

Growth challenges for Mi Fruta include continuing to pursue certifications, promote the changeover to the varieties most in demand by the market, grow in new destinations such as Southeast Asia and China, and consolidate sustainable production practices by adopting technologies that use fewer agrochemicals and less water and by taking a comprehensive approach to pest control.

### 5.2.3 Corporación Fortaleza del Valle: A Partnership of Cocoa Farmers in Ecuador

Corporación Fortaleza del Valle (CFV) is a farmer cooperative in Ecuador that produces, stores, and markets high-quality cocoa beans (fine cocoa and aroma cocoa). This segment specializes in the gourmet chocolate niche market, which has boomed in recent decades and is expected to continue growing. The association was founded in 2006 with the merger of two local organizations (Fortaleza and Valle del Carrizal), initially with 60 members. Horizontal associativity has enabled farmers to better face the challenges of high transportation costs through economies of scale and enjoy greater bargaining power with respect to intermediaries.[3]

At present, CFV is comprised of four agricultural cooperatives with around 1,000 members whose farmland covers a total area of nearly 17,000 hectares of agroforestry systems. Their annual sales of organic cocoa amount to approximately 600 tons, generating annual gross revenue of US$2.85 million. Most of the high-quality production goes to the Swiss market (80 percent).[4]

CFV's international strategy is based on three important pillars: production systems that meet the growing demand for credence attributes in the gourmet chocolate markets; post-harvest practices that ensure the quality of the final product; and an efficient management system prioritizing direct sales on the international market.

Regarding credence attributes, CFV offers high-quality cocoa on the international market under a certified organic and agroforestry system. The partnership produces fine organic cocoa and flavoring cocoa with organic certifications from Bio Suisse and the U.S. Department of Agriculture (USDA). Its products are also Fairtrade certified. The costs of these certifications are borne by CFV, and the producers cover this expense with a percentage of their sales, deducted over time. It should be noted that the cooperative buys both from certified partner producers and from third parties with organic certifications (Bio Suisse and USDA). In order to promote these types of productive practices among its members, CFV provides technical assistance and training based on the quality standards imposed by the Agency for the Regulation and Control of Plant and Animal Health (Agrocalidad).[5] It also provides training on a number of crop

[3] These are frequent problems faced by the small non-partnered cocoa producers in the region (Barrera et al. 2019)

[4] The remaining production goes to the United States (10 percent), the Czech Republic (5 percent), and customers in Germany, Italy, France, and the local market (5 percent).

[5] Agrocalidad supervises quality control in the cocoa value chain in Ecuador. It is in charge of establishing and enforcing procedures for registering and certifying the cocoa storage and collection centers; registering and certifying nurseries and producers of national cocoa plant materials; mandatory fumigation of batches of cocoa beans intended for export; and various quality certifications for cocoa intended for export, including organic certification.

management practices (including pruning, pest and disease control, crop rotation, and crop management in agroforestry systems), and provides its producers with tools and organic inputs. With the fair trade premiums, CFV gives its members a Christmas bonus and covers the costs of providing free technical assistance, along with providing interest-free loans and general assistance to producers.

CFV's relationship with each partner producer is contractual. This minimizes producers' exposure to price fluctuations and motivates them to invest in their operations. In addition, the members of the cooperative receive higher prices than on the market. For example, according to its CEO, CFV paid US$48 per quintal in 2020, while middlemen were offering US$30. The use of purchase contracts also helps CFV enforce quality control. In accordance with its statutes, and because CFV focuses exclusively on organic cocoa, partners who use non-organic products in production face penalties and contract cancellations. CFV performs on-site controls to monitor possible irregularities in production and comply with the organic verification and traceability standards required by certifiers.

Post-harvest practices (the fermentation and drying of the beans) are critical to the flavor and aroma of cocoa beans, the two characteristics that are most prized in gourmet markets. Their correct implementation requires both knowledge and the appropriate capital and technology.[6] CFV ensures the quality of these practices by acquiring cocoa beans from its producers prior to fermentation and drying, and following the requirements stipulated by Agrocalidad. These practices ensure a homogeneous post-harvest process and enable CFV to customize fermentation and drying based on buyers' demands. Following this process, the cocoa beans are stored in two collection centers (Centro de Calceta and Membrillo-Quiroga) until they can be sold.

Another critical feature of CFV's success is direct sales. The main motive for establishing the association was lack of adequate marketing channels for farmers, who faced high transport costs and price discrimination from intermediaries.[7] CFV maintains direct relationships with its buyers that in many cases date back more than a decade. These ties rest on the quality of the product and delivering the product as promised throughout the year.

[6] Proper fermentation time varies by cocoa variety, and fermentation methods generally involve the use of wooden boxes and piles of leaves. It is also recommended that the beans be stirred regularly throughout the process to achieve homogeneous fermentation. The grains are dried to reduce their moisture content by up to 7 percent in order to facilitate storage and subsequent transport. This process is normally done by drying them in the sun on concrete floors. An example of bad post-harvest practices include is using roadways to do the drying because of a lack of access to cement floors, which exposes the beans to exhaust. Additionally, unpredictable rains can impact the beans' quality.

[7] Ecuador's cocoa value chain involves significant participation of intermediaries that perform marketing activities, including transportation, storage, trade, and, in some cases, even post-harvest fermentation and drying. It is estimated that there are between 400 and 1,000 cocoa intermediary entities operating in Ecuador (Radi and Ramirez 2006).

Throughout its history, the partnership has received support from local public entities, NGOs, and international cooperation agencies. Supporters have included Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA) and the Unión de Organizaciones Campesinas Cacaoteras del Ecuador (Unocace). In 2006, CFV received support from the Ecuadorian Export and Investment Promotion Corporation (Corpei), a private non-profit institution, to establish local trade relationships with Nestlé. In 2009, German Technical Cooperation (GTZ) helped CFV participate in international fairs to market its products outside Ecuador. In the past, the national government has also encouraged and financed the organization's participation in international events, mainly at fairs in the United States and Europe. Over the last five years, CFV has also received financial support from Rabobank in the Netherlands to increase its production.

CFV faces significant challenges related to its ability to meet the growing demands of the international gourmet cocoa market. These include implementation of a traceability system that can identify the origin of the product and trace it along the entire value chain. Establishing a traceability system is particularly important for the fine cocoa and high-quality aroma cocoa sector, as its value in global markets depends, in part, on recognizing its place of origin.

### 5.2.4 ANAPQUI: A Cooperative Dedicated to Royal Quinoa in Bolivia

Established in 1983, ANAPQUI is one of the oldest small-producer organizations in Bolivia. The cooperative is comprised of 12 regional organizations with a total of 1,800 members, of whom 23.8 percent are women. Cooperative members farm 8,000 hectares of organic royal quinoa, and the cooperative has a processing capability of 250 quintals per day. Of the total production, 50 percent is exported, mainly to the United States as organic royal quinoa. During the 2018–2019 season, ANAPQUI exported 1,192 tons worth US$3.4 million. The organization's productive, technological, and social model makes growing quinoa a sustainable option for its members, connecting them to the global agrifood market with more favorable conditions. Member producers receive the highest gross profit margin in the value chain, equivalent to 53 percent of the total, amounting to gross income averaging US$5,736.64 per family per year. ANAPQUI also pays producers 14 percent above the market price (US$1.78 per kilo) and the equivalent of US$0.29 cents per kilo in technical assistance and supplies.

ANAPQUI's production model is centered around the introduction of organic farming practices and certification. Technical assistance to implement organic farming practices was institutionalized with the creation of the Programa de Producción de Quinua Natural (Proquinat), which focuses on disseminating organic production standards and cultivation techniques, as well as on disseminating and establishing an

internal system for certification and monitoring organic production. The association has been expanding its portfolio of certifications by providing technical assistance and financing to its partners and incorporating a range of other organic certifications (National Organic Program, USDA, European Union, Japan Agricultural Standards), fair trade certifications (Fairtrade and Hand in Hand), quality certifications (ISO 22000), and kosher certifications.

ANAPQUI's royal quinoa production model is fully integrated—from the provision of inputs to production, storage, industrialization, and marketing—in both the domestic and international markets. Upstream, ANAPQUI provides its partners with seed certified by the National Institute for Agricultural and Forestry Innovation (*Instituto Nacional de Innovación Agropecuaria y Forestal* – Iniaf),[8] and with bio-inputs provided as a loan repaid upon harvest. Downstream, in the collection stage, producers harvest quinoa cooperatively and transfer it to community collection centers. From there, the quinoa is taken to the processing plants, where it is milled and/or transformed into intermediate products, such as flakes, puffed quinoa, noodles, cookies, quinoa flour, and quinoa grains.[9] ANAPQUI has a central processing plant in the city of Challapata, another in El Alto, and another five small plants in different parts of the country. Altogether, they produce a dozen organic products that are gluten-free, lactose-free, GMO-free, and that contain no artificial colors.

Domestically, ANAPQUI markets its own brand directly at the point of sale in stores and supermarkets in El Alto. It also provides different quinoa products (grain, flakes, cookies, and quinoa flours) at public markets (*compras públicas*). Abroad, it participates in international fairs, and has direct connections with international brokers, with whom it is working on opening a direct point of sale in France.

The operation and growth of the ANAPQUI production model has been based on two central pillars: a community organizational model, which allows for a technical assistance and marketing structure that benefits small producers; and access to national and international support for building productive, technology, and marketing capability.

The community organization and production model requires its members to participate in all links of the value chain for royal quinoa production. The cooperative's operational structure is self-managed by leaders elected democratically by its members. ANAPQUI's structure enables it to successfully coordinate the efforts of the small cooperatives in the productive phase while meeting quality standards and production quotas, providing members with technical support, achieving relatively stable and

[8] Iniaf operates under the Ministry of Rural Development and Land (MDRyT) and is responsible for, among other things, directing, conducting, and executing research, innovation, and technical assistance projects, along with providing support for seed production, disseminating knowledge and technologies, and managing genetic resources.

[9] The milling removes the saponin (a bitter substance) from quinoa grains.

acceptable prices, and representing members' interests. ANAPQUI buys royal quinoa from producers at prices higher than what is offered on the black market or by private companies (with an organic premium of between 11 and 14 percent), and covers the costs of technical assistance and certification (16 percent).

Support from international and national organizations has been central to driving quinoa development and trade projects through ANAPQUI. Of note is the US$1.2 million loan from the United Nations Capital Development Fund (UNCDF) to build an industrial quinoa processing plant in Challapata, along with four regional quinoa washing plants. More recently, in 2015, the European Union financed the procurement of machinery for a processing plant in El Alto.[10] ANAPQUI has also received international funding from Germany, Switzerland, and Belgium that has focused on supporting research and technical assistance.

Over the last decade, ANAPQUI has also benefited from policies to support food security for the quinoa complex, including the National Quinoa Policy and the National Development Plan of the Plurinational State of Bolivia. Other public programs that have provided support to the organization include:

i. The National Irrigation Program, with a focus on watersheds through the Programa Nacional de Riego con Enfoque en Cuenca (Pronarec),[11] which promotes integrated and participatory management of water resources with a community approach, finances public infrastructure for implementing or rehabilitating irrigation systems, and offers agricultural training.
ii. The Mechanization Program (*Programa de Mecanización* – Promec), which facilitates access to machinery, equipment, and agricultural implements for small and medium-sized agricultural producers by providing both collective and individual credit.
iii. The Asociación de Organizaciones de Productores Ecológicos de Bolivia (Aopeb), which promotes and provides technical support to organic producer organizations and associations of tractor drivers and transporters that provide specialized services to producers.

### 5.2.5 Asohass: Hass Avocados Produced in Colombia

Founded in 2014, the Asohass cooperative has 44 small producer members in the Colombian department of Risaralda, where they grow 113 hectares of Hass avocado.

[10] The financing was under a project aimed at generating value added to royal organic quinoa in order to diversify exports.

[11] The Inter-American Development Bank (IDB) approved a US$158.4 million loan to support irrigation improvements to increase agricultural productivity in Bolivia. The loan was coordinated through Pronarec, which is part of the "More Investment for Irrigation" Program of the Ministry of Environment and Water. Implementing this program will directly benefit more than 20,000 farmers by improving irrigation and increasing irrigated areas by 25,000 hectares.

The cooperative's objective since its founding has been to support the export expansion of its partners. The results to date have been encouraging. During 2014–2018, Asohass sold 134 tons of avocado annually between its domestic and export markets, generating sales of approximately US$94,000 on average per year. Then in 2019, with the avocado trees mature, and thanks to changes in the cooperative's trade strategy, production reached 170 tons, with an approximate value of US$142,000.

The growth of Asohass is based on its solid organizational structure and the government support it has received. The cooperative initially received support from the Rural Opportunities Program of the Colombian Ministry of Agriculture, which provided financial support and leadership training. This public support has made it possible to finance the initial planting and maintenance of up to two hectares of avocado per producer, temporarily attracting new producers to join Asohass. The cooperative has also received support to participate in the Macfrut international fair in Rimini, Italy as part of a government program to help victims of the country's internal conflict enter new markets. Asohass is currently financed through payment of a 3 percent sales commission and a monthly membership fee of US$8.50. This covers salaries and technological infrastructure, office leases, and operation of the collection centers.

To participate in Asohass, small producers must have a Hass avocado orchard of at least one hectare and be willing to participate in export certification programs, comply with the cooperative's regulations, and be located in its region of influence. Asohass began with 24 members, increased to 62 in 2017, and currently has 44 members. There are several reasons for the fluctuating membership numbers. Some members leave as a result of breaking rules, such as marketing their production through other channels outside the cooperative or not paying the organization the required fees (3 percent of sales). Other producers only joined temporarily to access public transfers within the framework of the Rural Opportunities Program, which only financed producers who were part of an association or cooperative. When the transfers stopped, Asohass lost a significant number of its members. This highlights the importance of community elements and common objectives for associations or cooperatives to function. In their absence, the associative activities only last as long as the benefits.

Asohass is organized with a governance structure comprised of a Board of Directors that answers to a General Assembly and five committees that lead the main activities: special projects, solidarity and social welfare, marketing, technical and environmental matters, and quality management. The committees need the board's approval to execute their projects. For example, when evaluating new markets or clients, the marketing committee proposes alternatives to the board, which has the final say in the trade strategy. The marketing committee then manages the terms of the trade with customers (payment times, transportation, etc.). The cooperative's actions have enabled its members to obtain important advantages and acquire skills. Three actions

have been crucial: increasing negotiation capability to improve payment conditions for producers; subsidizing and facilitating the certification process; and obtaining technological improvements. The paragraphs below examine each of these actions in detail.

The payment terms and conditions are very sensitive, especially for small producers, who in the case of fruit in Colombia usually receive payment for their sales up to two months after the transaction. This means small producers are providing financing to the large export firms. Improving the bargaining position of small producers, mainly by establishing cooperatives, has been essential to shortening payment times. Currently, in the case of Asohass, payments can take as little as two weeks or even be made immediately.

Asohass has led the process to certify 26 producers with the GlobalG.A.P., the minimum certification required to enter the European mass consumer market. This process took place during 2014–2017, with support in the form of public funding and technical assistance from the Asociación Hortifrutícola de Colombia (Asohofrucol), the Mayor's Office of Pereira, and the government of the department of Risaralda. The support subsidized the certification cost, although this process has not been completely fluid given the lack of producer competitiveness at the beginning and the withdrawal of public support in 2017. Asohass also has 22 members with the national Exporter Farm certification, and 24 with the GAP certification issued by the Instituto Colombiano Agropecuario (ICA).[12] These certifications guarantee food safety, production risk management, and proper harvesting processes. Asohass's objective is for all its members to secure export farm and GlobalG.A.P. certifications to ensure that all production can be sold on the international market.

Asohass has implemented a number of technological improvement projects for its members, including adopting a rainwater collection system; adopting a system to improve quality control that has enabled members to reduce the use of pesticides and other chemical inputs; adding ditches to the orchards to manage heavy rainfall, thus limiting damage to the trees; and adopting precision agriculture and monitoring tools, a project in cooperation with the Universidad Tecnológica de Pereira.

Lessons learned and changes made by Asohass producers recently resulted in a change to its policy and marketing strategy. During 2014–2017, the cooperative focused on the foreign market as the target destination for its products, leaving the marketing of reject fruit for the domestic market mainly to third parties. However, in 2019, efforts to improve quality and competitiveness were also aimed at the local market by way of a partnership with PriceSmart, a U.S. wholesaler working for more than 20 years in

[12] See ICA, "Con el registro de predio exportador, lo espera un mundo de mercados" (*With Registration as an Exporter Farm, a World of Markets Awaits You)*, October 16, 2019, available at https://www.ica.gov.co/noticias/ica-registro-predio-exportador-mundo-mercados.

Colombia and with broad coverage of the local market. This partnership enables Asohass to directly negotiate the sale of fresh avocados in the local market, without intermediaries, thus diversifying its sources of income. Through this new channel, the sale price of avocado rose to between US$0.63 and US$0.71 cents, a 100 percent increase over the industry price and an almost 300 percent increase in prices of domestic reject fruit that used to be sold by wholesalers. To serve this new channel, Asohass has invested in a new collection center that meets the quality standards of the domestic market. The fruit is stored, subject to quality control, and packed at the center. The domestic trade of fresh avocado (with less strict quality standards) provides an excellent complement to international trade.

In the future, Asohass faces the challenge to ensure the sustainability of its project by improving quality and furthering its international expansion without depending on marketers. Its members can also capitalize on the organizational capability and infrastructure it has created to produce and trade crops that are complementary to avocado.

## 5.3 Supporting the International Expansion of Small Agrifood Producers: Lessons Learned

This chapter concludes with some lessons learned that may be of interest in designing policies to support the international expansion of small agrifood producer partnerships and cooperatives.

First, these cases suggest that associativity is both possible and beneficial—although not the only way—to help small producers take advantage of the new opportunities presented with the emergence of niche markets and markets of greater value in the agrifood market. This model has enabled the small producers analyzed in this chapter to secure the benefits of associativity, including building economies of scale to make community investments, sharing the costs associated with learning new productive practices and controlling their implementation, and increasing their capability to negotiate in order to secure better prices for their members than if they transacted individually.

In agrifood markets that increasingly value credence attributes such as organic production, fair trade, and carbon neutrality, verification through certifications has become a barrier to entry for producers seeking to enter high-value niches. The exporting cooperatives analyzed have developed productive, technological, and organizational models that have enabled them to secure these high-level certifications for their members. In these models, strategic decisions to move in this direction have been central. The decisions have been accompanied by strategies that have combined at least three elements: technical assistance for producers; financial support through funding from both the cooperative itself and third parties; and administration and management support. The cases analyzed show different successful models and

ways of articulating this strategy. They vary depending on the productive scale of the producers, the destination markets, producer capability, access to financing, and the commitment of the farmers. In general, the cases indicate that the first certification functions as a "ticket" to the world of global certification. Following that first certification comes a process by which both individual producers and the organization as a whole learn new technological, productive, and management practices, which is then capitalized to obtain new certifications.

In addition, the cases analyzed show the benefits of associative activities in enhancing farmers' bargaining power with suppliers and customers, helping them obtain better prices and terms of sale collectively compared to what they could have secured individually. Likewise, operating as a cooperative has made it possible to secure productivity gains from economies of scale in the use of specific assets, such as community collection or processing centers and the implementation of collective training programs.

A second lesson learned is that the cases selected show that the managerial and leadership capability of leaders and those establishing the rules for the cooperative is central to reducing free-rider problems, generating community elements that ensure the commitment of cooperative members, and resolving conflicts of interest and control problems. The cooperatives studied operate successfully in large part thanks to governance that is based on democratic decision-making mechanisms and on delegating tasks through an administrative structure with sufficient operational and leadership capability. It is important to mention that in all cases, the management structure tends to be small in terms of the number of people involved, facilitating flexible and agile decision-making. Additionally, a system to monitor and sanction members who violate the rules is fundamental for the cooperative to function properly, as it minimizes opportunities for free riding by members.

A third and final lesson is that the successful cooperatives analyzed here do not operate in isolation. Instead, they work with national and international networks that provide them with technological, productive, financial, and trade support. Some of the cases illustrate the value of international funding to support economic, social, and community development in developing countries by strengthening agricultural cooperatives, in turn strengthening the economic and social fabric of small farmers. The managerial, productive, and technological capability of the cooperatives has been essential for them to be able to take advantage of this support. In the cases studied, State support has also often been decisive for the emergence and/or development of the internationalization processes of the cooperatives. This support provides financing for activities ranging from launching the cooperative to implementing technical assistance and quality control programs, building road infrastructure to transport production, purchasing equipment, and supporting international expansion by opening new markets and attending trade fairs.

These cases clearly illustrate that public support has played and continues to play an important role in supporting the successful international expansion model of agricultural producer associations that seek to compete in global, high-value agrifood markets. However, some of these cases also raise two relevant issues. The first is that public financing must be accompanied by other types of complementary support for managerial, productive, and technological capabilities that contributes to building an efficient and sustainable cooperative model, especially for young cooperatives. The second is that providing public resources (such as non-reimbursable funds) as a catalyst for the emergence or growth of the cooperative tends to be weak in the long term if it is not accompanied by community elements that give meaning and a sense of belonging to the cooperative, and by good governance that establishes the rules for joining and remaining in the cooperative.

6

# Connecting with Global Agrifood Markets

## The Perspective of Small Landholder Producers

• Maria Adelaida Fernández
• Lina Salazar

Agribusiness value chains have undergone rapid and profound changes worldwide in recent years (OECD 2020; Humphrey and Memedovic 2006). Commodity-type agricultural products without much processing or added value have been swapped for nontraditional products (e.g., fruits, vegetables, and flowers) and for differentiated products with some relevant characteristic or greater added value, such as products with organic and Fairtrade certifications. These products include natural essences or derivatives that are added to healthier products. Latin American countries are among the world's main suppliers of fresh or intermediate products, which are usually processed and sold in regional networks of developing countries (OECD 2020).

The implication here is that within the framework of these global agrifood value chains, the agriculture sector could be a potential promoter of economic growth and development, especially in low- and middle-income countries where a large part of the population remains rural and works in agriculture (Humphrey and Memedovic 2006).

Most studies on the subject highlight that the development of these global value chains can be

The objective of this chapter is to analyze how strategies to integrate small farmers into global agrifood value chains affect small farmers, especially from the point of view of their income, quality of life, and general well-being. It also looks at the potential of these strategies to promote development in rural areas and reduce poverty in Latin America. The chapter draws on the case studies on integration into agrifood markets presented in this publication.

an important opportunity to increase income in rural areas, reduce rural poverty, and promote growth that is focused on the poorest population (Maertens and Swinnen 2009; Reardon et al. 2009; Rao and Qaim 2011; Rao et al. 2012). Under certain conditions, strategies for integration into global agrifood value chains can support structural transformations in developing countries, especially in agriculture and in rural areas. In addition, they can promote changing from a subsistence-oriented system focused on individual farm production that offers low productivity and income to a more competitive system focused on trading, with higher value added. If there is adequate provision of public goods, such a system enables small producers to integrate into the international market.

In fact, in its study on the global state of agriculture and food, the Food and Agriculture Organization of the United Nations (FAO 2017a) indicated that rural areas are essential for the economic growth of developing countries. Although the FAO's approach focuses on the planning of domestic market "agroterritorial" systems for urban-rural interaction, it proposes factors to promote the expansion of these opportunities for rural residents that can also be applied to the case of international markets. This especially includes areas where consumers are willing to pay a premium for products with certain desirable characteristics, such as those produced in systems that promote fair payment conditions and sustainable production, generate environmental benefits, are organic, or have positive health effects.

In that same study, the FAO identifies several elements that are key for expanding the opportunities of these new agrifood markets in terms of regional development and the well-being of rural inhabitants. These elements can be classified into three groups:

- State investments in public services that increase a sector's competitiveness, such as transportation routes, technical assistance, and research and development
- Promotion of specialized services to improve rural production, such as financial institutions that provide credit to small producers, organizations that can certify the quality of products or suppliers of inputs, and technologies to expand production in line with the requirements of the new markets farmers wish to access
- Opportunities for livelihoods and income generation in the rural non-agricultural sector that can absorb surplus labor, especially for residents who obtain better education.

As seen in Chapter 2 of this publication, several of these elements are identified as factors that can maximize the value-adding opportunities of agrifood companies in Latin America and their participation in these new global agrifood value chains. However, some research on how to successfully participate in these chains shows that it is by no means an easy endeavor, as also shown in Chapter 2. For example, increasingly high

standards in international markets may exclude many producers that cannot meet the most stringent requirements due to the lack of financial or technical capability (Swinnen 2014). Also, many developing countries have obstacles that can threaten export competitiveness, such as weak regulatory institutions, poorly designed and implemented phytosanitary and sanitary regulations, lack of access to transportation, an inadequate supply and quality of energy and water, and important actors missing from the value chain (Salvatici and Nenci 2017).

From the point of view of small landholder producers, the barriers to participation in global agrifood value chains are significant. The first limitation is the production volume required to export, given the size of the farms and their low levels of productivity. This means that it is impossible individually to produce the minimum amounts required by international markets. Associativity is therefore central for small producers to reach the production volume necessary to participate in global value chains. The second limitation is the availability of the capital needed for producers to make the required investments in their production systems and adapt them to the demands of the new markets. This is where access to financing becomes a fundamental issue. The third limitation is the lack of access to the knowledge needed to identify technologies, possible business partners, export requirements, and information on consumer preferences in order to target products to the market of interest. Thus, access to education and quality technical services must be made a priority in supporting small producers. There are also challenges in terms of a regional agrifood system that is often not export-oriented (as explained in Chapter 2). Because of all of these factors, many small and medium-sized producers are generally not well positioned to respond to changes in market structures (Salvatici and Nenci 2017), so they are excluded from these opportunities.

According to IMF (2015) and Montalbano et al. (2018), participation in global agrifood value chains should facilitate access to flows of knowledge, capital, and sophisticated inputs that can help accelerate structural transformation and income growth for rural producers in developing countries. These higher incomes, together with improvements in access to information and capital, should facilitate access to new technologies and promote the emergence of innovations that reduce costs, differentiate products, increase production, and increase added value.

The hypothesis of this chapter is that linking small producers into global agrifood value chains can be positive for their well-being and for regional development if those small landholder producers can connect in a way that enables them to obtain higher incomes and improve other aspects that affect their quality of life, if the provision of public goods to rural areas is enhanced, and if development in remote areas is promoted (Wang et al. 2021; FAO 2017a).

This chapter first analyzes select case studies of small agricultural producers in several countries of the region for this report in order to identify some of the strategies

that have facilitated their access to these new opportunities for international trade. Second, it looks at the impact that integration has had on the income, nonmonetary benefits, and quality of life of small producers based on those case studies. Lastly, the chapter identifies the public policies that promote greater participation of rural producers in the value added of these chains, such that their potential for promoting development and reducing poverty is maximized.

## 6.1 Strategies to Integrate Small Producers into Global Value Chains and Factors that Make It Possible

Earlier chapters of this report described the main ways that agricultural producers are integrated into global agrifood value chains, along with several of the factors favoring the development and expansion of these successful strategies. This section uses the general analytical framework proposed in those chapters to provide a general overview of the case studies of small producers, highlighting the factors that enable them to be part of these chains.

The cases analyzed in this chapter correspond to different Latin American countries and have to do with an array of agricultural products (Table 6.1). A summary is also available in Annex 6.1.

### 6.1.1 Forms of Global Value Chain Integration

The case studies analyzed show that, in general, small farmers can integrate into global agrifood value chains through two strategies: vertical integration through an anchor company (see Chapter 4); or horizontal integration with other small producers in the form of associations/cooperatives and partnerships that receive early financial support from the government, nongovernmental organizations (NGOs), or independent companies owned by a group of producers that take on all the risks and financial costs of creating the company and expanding it abroad (see Chapter 5).

Both strategies allow small producers to overcome several of the barriers that make linkages to global value chains almost impossible on an individual basis. First, with both strategies, small producers can manage to reach the minimum product volumes for export by combining the production of several farms, generally located in the same geographic area, and thus allowing them to act as a productive cluster. Second, identifying a leader with business skills (the owner of the anchor company or the person chosen to lead the association/cooperative enables the group to access key information to connect with target markets, create networks with other organizations in the regional agrifood system, identify new market opportunities, organize production more efficiently, make contacts with buyers, comply with export requirements, and

**Table 6.1 Countries, Type of Integration, and Products**

| Country | Vertical Integration | Horizontal Integration |
|---|---|---|
| Argentina | San Miguel (lemons) | Coopsol (honey) |
| | | Frutucumán (lemons, blueberries, oranges) |
| Bolivia | Andean Valley (quinoa) | Anapqui (quinoa) |
| | Agroexport (sesame) | |
| Chile | | Mi Fruta (grapes) |
| Colombia | | Asotrópico (avocado) |
| | | Asohass (avocado) |
| Mexico | Kekén (pork) | |
| Nicaragua | Sol Orgánica (mango, banana, pineapple, dragon fruit) | |
| | Mercon Group (coffee) | |
| Paraguay | Chololó (yerba mate) | |
| | Guayakí (yerba mate) | |
| Peru | Wiracchocha (quinoa, amaranth, chia) | |
| | Westfalia Fruit (avocado) | |

Source: Prepared by the authors.

buy inputs in bulk, among other things. In addition, with both the anchor company and horizontal integration, small producers can obtain the financial resources they need to make the necessary investments to meet the minimum quality and safety requirements of the target market. Likewise, both organization types have the capability to support their members in obtaining certifications for value-added credence attributes, as well as the opportunity to develop new products with more valuable qualities, take advantage of time-sensitive sales windows that offer better prices, and create brands. Even the strategy of developing derivative products—which perhaps requires greater know-how, capability for innovation, and capital availability for research and development—can be implemented by both the anchor companies and large producer associations/cooperatives, as in the case of the Association of Quinoa Producers of the Southern Altiplano (Anapqui) in Bolivia, where a method was devised to use the saponin from royal quinoa to develop vaccines.

### 6.1.2 Vertical Organization: Linkage Strategies through Anchor Companies

The case studies on which this report is based include nine examples where small producers are able to participate in global agrifood value chains thanks to their link to an

anchor company. In general, five strategies have been identified that anchor companies use to involve small producers.

The first strategy takes advantage of agroclimatic conditions. In other words, the anchor company identifies a market opportunity and decides to establish itself in a particular geographic location where biological and climatic conditions are suitable for producing a particular crop and where the presence of a significant group of producers enables it to secure adequate volume for trading (e.g., a productive cluster). This is the case of Agroexport in Bolivia, which identified Chiquitania as an area suitable for planting sesame but where producers did not grow it, limiting themselves to producing subsistence crops. This is also the case of Andean Valley, a company established in the southern Altiplano of Bolivia, the country's largest concentration of royal quinoa production, and Wiraccocha in Peru, which selected the province of Ayacucho because of its significant production volume of Andean products, including quinoa. In general, the anchor companies identify productive clusters that enable them to organize production in a limited geographic area that have the appropriate characteristics for developing the crop in question.

Under the second strategy, companies also follow a vertical integration approach to take advantage of windows of export opportunities that may exist in a particular region. This is the case of Westfalia Fruit in Peru, which identified an opportunity to source avocados in the highlands region—where the land is owned by small farming families—before the country's export harvest. This allows Westfalia Fruit to get better market prices during a specific time of the year. However, to take advantage of this window, it needed to buy the product directly from the highlands families and help them achieve the quality levels required by the export market. Also in this case, the company identified a productive cluster in the area of interest.

The third strategy to bring together small landholder producers identified in the case studies is through geographic proximity to the anchor company's manufacturing or processing facilities, and by ensuring that producers having good levels of modernization or adequate production volume, making low-cost integration into the company's export structure possible. This is the case of San Miguel in Argentina, which, being one of the world's leading citrus export companies, exports fruit not only from its own orchards but also from small producers—with farms averaging 30 hectares—located in the same geographic cluster and able produce with the quality and conditions required to meet the company's standards.

The fourth strategy to facilitate links with global markets occurs when anchor companies want to improve their corporate image or enter a niche market that requires credence attributes along social lines. To do this, some anchor companies integrate small producers into processes along the chain with less stringent requirements to order to meet a demand from consumers and markets interested in social criteria, such

as sharing benefits with the community. In this way, companies incorporate other local actors into the production chain to improve their corporate image and relations with the community. This is the case with Kekén (see Chapter 3), one of the largest pork producers and exporters in Mexico, which contracts finishing services with communities. In addition, outsourcing this process frees up resources for more strategic investments in new technologies or production plants.

The final strategy identified is one where the anchor companies connect with small producers because they have a genuine interest in working toward social and environmental objectives. The aim is to improve the living conditions of family farmers in a particular region or to contribute to protecting the environment. This is the case of Sol Orgánica (see Chapter 4), a company launched by an entrepreneur with the aim of supporting small mango producers in Nicaragua who sold their product along highways, with high rates of product wastage. In addition to its social commitment, the company also sought from the beginning to certify its associates to produce organically. Later, Sol Orgánica's commitment to the environment led it to be a pioneer in the development of the Regenerative Organic Agriculture (ROC) certification (see Chapter 7).

A similar case is that of Chololó SRL in Paraguay, which ventured into yerba mate processing and trading based on its interest in protecting the 8,000-hectare Atlantic Forest ecological reserve—located on its lands—and in involving the Aché-Guayaqí indigenous group living within the reserve. The aim was to expand the agroforestry cultivation of organic yerba mate within the forest in order to help restore this ecosystem while at the same time protecting the indigenous culture. In this case, international markets were accessed with the creation of the company Guayakí U.S., which financed the process of securing organic certification and began exporting organic yerba mate from Chololó to the United States. It marketed the product using its organic certification, thereby protecting the Aché indigenous culture and the Atlantic Forest. Guayakí U.S. spun off from Chololó in 2011, but maintains the original company's social and environmental commitment. In particular, it maintains its commitment to restoring and protecting natural ecosystems and working with small producers. In Paraguay, it sought to partner with new indigenous families to produce organic yerba mate in agroforestry systems in areas near reserves or natural parks in order to help restore them and expand buffer zones and wildlife corridors. Later, it expanded to suppliers in Argentina and Brazil under the same model. In fact, in 2007, the company was one of the pioneers in the B Corporation certification, which certifies that the entire organization is committed to social and environmental values and that these values are included in the organization's statutes. In addition, as part of its commitments, the company reinvests 20 percent of its profits in restoring and conserving protected areas, infrastructure, and health in the regions where its suppliers live.

### 6.1.3 Horizontal Organization: Strategies for Connecting Small Landholder Producers

Integration through horizontal strategies is analyzed based on five case studies where joining together small producers in cooperatives, producer associations, or private companies enables them to connect with international markets. In general, the horizontal integration strategy is relatively similar in all cases. Whether to improve their income and economic opportunities on their own or thanks to promotion by a third party (such as an NGO or the government), producers organize themselves around a management structure that enables them to reach the minimum export volume; access the information and financing they need to produce the product at the quality required by the market; and connect with buyers and export. They do all this with the support of a lead manager and a board of directors that represent the interests of all producers. However, there are some unique characteristics associated with each case.

The first horizontal integration strategy involves creating associative arrangements, as explained in the previous chapter. The first case study—and perhaps one of the most successful given the number of members and the impact on social welfare and regional development—is that of Anapqui in Bolivia. Created in 1983, Anapqui is currently the main cooperative association in the country for producing and exporting royal quinoa, and its growth has enabled it to vertically integrate all the links in the value chain. It has 1,800 small producers as members. The case of Anapquí shows how the confluence of several factors—especially support from international NGOs for its organization, formation, certification, financing, and opening of international markets, along with support from the public sector for building support infrastructure like roads, collection centers, and processing plants—has enabled the development and consolidation of a strong association that has designed and undertaken several of the key activities required to participate in the value chain. These include providing inputs, transportation, storage, and industrial processing. In addition, this association has established a strategy for differentiating its products through certifications and marketing them as superfoods, consolidating itself as an important quinoa production cluster in the country. In addition to paying producers 53 percent of the final sale price of the products (one of the highest shares of all the cases of small producers evaluated), the association offers free technical assistance, a reduced prices for organic production inputs, and certification renewals. Also, the producers that are part of this structure are not only suppliers but also members who participate in the company's decisions.

In fact, this case is similar to that of the National Federation of Coffee Growers of Colombia, a successful case of integrating smallholder farmers into international markets and promoting development of the country and its rural coffee-growing areas (Parente-Laverde 2020; Bentley and Baker 2000).

Another case of horizontal integration is that of Asohass, which was founded in 2017 by 24 small and medium-sized producers in Risaralda, Colombia, using support the government was providing at that time to promote the cultivation of avocados. The association aims to support the commercial processes of its members in order to facilitate their livelihoods, including access to certifications and new technologies. In addition to supporting its partners in obtaining certifications (GlobalG.A.P., *Predio Exportador*, and Good Agricultural Practices), Asohass also has a revolving fund it uses to provide financial support for new plantings and other initiatives approved by the board of directors in its different committees. It currently has 44 associates, and they have managed to complement exports with domestic-market partnerships with wholesale supermarkets. Thanks to the high quality of the product, this partnership enables Asohass associates to obtain prices 100 percent higher than domestic market prices.

Colombia also has the case of Asotrópica, which is comprised of 60 producers in the department of Caldas. As in the case of Asohass, the cooperative was founded by a group of producers who, upon identifying the opportunity presented by exporting avocados, sought government assistance in securing financing and technical support, with additional help from other regional institutions such as mayor's offices, the Universidad Tecnológica de Pereira, and the Colombian Agricultural Institute. With this support, the association was able to subsidize its members' planting, build a warehouse, and secure a GlobalG.A.P. certification for some of the properties. In this case, the managerial scheme is again identified as a key factor for the success of the initiative, which has managed to significantly increase sales. The cooperative is currently in charge of ensuring that all its members are able to export to Europe through certification as exporting properties (*Predio Exportador*), and it is working to finalize a partnership with a company that processes avocados with individually quick frozen technology, opening another opportunity for exporting fruit that does not meet the parameters for export as fresh.

Lastly, there is the option of horizontal integration via associativity directly through a private company established by the producers, as in the cases of Mi Fruta in Chile and Frutucumán in Argentina (Chibbaro et al. 2021; Bisang et al. 2021).[1] A private company's characteristics are different from those of producer associations, cooperatives, or grassroots organizations.[2] There are differences in the approach to benefits, which is economic and not social; the type of leadership, which is more vertical compared to the horizontal leadership of grassroots organizations; business management competencies, which are more developed in managers of private companies than what is

[1] Frutucumán is comprised of four producers who have a total of 1,000 hectares.

[2] See Instituto de Gestión y Desarrollo, "6 Diferencias de Gestión Entre Una Asociación y Una Empresa," October 25, 2018, http://igd.pe/6-diferencias-de-gestion-entre-una-asociacion-y-una-empresa/.

typically found among presidents of cooperatives; and in sources of initial funding, which usually comes from the individual partners and financial institutions, unlike grassroots organizations, which receive support from the government, international organizations, or NGOs.

Given that this type of integration seems to be rare—even though one might think it as an alternative that provides the most benefits to producers because they own the company—it is worth exploring what conditions enable small producers to consolidate into these types of production and trading structures.

A review of the two cases in which the producers decided to establish their own company to market their products internationally (Mi Fruta and Frutucumán) identifies several factors that facilitate this process. First, both emerged in regions or clusters that are highly specialized in the product in question (grapes for Mi Fruta and citrus fruits for Frutucumán), enabling them to access specific services, such as companies that provide certifications or market information. For example, Argentina's Obispo Colombres Agribusiness Experimental Station provides technical assistance and innovation in the Tucumán region, while the government of Chile's Production Development Corporation (*Corporación de Fomento de la Producción* – Corfo) has provided support by fostering associativity in the case of Mi Fruta.

Second, in both cases the producers had experience as suppliers of fruit to an anchor company (Moño Azul, in the case of Frutucumán, and Exser Agroindustrial Limitada in the case of Mi Fruta), obtaining knowledge that enabled them to move into exporting independently. Third, producers have highly productive modernized farms and join forces to achieve production volumes large enough to access international markets. Fourth, in both cases, the producers have access to State services such as financing, research and development centers, good ports and infrastructure, and opportunities to attend international fairs where they can make contact with new clients. Lastly, in both cases, the managers are young professionals with export experience who provide the enterprises with leadership skills so they can be successful.

## 6.2 The Impact that Connecting to Global Value Chains Has on the Income and Quality of Life of Small Landholder Producers

This section discusses the benefits to small landholder producers of participating in global agrifood markets on two levels. First, in some specific cases, the economic benefits and income received by small producers are evaluated according to the type of integration and the share of gross profit. Second, an analysis is conducted of the additional benefits that not only impact small producers' capability to produce and improve their crops, but also provide them with access to important services for their quality of life that end up promoting development at the regional level.

### 6.2.1 The Economic Benefits and Income Small Producers Gain from Participating in Global Agrifood Markets

Among the case studies, some companies/associations stand out for the high share of gross profits that is transferred to small landholder agricultural producers from the export and sale of agrifood products. The first is Mi Fruta. Because the producers are also the owners of the company, and because its structure has few staffing expenses, Mi Fruta can transfer most of the value generated in the trading process to its producer partners (Chibbaro et al. 2021). During interviews for this project, it was noted that as the owners of Mi Fruta, the producers obtain between six and seven times the income they made when they were linked to global agrifood value chains through an anchor company. This was due to several elements: a product with a premium price due to Fairtrade certification; the possibility of recovering the value-added tax; low operating costs because of minimal staff; and direct sales without intermediaries. As regards this last factor, exporting directly earns a price premium of at least 20 percent over the prior situation.

The second case is Anapqui, which, as mentioned before, is a partnership of small producers. Anapqui is particularly relevant because it operates in one of the poorest areas of Bolivia, where its small landholder producers previously were subsistence farmers raising camelids, and cultivating quinoa for their own consumption. Surpluses were exchanged in order to access other basic products. Today, the situation of these producers has changed significantly. Higher incomes have enabled them to have homes not only with basic services, but also with satellite television and Internet connections.

Operating through horizontal integration also makes it possible for producers to receive a significant percentage of the gross profits from exporting and marketing their products, which in this case is 53 percent of the total, amounting to gross incomes averaging $5,736.64 per family per year (Valdivia et al. 2021). Considering that the annual minimum wage in Bolivia is around US$3,666,[3] Anapqui producers earn 56 percent above the national annual minimum wage, much higher than what producers in rural areas typically earn. Anapqui pays the producer US$1.78 per kilo of quinoa, which is 14 percent above the market price, along with an additional US$0.29 per kilo in the form of technical assistance and supplies, transferred from the producer's profits (Valdivia et al. 2021). It should be noted that Anapqui's producers are partners of the association, meaning that the company's governance structure is built to maximize their benefits.

An important point to highlight is the effect that Anapqui's existence has on the price of quinoa in the southern Altiplano region of Bolivia. Because the Anapqui price becomes the minimum price received by producers, other companies that have entered

[3] See the Bolivian Ministry of Labor website at https://www.mintrabajo.gob.bo/?p=3251.

the royal quinoa export market in Bolivia—like Andean Valley—have had to attract suppliers by offering them a higher price than what Anapqui pays (in this case, a 2.5 percent higher price of US$1.82 per kilo). In addition, Anapqui also offers perks such as paying in cash and providing new certifications with the opportunity of opening new markets (kosher and gluten-free). This points to how important it can be to develop a strong regional cluster associated with a successful export product, generating competitive relationships that promote continuous improvement in the terms of trade between suppliers and anchor companies.

Another company analyzed, Wiraccocha in Peru, demonstrates the value of connecting small landholders through an anchor company under different circumstances. In this case, the percentage of the final price that stays with producers is lower than in the Bolivian cases (30 percent), as is the price received by the producer, which is US$1.28 per kilo. Similar to the previous case, producers receive certified seed and organic inputs. However, because average agricultural quinoa field productivity in the company's area of coverage is 1,500 kilos per hectare per season (seven months), and because a predominantly semi-mechanized production system is used for areas of two to six hectares, small producers can earn between US$3,840 and US$11,520 a year. Compared to Peru's minimum wage in 2021,[4] which is equivalent to US$3,052 per year, Wiraccocha's medium-scale partner producers are earning more than the country's minimum wage. Producers are estimated to receive, on average, US$1,920 per hectare.

Agroexport in Bolivia is another example of an anchor company whose producers receive a significant percentage of a product's international market value, enabling them to earn well above the average for rural areas of their country. As mentioned above, Agroexport supports producers in the Chiquitana area and other nearby regions in growing and trading sesame seeds. The benefits provided by the company to its partners include financing for up to 50 percent of farming costs, providing technical assistance support, and paying US$1,100 per ton, or almost 50 percent of the product price received from export markets. Based on average yields of one ton per hectare and farms of between 5 and 10 hectares, farmers earn an annual income of between US$5,500 and US$11,000, considerably higher than the minimum wage in Bolivia. It should be noted that the areas where agro-export producers farm were traditional communities that practiced subsistence agriculture, planting rice, corn, bananas, coffee, and cassava. They transported their products on donkeys and other precarious means of transportation to the closest communities and sold them at low prices and with great difficulty, then spent May to August in search of some other non-agricultural livelihoods way to provide for their families. By adding sesame seeds to their production, some of

[4] See the Peruvian government's web platform at https://www.gob.pe/476-valor-remuneracion-minima-vital.

the producers no longer need seasonal migration to support themselves. They are also now exploring the possibility of complementing sesame seeds by planting chia—another high-value crop—during the winter months.

For horizontal organizations of avocado growers, two avocado associative arrangements in Colombia were analyzed: Asohass and Asotrópica. Both are young firms, just starting the processes of seeking certifications and entering domestic and international markets. Asohass receives US$0.67 per kilo for domestic sales and US$0.88 per kilo for exports. Asotrópica receives US$1.05 per kilo. Both cases are below the prices that consolidated companies like Westfalia Fruit (US$1.97 per kilo) receive in their export window and through their trading channels. Unfortunately, there are no figures on the yields per hectare or the average number of hectares per producer to calculate members' annual income levels. In any case, assuming an average national yield of 9.1 tons per hectare,[5] and one hectare per producer, income could range from US$6,097 to US$9,555, well above the country's minimum wage of US$3,047 per year.[6]

In the case of Westfalia Fruit, an anchor company in Peru that focuses on producing avocados for export, it pays producers 5 soles per kilo (US$1.30 per kilo) for conventional fruit and US$2.40 per kilo for certified organic fruit, 10 percent higher than the market price of export avocados. This payment is made immediately upon delivery of the product. The producers the company works with have between 1.5 and 5 hectares of avocado orchards, producing between 15 and 20 tons per hectare. Based on prices per kilogram and a production cost of 15,000 soles per hectare (US$11,530 per hectare), the annual net income of these producers can range between US$12,000 for those with 1.5 hectares and productivity of 15 tons per hectare and US$72,000 for those with 5 hectares and the best productivity, much higher than the income of any other product analyzed. However, it should be noted that the characteristics of the producers Westfalia Fruit works with stand out from other highland producers, since they must have higher-than-average yields per hectare and sufficient land to reach a production volume of six tons, the company's minimum purchase volume.

The case of Guayakí, one of the two yerba mate companies analyzed, was created with the aim of generating a social and environmental impact. It demonstrates how this type of commitment from anchor companies can have a significant impact on the income of their member producers. Guayakí is dedicated to exporting and marketing organic yerba mate obtained from small-producer agroforestry systems in Argentina, Brazil, and Paraguay that are located near protected areas and areas of importance for conserving biodiversity. The company obtains prices for its producers that are 130 to 200 percent above the market price for yerba mate. It also reinvests 20 percent of its

[5] See Fondo para el Financiamento del Sector Agropecuaria (FINAGFRO), "Ficha de Inteligencia: AGUACATE," July 2018, https://www.finagro.com.co/sites/default/files/node/basic-page/files/ficha_aguacate_version_ii.pdf.
[6] See "Colombia's Minimum Wage for 2022," https://www.salariominimocolombia.net/.

profits in programs aimed at restoring protected areas and conserving wildlife corridors. Specifically, the 200 indigenous families that supply the company with yerba mate have 425 hectares of agroforestry crops within the 850-hectare reserve where they live, with productivity of 3,066 kilos per hectare (Alwang et al. 2021; González Villalba and Zelada Cardozo 2019). This production, valued at the market price of US$0.65 per kilo on the farm (Alwang et al. 2021), plus 140 percent of the market price paid by Guayakí, is equivalent to a gross income of US$4,235 per year per family.

A similar case is that of Sol Orgánica, another anchor company founded with a business plan aiming to improve the living conditions of smallholder fruit producers in Nicaragua and improve their production systems through organic production. The company's commercial success has enabled it to bring on board more than 1,000 mango, banana, pineapple, and dragon fruit producers who have seen their income, quality of life, and opportunities for their families improve significantly.

Sol Orgánica defines the price it pays producers for their fruit differently from the other cases analyzed, since the process is carried out in reverse. In other words, the company first negotiates with the producers the price they wish to obtain from a crop. The price takes into account its producers' costs (which do not include the costs of technical assistance or the costs of certification, covered by the company) and an expected profit for them. Additionally, because the company closely monitors each property, it has very complete information on productivity, expected yields, and production and harvest costs. The minimum margin paid to producers is generally 25 percent above the market price of certified organic products, but it can be as much as 170 percent higher for products certified with the ROC seal.

The net annual income received by Sol Orgánica's mango producers, estimated based on the information provided by the company, depends on whether the fruit is certified organic or certified ROC. Given that the average orchard size is 0.8 hectares per producer and that the company buys approximately 90 percent of each farm's mango production, organic mango producers earn an annual income of around US$1,800, 75 percent more than if they sold their product on the local market. For their part, ROC-certified mango growers earn an annual income of US$2,057, 14 percent higher than the company's organic mango growers.

In addition, thanks to the economic benefits they receive from their association with Sol Orgánica, the producers have been able to buy more property, and most have acquired motorcycles, improved their farms, and been able to send their children to university. Likewise, a large number of these producers have been able to take action to improve their soil thanks to the implementation of the ROC certification, without needing to bear the costs associated with reducing productivity during the three years the soil needs to recover. These costs are covered by the company, which pays them income equivalent to what they were receiving before the changes in the farm's productive system.

The company also pays each producer individually three days after receiving the harvest, again because of how important it is to producers to be paid as quickly as possible, and to head off the temptation to negotiate with other buyers.

As the case studies indicate, these strategies to integrate small producers into global agrifood value chains have a significant impact. In all cases, earnings far exceed the market price and—more importantly—the national minimum wage, which is generally much higher than the average income of agricultural producers in rural areas. This additional income enables the producers to make investments in their farms in such areas as irrigation technology, expanding cultivation areas, and even buying more land to expand their productive area.

In most cases—and in both horizontal and vertical integration—the small landholder farmers who supply their production increased their income thanks to access to certifications that differentiate their products (e.g., export farm certifications and GlobalG.A.P. certifications), which enables them to export. Organic certification also enables them to sell at higher prices than conventional products and earn a greater profit compared to non-certified producers. Likewise, if they also have a Fairtrade certification, they earn additional income because their products must be purchased at a 15 percent premium over the domestic price. However, obtaining that certification requires meeting certain price, social and environmental conditions (Box 6.1).

### 6.2.2 Additional Benefits

These additional benefits are important because they go beyond improving small farmers' production systems and productivity to contribute to the development of the region where they live. Although all of these benefits are discussed in greater depth in the preceding chapters, here is a quick overview to highlight their importance in terms of the quality of life of small producers.

#### *Support for Certification*

In general, all types of links to global value chains involve using credence attributes to differentiate products and access international markets or the niche markets identified. To secure these attributes, especially those related to environmental, productive, and social certifications, producer associations, private companies, and anchor companies must help small producers obtain certifications, the costs of which are impossible for these types of producers to cover. Therefore, the main noneconomic benefits that producers receive include help with investments in their farms and payment of the costs involved in obtaining and maintaining certifications.

For example, in addition to having organic production in all its product lines, Sol Orgánica is a pioneer in the implementation of the ROC certification and intends for all

### Box 6.1 Conditions to Obtain the Fairtrade Certification

**PRICE**

- Creation of a Fairtrade Committee to empower producers to manage their Fairtrade premium.
- The minimum price and the price premium for a wide variety of products are defined in the Fairtrade tables based on a variety of characteristics, including quality, how the product is purchased, and the country it comes from, among other characteristics (see https://www.fairtrade.net/standard/minimum-price-info).
- For herbs and spices without a Fairtrade defined minimum price or a Fairtrade defined minimum premium, the Fairtade premium—set globally—is 15 percent of the trade price.
- For secondary or derivative products, the Fairtrade premium to be paid above the negotiated price is 15 percent.
- For Fairtrade in Europe, the premium payment is made to a fund managed by the producers' association so that the producers themselves define how to invest the resources in important community projects. Fairtrade in the United States, meanwhile, allows the premium to be paid directly to the individual producer (this is the formula used by Sol Orgánica).

**SOCIAL CONDITIONS**

- Adequate working conditions (compliance with the law and clear, healthy, and safe conditions, with adequate health services and protective equipment).
- Free of child labor and providing adequate working conditions for young people.
- Free of forced labor, servitude, or compulsory labor.
- Respect for freedom of association and the right to collectively bargain.
- No discrimination.
- Traceability.

**ENVIRONMENTAL CONDITIONS**

- Proper management of waste and adequate disposal of hazardous waste.
- Proper water management.
- Proper energy management.
- Environmental protection.
- Use of good practices and reduced pesticide use.

its associated producers to have this certification in the future. Its social commitment to its producers also led Sol Orgánica to obtain the Fairtrade certification. Andean Valley also provides support for securing and maintaining multiple certifications, such as organic and Fairtrade. It has managed to compete with Anapqui thanks to new seals such as kosher and gluten-free. In the case of Guayakí, the company provides support for securing organic and Fairtrade certifications. Mi Fruta has also helped its producers secure organic and Fairtrade certifications, and Wiraccocha also helps its suppliers secure organic, kosher, gluten-free, and HACCP certifications.

Horizontal organizations also provide certification support. In fact, all of the cases analyzed provide this benefit to members. For example, Anapqui has the National Organic Program (NOP), U.S. Department of Agriculture, European Union, Japan Agricultural

Standards (JAS), kosher, Fairtrade, TÜV Rheinland, ISO 22000:2005, and Hand in Hand certifications, in addition to organic certification. In these cases, Fairtrade certification is important because it requires producers to pay a price premium at least 15 percent above the market price, as well as build adequate infrastructure in the production system, including washrooms, rest areas, and adequate areas for storing and disposing of certain products that can affect health and the environment, among other things.

As mentioned in earlier chapters of this report, once a company obtains an attribute certification, it is relatively easy to access new certifications, since it has experience in improving the production system and establishing good practices and quality-control processes. It is therefore common for anchor companies and mature horizontal organizations to have a wide variety of certifications for their producers' farms. This enables them to enter new markets and market niches, and continue to increase their income and profits—both their own and those of their associates.

However, to dissuade producers from selling their certified product to another buyer, the certificate is linked to the anchor company that covered the cost of acquiring it. In this way, producers only obtain the price premium associated with the seal if they sell the product to the anchor company. Should they decide otherwise, their product loses the certification (a more extensive discussion of group certifications can be found in Chapter 4).

### *Technical Assistance*

Technical assistance is an additional benefit that is fundamental for bringing small producers up to the quality and productivity levels needed for export and to meet the minimum requirements of the target markets. Such is the case for Kekén, which integrates small producers into its production chain in order to ensure that they maintain high standards of quality and sanitary control in the pork meat process. The technical assistance is therefore essential to keep this outsourcing from endangering the entire chain and to ensure it has the desired results.

The technical assistance also enables producers to gain the knowledge and make the changes necessary to their production systems in order to pass the audit processes of the various certifications. This applies whether it is simply to meet the minimum standards required by the target market (e.g., GlobalG.A.P.) or to have attributes that enable the producers to add value and reach other market niches, such as organic production, kosher, or gluten-free production. This means that the companies and associations/cooperatives that use the credence attribute strategy have to provide specialized technical assistance services for each certificate, often directly, as in the cases of Anapqui, Andean Valley, Sol Orgánica, Westfalia Fruit, Wiraccocha, and others.

Some producers for Mercon, an anchor company that buys coffee from small producers in Central America, see technical assistance as a fundamental service that

has helped them significantly increase their crop productivity and income. In addition, by following the recommendations, they are also able to use inputs like fertilizer more efficiently, and production recovers faster after hurricanes. Another interesting case is the technical assistance provided by Andean Valley to its producers for collecting and properly disposing of product containers that must receive certain treatments to prevent contamination. In this way, the company ensures that its suppliers' properties meet certificate requirements.

In addition to improving the productivity of producer farms, enabling them to get certified and obtain better prices for their products and making the farm more efficient at different levels, this technical assistance provides producers with knowledge and information that they can transfer to other crops and that can be leveraged for managing their family finances, improving their economic opportunities and their quality of life.

### *Access to Credit*

Another benefit identified in the case studies is the opportunity several of these companies and associations/cooperatives provide to their producers to apply for small loans at preferential rates. The companies are able to do this because they have first-hand information about the markets and can guarantee loan repayment by withholding payments directly from the payment for the products. As a result, the anchor companies and associations/cooperatives can better weigh the risk of providing these loans and reduce the risk to which they are exposed, something that would not be possible with a commercial bank. These loans help small producers cover the investment costs necessary to make changes within productive systems, introduce new technologies, expand cultivation areas, and handle unexpected situations or family emergencies. Small producers see this service as an important benefit, since they usually do not have access to formal financial services.

Often the anchor companies that help their producers access credit serve as guarantors vis-à-vis the financial institution. In other cases, although they are not guarantors, they sign long-term contracts with small producers, and this allows them to access credit. This is the case for Kekén, which grants 10-year contracts to feedlots—including for communities living on communal lands—so they can make investments that in some cases reach US$1 million (for farms with a 6,000-pig capacity). In these cases, Kekén also works as a withholding agent, subtracting loan repayments from payments for finishing services and forwarding them directly to the bank.

The case of Sol Orgánica is unique, as it not only provides direct financing to its associates at very comfortable rates, but also covers reductions in family incomes when crops are being adapted to organic production practices or organic regenerative production. In this way, producers are not negatively impacted while productivity levels are being restored.

Finally, some horizontal organizations establish revolving funds to support members in obtaining certifications and expanding cultivation areas, as in the case of Asohass and Asotropic.

### *Providing Inputs at Low Cost*

In addition to access to certifications, technical assistance and credit, in some cases, such as that of Anapqui, an association also offers its members the opportunity to procure inputs at prices below what they could obtain individually. This lowers production costs, thereby improving profit margins for producers. Some anchor companies like Agroexpo and Sol Orgánica do the same. Although this latter company charges producers an additional 10 percent for access to inputs, it is still profitable for the producer since the company obtains the inputs at prices well below the market price.

This supply of inputs becomes particularly important in the case of certified organic producers, since it is essential that they use the bio-inputs that enable them to maintain their certification. However, these bio-inputs are expensive or not produced directly in the regions where they are needed, so it is important for companies and cooperatives/associations to ensure that their producers have adequate access to them.

### *Research and Technological Improvements*

This is another benefit common to all methods of organizing the chain, given how important innovation and technological improvement are to maintaining competitiveness and finding new sources of differentiation that enable further market expansion. An example is Sol Orgánica, which in addition to producing new technologies for sun-drying fruit, also began experimenting with obtaining certification in regenerative organic agriculture, which it later transferred to its producers. It also delved into searching for industrial processes to produce fruit extracts and ingredients that now represent its most important market.

Another interesting example is Mi Fruta, which, taking advantage of the development of the new protected Maylén grape variety by Corfo and the Chilean government's Agricultural Research Institute (*Instituto de Investigaciones Agropecuarias* – INIA), is seeking to enter new markets and increase its export volumes. This new variety is more productive, has an excellent flavor, and can be stored for up to 90 days, making it especially suitable for export over long distances.

In general, evidence shows that this support for research and development and the adoption of new state-of-the-art technologies tends to be provided mainly by anchor companies with the financial capability to do so. However, because this is key for differentiation in global value chains, it should be widely promoted by public institutions, using public resources and in collaboration with research centers and universities, in order to broadly disseminate these technologies to small producers.

### *Investment in Rural Public Goods*

In some cases, the anchor companies most committed to improving their suppliers' quality of life even invest in providing rural public goods in the regions where they obtain their product. For example, Sol Orgánica has supported its associates by helping to provide public goods related to efficient water management at the watershed level by investing in establishing reservoirs and managing contour lines in croplands to ensure there is enough water during the driest months and help producers adapt to climate change.

For its part, Guayakí is committed to reinvesting 20 percent of its annual profits in restoring the protected areas adjacent to its suppliers, and has also used these resources to build schools and health centers.

Another important role played by these companies and cooperatives/associations involves motivating government institutions to invest in providing public goods in the areas where small producers live. This is the case with Anapqui, which together with Bolivia's National Watershed-focused Irrigation Program (*Programa Nacional de Riego con Enfoque en Cuenca* – Pronarc), promotes integrated and participatory management of water resources from a community perspective and with a focus on watersheds. It also finances public infrastructure for implementing or rehabilitating irrigation systems.

Elsewhere, it is clear that a lack of public goods such as roads can limit the participation of small producers in strategies to link into international markets. This is the case for Westfalia Fruit, which when selecting suppliers, avoids producers located in areas without appropriate road infrastructure, even if they are in the highlands and have the potential to produce avocados for the export window of interest identified by the company.

### *Improvements in the Quality of Life of Small Farmers*

Finally, there have been improvements in the quality of life secured for member producers or suppliers as part of linking them into global value chains.

In the case of quinoa production in Bolivia, Néstor Vera, a quinoa specialist from the southern Altiplano region, notes that "being associated with or linked to an anchor company or an association is life or death for a producer." Without access to the flow of benefits generated by participating in the global quinoa value chain, families would return to the levels of poverty and subsistence farming that predominated prior to expansion of export quinoa cultivation. As mentioned above, small quinoa producers now have decent housing, access to public services, Internet connections, and even satellite television.

In the case of Guayakí's indigenous producers, the interviews conducted also suggest that if they were not part of this enterprise, they would return to subsistence living, with little chance of gaining access to the external income that today

provides them with living conditions that are well above the conditions of poverty in which they were living before. In addition, thanks to their connection to the anchor company, the producers have been able to preserve their culture and recover their ancestral forest.

For their part, the Sol Orgánica producers have seen their quality of life and welfare increase significantly. Interviews with producers identified several positive impacts that this anchor company has had on the families that supply it with fruit. For example, several producers have bought new farmland to expand production. Because each plot has a different cadastral registry, it is not possible to know how much additional land has been acquired, but it is telling that surpluses have made it possible for suppliers to increase their landholdings. Additionally, many producers have acquired motorcycles, which are now their main means of transportation. This is a substantial improvement over the use of mules for transportation. Another important impact is that many families have had the opportunity to send their children to secondary schools and even universities to receive a better education than their parents. Lastly, the link with Sol Orgánica is a source of pride for many growers, as they produce high-quality organic fruit and are transforming their farms to heal the soil and protect the environment.

The case of Mercon is also a good example of how connections with anchor companies enable small producers to significantly improve their quality of life. From the interviews conducted with suppliers, it is clear that they have been able to increase their income thanks to their relationship with the anchor company. In addition, they have been able to acquire more land to expand their farms and increase production. In one particular case, a producer indicated that she was now able to manage her time independently, since she did not have to follow a strict work schedule, which was very valuable to her. In all cases, producers were proud to make a living from their coffee production and be independent. This shows that these types of linkage strategies also have the potential to empower producers.

## 6.3 Policy Recommendations to Promote the Integration of Small Producers into Global Value Chains

In general terms, successfully integrating small landholder producers into global food value chains must focus on strategies, programs, and policies that increase their empowerment via different means. Based on analysis of the case studies, this section identifies some of the factors or conditions that enable small landholder producers to successfully connect with global agrifood markets. These factors are generally related to public agricultural services or goods that, in the case studies analyzed, are generally being provided by anchor companies or cooperatives/associations, filling a gap left by the State. However, the fact that these services and public goods are

provided by private actors poses an obstacle for most small producers in terms of their accessibility to these services and. therefore, their ability to participate in global value chains.

Some of the factors or conditions identified that enable small producers to successfully connect with global agrifood markets include those described below.

1. **Strengthening of Productive Clusters.** As discussed in Chapter 2, reducing the transaction costs faced by small producers requires a mature territorial agrifood system to which multiple public and private organizations that support export value chains contribute (e.g., research and development institutions, certification companies, technical assistance companies, financial institutions, international trade support offices, etc.). This productive ecosystem enables small producers to more easily meet the minimum requirements set by international markets, as well as develop other value-adding strategies.

   As seen in the cases of Mi Fruta and Frutucumán, these types of production clusters can even enable small independent producers to embark on an export project through their own company, which can be very successful. It can also enable them to develop innovation processes by developing derivative products, as Frutucumán did with lemons.

   The development of this type of cluster also makes it possible to promote healthy competition between companies and associations/cooperatives that contribute to the system by innovating, developing new products, and putting in place more attractive conditions for producers (such as more immediate payment or even a higher purchase price), and higher overall chain efficiency.

   In addition, clusters become a support network that helps small producers adapt to new markets and products should their anchor company run into financial problems, the product's margin fall, or the product's price drop significantly.

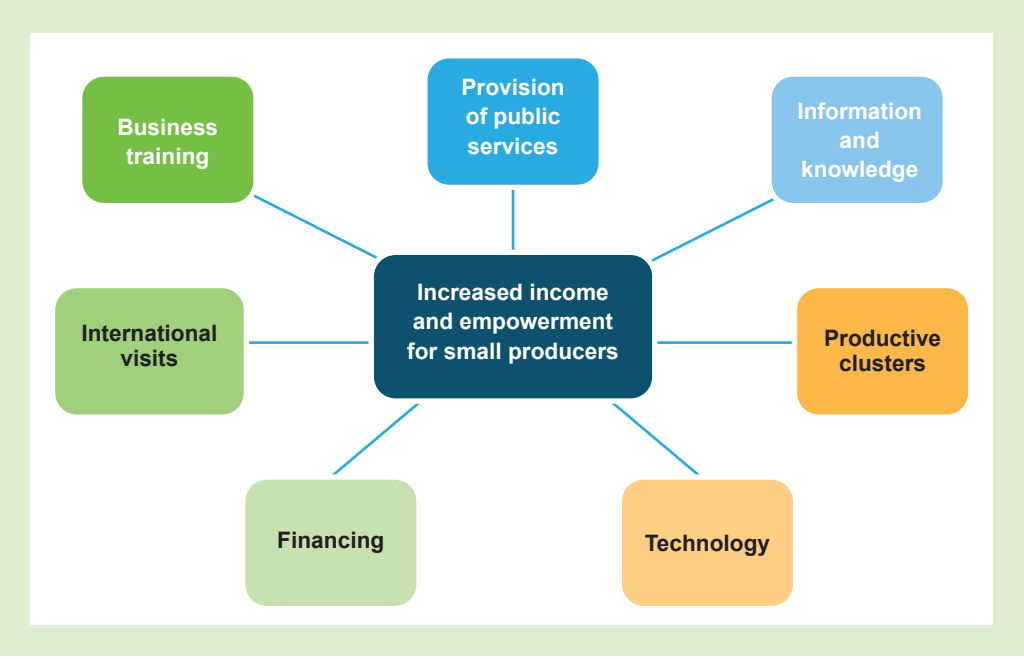
   Clearly, it is complicated and less than ideal to develop these productive clusters from scratch. It is not good practice to force producers to cultivate certain plants in order to put in place productive clusters. However, governments can identify geographic areas where these productive clusters are at the early stages of development and then strengthen them with complementary public goods or services (e.g., technical assistance, rural infrastructure, technological research and development). It is also essential to consider and implement support strategies when these productive clusters are impacted by trade relations with other countries, international price shocks, changes in demand, etc., as these factors can threaten the livelihoods of family farmers and entire regions, leaving them vulnerable.
2. **Technical Assistance.** All the cases analyzed in this chapter demonstrate the importance for small producers of accessing good-quality technical assistance.

Specifically, it is important to establish programs to improve the flow of knowledge within value chains as a means of improving small producers' access to information. For example, through technical assistance and agricultural extension services, farmer field schools, demonstration plots, and other mechanisms can be developed to provide small producers with information and training. It is important that this training not focus solely on productive topics, but rather cover a variety of topics including trading strategies, financial training, management strategies, etc. In this regard, it is also essential for governments to provide information and technical support to help small landholder producers take the necessary steps to establish cooperatives, organizations, and enterprises. These initiatives must be affordable, and it must be ensured that they can be conducted in rural areas without major displacement and that they employ clear rules and benefits that incentivize small producers to create their own cooperatives or companies.

3. **Access to Technologies.** Technological development and innovation are essential to increase the competitive advantages of any sector in international markets. Access to state-of-the-art technologies enables small producers to develop new products to generate business opportunities, as well as techniques and processes that improve productivity and efficiency in production, processing, and trading. In order for small landholder producers to have access to adequate technologies and new innovative developments, the governments must promote must promote and finance research institutes that generate and transmit this new knowledge and technology and make it available to the general public. In addition, it is important that these institutes be accessible in rural areas, generate relevant technologies, and be accessible to small landholder producers.
4. **Access to Financial Resources.** One of the critical factors in strategies to integrate into global value chains is that they require significant initial investments in order to obtain the product volumes and quality required by international markets. In addition, financing is a factor enabling development of credence attributes, which make it possible to differentiate and add value to the product. Not having mechanisms enabling access to financial resources at the right time makes it impossible for small landholder producer initiatives to gain access to global agrifood value chains. This barrier is particularly significant in the case of small landholder producers in Latin American countries, since in the vast majority of cases they do not meet financial institutions' minimum requirements (e.g., formal titles and land ownership) to grant them credit. In addition, these financial services are usually not adapted to the needs of the producers in terms of defined planting and harvesting seasons, among other issues. The interest rates are high, the procedures are difficult to implement for producers with low levels of education, and/or the financial institutions are often not located in rural areas, which prevents access by small producers.

5. **Participation in International Fairs and Visits to Identify Business Opportunities.** Opportunities to meet and contact with potential clients, learn about market trends at trade fairs, and make visits to potential target markets are essential for future exporters to be able to identify business partners and build adequate networks to expand their opportunities. However, the participants in these international fairs are usually large companies. For this reason, it is important that small landholder producers also have the opportunity to participate in these events and for them to have training beforehand so that their participation can lead to real commercial opportunities. In addition, it is crucial to have an entity that generates, processes, and disseminates market information to small landholder producers in an adequate and timely manner.
6. **Provision of Services and Rural Public Goods.** Developing, expanding, and consolidating mature agrifood value chains that can be linked to global value chains requires numerous public services. If public policies and resources are not directed toward providing these public services, small landholder producers will not be able to take advantage of new global markets, or their participation will be more costly. In particular, emphasis should be placed on providing adequate product transport routes that are connected to the ports of product exit and input entry (in cases where inputs are imported) so that the different rural areas can be connected and transportation costs reduced. Access to irrigation is also essential in some cases, especially during dry seasons. In addition, as mentioned earlier, technical assistance is essential to help producers obtain adequate product volume and quality, and to help them successfully meet international market standards. Lastly, animal and plant health services are key to guaranteeing the quality of products for export. The existence of clear guidelines and regulations for animal and plant safety and health and certification of them by public bodies at the national level are fundamental for small producers to be able to integrate into global agrifood value chains.

**Figure 6.1 • Factors that Promote the Successful Integration of Producers into Global Agrifood Value Chains**




Source: Prepared by the authors using data from SUNAT.

## Annex 6.1 Case Study Summary

| Name | Country | Product | Type of Integration | Number of Small Producers | Income and Benefits |
|---|---|---|---|---|---|
| Agro-export | Bolivia | Sesame seeds | Anchor company | 800 | • US$1,100 per ton (approximately 50 percent of the international price)<br>• Yield of one ton per hectare<br>• Between 5 and 10 hectares planted<br>• Payment on delivery<br>• Financing of 50 percent of the cost of cultivation<br>• Sale of inputs at a lower price |
| Andean Valley | Bolivia | Quinoa | Anchor company | 487 | • Price 2.5 percent higher than that of Anapqui (US$1.82 per kilo)<br>• Immediate payment<br>• Support for organic certification<br>• Technical assistance service<br>• Other certifications<br>• Technological innovation<br>• High-value-added products |
| Mercon | Nicaragua | Coffee | Anchor company | 295 | • Organic certification and UTZ, part of the Rainforest Alliance<br>• Technical assistance<br>• Payment above the market price<br>• Financial support |
| San Miguel | Argentina and Uruguay | Lemons and citrus | Anchor company | 200 | (No payment information available.)<br>• Export packing and harvest crews provided by the company<br>• Technical assistance<br>• Pest management<br>• Irrigation support<br>• GlobalG.A.P. certification and the **GlobalG.A.P. Risk Assessment on Social Practice module**<br>• New product development |
| Wiraccocha | Peru | Quinoa, amaranth, and chia | Anchor company | 1,400 | • Producer price of US$1.28 per kilo (30 percent of the final price)<br>• Provides certified seed and organic inputs<br>• Extends credit to producers<br>• Provides technical assistance<br>• Supports organic certification<br>• Fair price and market certainty<br>• Other certifications such as kosher, gluten-free, and HACCP |
| Kekén | Mexico | Pork | Anchor company | **166 families, including on *ejidos* (indigenous)** | • Fixed payment per kilo plus a premium for the feed-to-weight conversion rate, promoting efficiency<br>• Finishing services contracted with small producers<br>• Supplies the pigs, feed, and medicines<br>• Provides technical assistance<br>• Support for financing |

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| Name | Country | Product | Type of Integration | Number of Small Producers | Income and Benefits |
|---|---|---|---|---|---|
| Westfalia Fruit | Peru | Avocados | Anchor company | More than 270 producers | • Pays US$1.30 per kilo for conventional fruit and US$2.40 per kilo for certified organic fruit, 10 percent above the market price<br>• Payment on delivery<br>• Technical assistance support<br>• Producers must have a minimum yield per hectare<br>• GlobalG.A.P. certification |
| Sol Orgánica | Nicaragua | Tropical fruits and fruit ingredients | Anchor company | 1,200 (associates) and 600 additional fruit suppliers | • Payment to the producer is negotiated prior to the harvest and then the price for the buyer is set. This ensures prices 20 or 25 percent above the market price<br>• The company covers the certification and technical assistance costs and does not charge the producers<br>• Initially, certified organic fruit dried in the sun.<br>• The company's commitment to producer families led it to obtain Fairtrade certification<br>• Commitment to healthy food and positive impacts on the environment led the company to obtain certification in regenerative agriculture.<br>• Significant investment in technological innovation<br>• Company has evolved and innovated in terms of differentiation. |
| Chololó SRL | Paraguay | Yerba mate | Anchor company | 100 | •<br>• Production in the Atlantic Forest that promotes its conservation<br>• Organic certification<br>• Works with indigenous families<br>• Preservation of the Aché indigenous culture<br>• Health benefits of yerba mate (superfood) |
| Guayaquil | Paraguay, Brazil, and Argentina | Yerba mate | Anchor company | 1,000 | • Payment of between 130 and 200 percent above the market price<br>• Reinvests 20 percent of its profits in conservation, infrastructure, and health<br>• Production in agroforestry systems that promote forest regeneration and conservation of protected areas<br>• Organic certification<br>• Fairtrade certification<br>• Works with indigenous and family farmers<br>• Preservation of the Aché indigenous culture<br>• Health benefits of yerba mate (superfood) |

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| Name | Country | Product | Type of Integration | Number of Small Producers | Income and Benefits |
|---|---|---|---|---|---|
| Asociación Nacional de Productores de Quinua (Anapqui) | Bolivia | Quinoa | Horizontal integration | 1,800 | • Anapqui sets the market price<br>• Payment of US$1.78 per kilo plus US$0.29 for inputs<br>• Also provides technical assistance<br>• Fairtrade certification<br>• Other certifications<br>• Superfood |
| Asohass | Colombia | Avocados | Horizontal integration | 44 | • Export price of US$0.88 per kilo<br>• Domestic price of US$0.67 per kilo with 100 percent markup for quality<br>• Inputs for harvest<br>• Revolving fund<br>• Collection center<br>• GlobalG.A.P. certification<br>• Exporter Property certification<br>• BPA for domestic fruit |
| Asotrópico | Colombia | Avocados | Horizontal integration | 60 | • Payment of US$1.05 per kilo<br>• Collection center<br>• Revolving fund<br>• Inputs for harvest<br>• All member properties have an Exporting Property (*Predio Exportador*) certificate, enabling them to export to an array of markets<br>• The cooperative is currently working on finalizing a partnership with a company that processes avocados using individually quick frozen technology |
| Coopsol | Argentina, Paraguay, and Bolivia | Honey | Horizontal integration | 600 | • Organic honey<br>• Combines economic, social, and environmental objectives<br>• Fair profit distribution<br>• Fairtrade certification<br>• Social premium of between 5 and 15 percent of the value of the product, paid so that producers can reinvest in their businesses<br>• Advantages of access to credit<br>• Support to help members diversify their production<br>• Decision-making in the cooperative<br>• Blockchain traceability with support from IBM |
| Frutucumán | Argentina | Lemons, blueberries, and oranges | Horizontal integration (own company with independent producers) | 4 | • Sale prices 80 percent higher than export prices for non-certified fruit<br>• Excellent quality<br>• Organic certification for production<br>• Development of products derived from lemons<br>• Synergies with the Tucumán lemon cluster<br>• Young manager with business and export skills |

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| Name | Country | Product | Type of Integration | Number of Small Producers | Income and Benefits |
|---|---|---|---|---|---|
| Mi Fruta | Chile | Table grapes and raisins | Horizontal integration (own company) | 28 | • Young and visionary manager<br>• Income between six and seven times higher than when they were suppliers for an anchor company<br>• Previous experience with an anchor company<br>• Export-quality production<br>• Knowledge and existence of a regional cluster<br>• Fairtrade certification<br>• GlobalG.A.P. Certification<br>• In the process of offsetting carbon footprint<br>• Technological innovation<br>• Maylén variety, a more productive grape that is better suited for export<br>• Payment of royalties |

Source: Prepared by the authors based on case study documents.

7

# Value-Creation Strategies in Global Value Chains in the Face of Environmental Challenges

• Romina Ordoñez
• Yoanna Kraus
• Lilia Stubrin

This chapter reviews the internationalization strategies of different companies in Latin America that aim to tackle environmental challenges while at the same time take advantage of market niches that value environmentally responsible production and are willing to pay premiums for it.

According to recent estimates, the world population will grow from its current 7.8 billion inhabitants to 9.7 billion in 2050 (United Nations 2019). Demographic projections show an upward trend in average per capita income and in the intensity of the use of natural resources (FAO 2020). The agrifood sector has responded to these challenges in the last 50 years by tripling productivity.[1] However, despite the benefits to the food security of millions of people, particularly in the poorest regions of the world, this increase in productivity has had negative consequences for the environment. They include erosion and soil degradation, overexploitation and pollution of bodies of water, loss of biodiversity, deforestation, and increased greenhouse gas emissions. These effects are further exacerbated by the impact of climate change, including irregular rainfall, increased temperatures, and the increased frequency of extreme weather events.

The United Nations Sustainable Development Goals (SDGs) state that the impact of the agriculture sector on the environment requires shifting to new production models that prioritize efficient use and conservation of natural resources. These models must

[1] According to FAO (2017a), between 1960 and 2015 global agricultural production increased by more than 300 percent. This increase was possible thanks to the so-called "green revolution" (Pingali 2012).

adjust to increasingly scarce water and arable land, and they must not only produce food but also reverse the negative impact of the model used thus far, which focused mainly on increasing productivity (Vos and Bellu 2019). As Giovannucci et al. (2012) note, instead of producing more, consideration should be given to producing better and creating better food systems.[2]

This chapter analyzes how environmental challenges affect the integration of certain agricultural companies in Latin America into international value chains. These companies implement various strategies to address environmental challenges and to take advantage of the market niches that these challenges have created globally. These are niches that highly value environmentally responsible production models. These niches usually require environmental certifications, and in some cases, they are willing to pay for the environmental services that these models generate. In seeking to transform challenges into opportunities, these companies interact with other actors in the agrifood system, such as governments, innovation systems, and consumers themselves. Although environmental and social issues are intrinsically related, this chapter focuses exclusively on the former.

The first section of this chapter describes the main environmental challenges faced by the agrifood system. The second section presents a conceptual framework describing the main actors that make up agrifood systems and their interrelationships. This point is fundamental for analyzing business strategies to tackle environmental challenges and the opportunities they generate, which is the backbone of this analysis. The third section describes four different production models adopted by export-oriented food companies and producers in the project case studies. To varying degrees, the models seek to increase the sector's adaptation to the effects of climate change and reduce its environmental footprint. Likewise, some of the mechanisms that these producers and companies implement to take advantage of these production models are described, including certifications and payments for environmental services. The fourth section illustrates the elements analyzed through several project case studies. The chapter concludes with some final thoughts.

## 7.1 Environmental Challenges and Agrifood Production

Agro-export companies in global value chains and the small and medium-sized agricultural producers that are part of their supply chains face direct environmental

[2] A food system is made up of all components (environment, population, resources, processes, institutions, and infrastructure) and activities involved in the production, processing, distribution, preparation, and consumption of food, as well as the socioeconomic and environmental impact of these activities. A sustainable food system is one that guarantees food security and nutrition for all in such a way that economic, social, and environmental conditions are not compromised for future generations (United Nations 2015).

challenges, including the degradation and scarcity of the natural resources necessary for primary production. At the same time, they must maintain high levels of productivity and competitiveness, while meeting demands for increasing quantity and quality from their destination markets. In addition, the sector must keep an eye on the impact of its activity on the future availability of natural resources to ensure that it can stay viable in the medium and long terms. This section presents an overview of the main environmental challenges that affect the sector, which include producing with degraded and unpredictable resources while at the same time needing to find ways to reduce the impact of the agricultural activities on those resources.

Agro-export companies in global value chains and the small and medium-sized agricultural producers that are part of their supply chains face direct environmental challenges. At the same time, they must maintain high levels of productivity and competitiveness, while meeting demands for increasing quantity and quality from their destination markets.

### 7.1.1 Changes in the Quantity and Quality of Water

The agrifood sector is one of the main users of water worldwide, depending on it for its very existence. The sector also has a direct impact on the availability and quality of water for other sectors and users due to its use of irrigation systems and fertilizer, changes in land use, and use of agrochemicals. Agriculture is the largest consumer of water worldwide, accounting for more than 70 percent of water extraction globally (FAO 2020).

According to the United Nations Food and Agriculture Organization (FAO 2020), approximately one-sixth of the world's population lives in agricultural areas with severe water limitations.[3] The amount of freshwater resources available per person per year has decreased by more than 20 percent over the last two decades, and if action is not taken immediately, many more people will be affected. Changes in water flow and quality have had a negative impact on agrifood system productivity and on the capacity of some ecosystems to provide environmental goods and services such as fisheries, timber and non-timber forest products, nutrient retention, biodiversity, and cultural and recreational uses (Mateo-Sagasta and Burke 2011).

The global water shortage is also due to the progressive deterioration of the quality of water in many countries, which reduces the amount of safe water available

[3] FAO (2020) uses water stress (freshwater extraction as a proportion of available freshwater resources) to measure the severity of water scarcity affecting irrigated agriculture.

for use (Mateo-Sagasta et al. 2017). Agriculture plays an important role in water pollution because it discharges large amounts of agrochemicals, organic matter, waste medications, sediments, and saline drainage into water bodies. The resulting water pollution poses proven risks to aquatic ecosystems, human health, and the productive activities themselves (UNEP 2016). The challenge for the agriculture sector is not only to continue increasing productivity with scarcer and more unstable water resources, but also to meet the present and future flow needed to sustain ecosystems and other water-dependent users.[4]

### 7.1.2 Soil and Ecosystem Degradation

Soil degradation and contamination have a direct impact on land productivity and on the ability of agricultural systems to produce food and other raw materials. Soil is an essential ingredient for agriculture, and properly managing it helps preserve biodiversity and provide other environmental goods and services. Healthy soil is also one of the best climate change adaptation strategies (FAO and ITPS 2015).

At the same time, land used for agricultural production accounts for more than 10 percent of the planet's surface. In the last 50 years alone, agricultural land area has grown by 12 percent. During this period, technological progress has enabled the tripling of production. However, the intensive use of inputs such as fertilizers and pesticides, and the expansion of the agricultural frontier to areas not suitable for it (for example, slopes, forests, and conservation areas) have had a negative impact on the soil that limits its productive capacity, as well as its ability to provide ecosystem goods and services such as carbon capture and storage, soil health, water capture and storage, and biodiversity preservation (FAO 2020). The challenge for the agrifood sector is to produce more food with increasingly degraded soils, while at the same time avoid deforestation and move into conservation areas and adopt practices that reduce soil erosion and pollution.

### 7.1.3 Extreme Events and Temperature

The agriculture sector plays a dual role in climate change, as it is both the cause and the victim of its effects. On the one hand, it is among the sectors most responsible for greenhouse gas emissions, as it generates between 10 and 12 percent of global emissions (Smith et al. 2014). If the emissions associated with changes in land use and deforestation are added to the emissions directly linked to agriculture, the sector in

[4] It is estimated that 41 percent of water use for irrigation around the world occurs to the detriment of the needs of environmental flow, which is the flow necessary to support the functions of ecosystems and other users that depend on present and future water (FAO 2020).

total is responsible for more than 25 percent of greenhouse gas emissions. Furthermore, the sector is responsible for high-impact climate emissions such as methane ($CH_4$) and nitrous oxide ($N_2O$).[5] Estimates are that the agriculture sector is responsible for 45 percent of $CH_4$ emissions, with 80 percent of that attributable to livestock. Additionally, the agriculture sector is responsible for 80 percent of global $N_2O$ emissions, mainly due to fertilizer use.

At the same time, climate variability, as well as the increased intensity and frequency of extreme events such as droughts and hurricanes due to climate change, add great uncertainty to agricultural production. This in turn contributes to price volatility, increasing the risks faced by the agriculture sector. Climate change has reduced agricultural total factor productivity globally by about 21 percent since 1961. This effect is more severe in warmer regions of Latin America and the Caribbean, where the reduction has been between 26 and 34 percent. Furthermore, there is evidence that global agriculture has become more vulnerable to climate change over time (Ortiz-Bobea et al. 2021).

In fact, climate change—together with changes in land use, deforestation, and associated adverse effects such as erosion, soil degradation, and desertification processes—can contribute to the increased spread of pests and diseases that, in turn, impact agricultural productivity, to the detriment of food availability (FAO 2017a). The greater prevalence of pests can lead to an overuse of agrochemicals in crops, which not only contributes to increased pollution of water sources and soils, but also threatens the health of workers in the fields and consumers when they are overexposed to agrochemicals. The challenge for the sector is, therefore, to increase its resilience to the impact of climate change while at the same time reduce its contribution to climate change, in line with the objective of the Paris Agreement to limit the increase in global temperature to 1.5°C compared to pre-industrial levels by the end of the 21st century.

### 7.1.4 Food Losses and Pollution

Although the challenges of climate change and water scarcity have a greater sense of urgency in the agriculture sector, losses and waste generated around food production also have important environmental effects. When food is lost and wasted, the land, water, labor, energy, and other inputs used to produce, process, transport, prepare, store, and dispose of discarded food are also wasted. Using a methodology developed by the FAO (2019), it is estimated that in Latin America and the Caribbean, 11.6 percent of the food produced is lost between post-harvest and distribution (not including the latter).

[5] Methane can have an impact on global warming that is up to 25 times greater than that of carbon dioxide (CO2) (EPA 2021). The impact of nitrous oxide on global warming can be almost 300 times that of $CO_2$ (Skiba and Rees 2014).

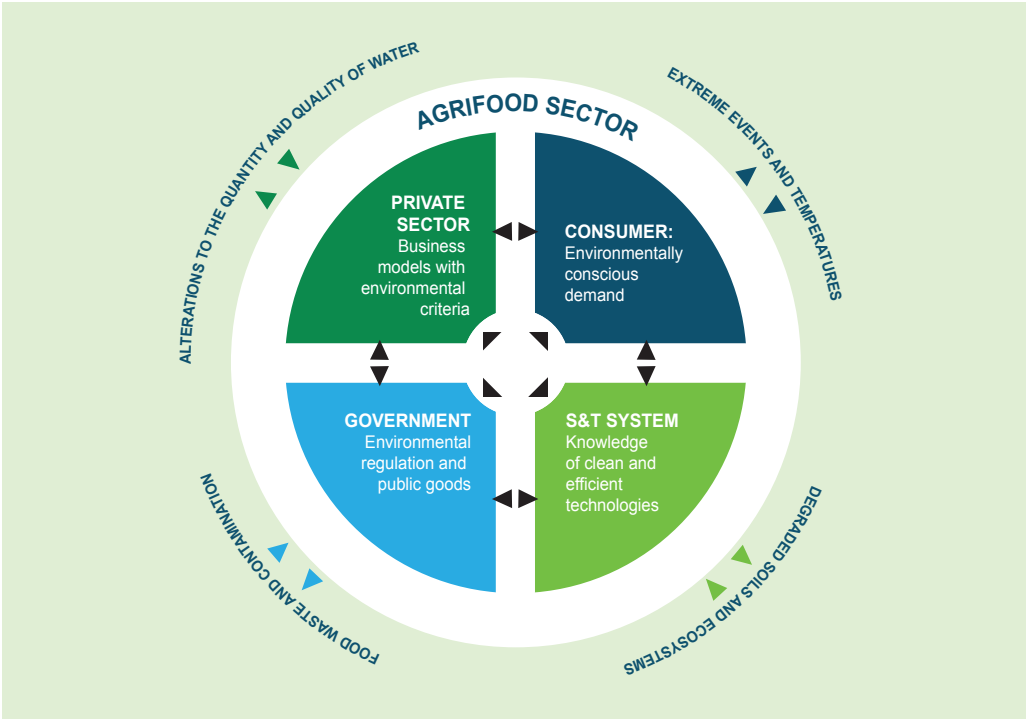
Additionally, according to the U.S. Environmental Protection Agency (EPA), food is the largest category of material placed in solid waste landfills (USDA 2021). Organic waste, both in water and in landfills, emits 3.2 percent of greenhouse gases worldwide because when it decomposes it produces methane and nitrous oxide (Ritchie and Roser 2020), contributing to climate change. The challenge for producers is to find innovative ways to transform waste into byproducts with commercial value, thus improving efficiency in the use of natural resources and reducing pollution and global warming.

## 7.2 The Actors in the Agrifood System and Their Interrelationships in the Face of Environmental Challenges

The environmental challenges described in the previous section impact the actors that make up the agrifood system: the private sector, government, science and technology systems, and consumers (Figure 7.1). These actors play different roles in a changing environment with shifting resource availability that is increasingly unpredictable.

The private sector, the main actor in food production, includes not only producers and traders of agricultural products (from small individual producers to large anchor

**Figure 7.1 • Environmental Challenges and Actors in the Agrifood Sector**




Source: Prepared by the authors.

companies with significant supply chains), but also companies that supply inputs, such as traders of agro inputs, companies that provide digital solutions for the sector, and certification companies, among others. Many of these input suppliers focus on producing solutions that contribute to more resilient agricultural production with a lower environmental footprint, leveraging new scientific-technical knowledge. The agrifood production sector itself is also an important engine for innovation that produces, pilots, and adopts technology adapted to challenges posed by the environment.

The private sector, however, does not act alone. Rather, it works in coordination with other actors: consumers, who increasingly prefer producers with greater environmental awareness; the government, which imposes environmental regulations that pose additional restrictions to the biophysical ones, and provides other public goods fundamental for the private sector's activities; and the science and technology system, which seeks to provide solutions to the challenges generated by the environment (Figure 7.1).

Many consumers, mainly in developed countries, understand the impact that their consumption decisions can have along the production chain and are looking for products that respond to their environmental concerns or values. Because food production processes are unobservable for most consumers, they turn to third-party certifications that validate certain attributes of these production processes, and they are willing to pay price premiums for those differentiating attributes.

The government, for its part, plays a key role as the entity in charge of guaranteeing society's environmental welfare through the equitable and sustainable provision of natural resources. To do this, it designs and implements policies, laws, and regulations, and provides other public goods that influence producers, traders, and consumers, changing their consumption and production possibilities. Chapter 9 describes in depth the public sector's role in developing successful agro-export chains in the region.

At the same time, the science and technology system produces new knowledge that allows for a better understanding of the magnitude of the environmental challenges and the development of possible solutions. Knowledge generated as a public good can be used by the private sector to develop process or product innovations, as well as by the public sector to establish regulations. As mentioned, this does not mean the private sector itself is not contributing a portion of the innovation and technological change.

In this way, the responses of each actor to the effects of climate change and other environmental challenges impact the decisions and actions of the other actors and the ecosystem itself. The strategies followed by each of them are thus influenced by multiple factors that operate simultaneously and that change over time as environmental challenges become more pronounced and social awareness of the urgent need to address them increases. This greater social awareness is reflected in consumption patterns and in government regulatory measures.

One illustration of the interaction between the actors and their responses is the environmental challenges caused by increased deforestation of tropical and subtropical forests, which has led to stricter government regulations in some countries and expanded use of traceability and monitoring systems. High rates of deforestation are also a concern to consumers in developed countries, who support programs and projects to reduce deforestation or strengthen production chains free of it, and are willing to pay price premiums for food whose production methods guarantee there is no deforestation in the chain. This process has a particular impact on the cattle sector, identified as the most important factor in deforestation in these areas, and affects the different actors in this value chain in different ways. For example, livestock producers may be forced to adopt better practices, such as silvopastoral systems or improved pastures, and to prove that they have not cleared forest on their land in order to be able to sell to slaughterhouses that must demonstrate origin control of the animals they slaughter. At the same time, the private sector offers some solutions, such as traceability systems for cattle and timber production, which allow for monitoring the sector's impact on forests. In many cases, the incentive for anchor companies to produce in a more environmentally responsible way comes from taking advantage of the international market niches that value it and are willing to pay for it (for example, for certified low-carbon or carbon-neutral beef).[6]

## 7.3 Production Models of Agro-Export Companies that Are Resilient and Have a Smaller Environmental Footprint

Based on this project's case studies, this section looks at the main production models implemented by some agrifood export companies in Latin America to address environmental challenges and take advantage of the opportunities they create.

Based on this project's case studies, this section looks at the main production models implemented by some agrifood export companies in Latin America to address environmental challenges and take advantage of the opportunities they create.

The motives for implementing resilient production models with a smaller environmental footprint can be classified into four categories: (1) strengthening the climate resilience of the activity to ensure future production viability (for example, through changes in the location of crops or the use of improved seeds); (2) searching for greater profitability by accessing specialized and high-priced market niches—mostly outside the region—that value these models; (3) complying

[6] This is the case of the Brazilian meat processor Marfrig, one of the largest in the world, which recently launched a new carbon-neutral meat brand on the market, approved by the Brazilian agricultural research institute Embrapa. See https://www.bioeconomia.info/2020/09/01/marfrig-lanza-una-linea-de-carne-carbono-neutro/.

with public sector regulatory requirements intended to guarantee the provision of public goods (for example, the health of the population or the conservation of the environment and natural resources); and (4) the environmental awareness of producers when they recognize the imminence of environmental challenges and their interrelationship with their productive activity, and lead them to change their production model for reasons of equity—sometimes intergenerational—or altruism. These four types of motivations are not exclusive—generally companies are driven by a combination of them.

### 7.3.1 Types of Production Models

The project's case studies identify production models that arise from environmental challenges and classify them as follows: (1) organic, (2) beyond organic, (3) agroforestry, and (4) use of waste from the production process. The production models analyzed are, in general, voluntary. In other words, they emerge not from a need to comply with regulatory requirements but rather as a direct response to environmental challenges or consumer demand that creates niches for differentiated products. However, in the medium or long terms, as governments pass stricter regulations on environmental issues and natural resources become even scarcer and more unpredictable, certain practices that are now voluntary may end up being mandatory in order to enter certain markets.

The salient elements of each type of production model are summarized below, with the understanding that they are not exclusive, since companies can have multiple objectives that lead them to take elements from more than one of them, as will be observed in the case studies described below.

#### *Organic Production*

Unlike conventional production, organic agriculture is a production system that seeks to reduce its impact on the environment while generating products with less toxic waste. This production system focuses on using natural and productive resource management practices without agrochemicals and prioritizing the conservation of clean water, soil, and biodiversity. Although the standards of this production model may vary from one country to another, they generally involve practices throughout the chain such as:

- Avoiding chemicals, such as synthetic fertilizers, pesticides, antibiotics, and additives
- Avoiding genetically modified organisms
- Farming in soils where no chemicals have been used for at least three years
- Maintaining a strict physical separation between conventional and organic products

Organic agriculture is one of the fastest-growing production systems within the agriculture sector. In 2019, 72.3 million hectares across the world were cultivated using

practices considered organic agriculture, an increase of almost 100 percent since 2009.[7] Australia, Argentina, and Spain are the countries with the most hectares of organic agriculture in the world. Additionally, the global retail market for organic products reached US$119 billion in 2019, an increase of more than 100 percent over the almost US$55 billion in 2009 (Willer and Lernoud 2021; Willer and Kilcher 2011).

In Latin America and the Caribbean, demand for organic food is still incipient and has great growth potential. In the region, where there are around 225,000 organic producers, cultivated organic area grew only 8 percent in the last 10 years (compared to 100 percent globally), and the value of the organic retail market accounts for less than 1 percent of the global market.[8] Argentina accounts for 44 percent of the total organic agriculture area in the region, followed by Uruguay (26 percent) and Brazil (16 percent). Exports of organic products from the region go mainly to Europe, the United States, and Japan (Willer and Lernoud 2019).

### *Beyond-Organic Production Models*

The environmental challenges facing the sector, as well as the greater awareness among producers today of the agriculture sector's contribution to climate change and environmental degradation, have led many producers and agricultural companies to look for strategies to manage the risk this poses to production—not only to present-day agricultural activities but also to those of future generations. These motivations have led them to adopt production models that significantly reduce their impact on the environment and contribute to improving available resources to the benefit of themselves, other ecosystems, and society in general. This process of recovery and maintenance of natural resources is understood in this chapter as the "creation of environmental value" that goes beyond organic agriculture.

There is evidence showing how different agricultural and livestock models (e.g., regenerative or biodynamic) can restore and maintain the ecosystem and related ecosystem services.[9] These production models are part of agro-ecological agriculture.[10] Although in some cases short-term yields may be reduced when such models are adopted, there is evidence that environmentally responsible practices have the potential to lead to higher and more stable yields in the long term (Rosa-Schleich et al. 2019).

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[7] The estimate includes areas both certified as organic and in the process of conversion.

[8] Some countries report the number of producers, while others report the number of companies or cooperatives, so it is possible that the number of organic producers is underestimated.

[9] Ecosystem or environmental services are ecosystemic resources or processes of natural ecosystems that benefit humans. The concept includes products such as clean drinking water, and processes such as waste decomposition.

[10] "Agro-ecology is a holistic and integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of sustainable agrifood systems. It aims to optimize the interactions between plants, animals, human beings, and the environment and, at the same time, address the need for socially equitable agrifood systems" (FAO Center for Agricultural Knowledge 2021).

The objective of biodynamic agriculture is to contribute to the protection of the environment and natural resources, conserve biodiversity, and improve the quality of life of rural communities through practices such as the use of compost, mixed farming systems, animal manure, and local distribution systems, among other practices (Turinek et al. 2009). Unlike organic production, it includes the application of multiple preparations to stimulate soil nutrient cycling, compost development, and photosynthesis. These substances, prepared from flowers, bark, and nettles, must be processed and applied in very specific ways following an application schedule that is based on the stars (Paull and Henning 2020; Ponzio et al. 2013).

According to Paull and Hennig (2020), in 2020 there were 251,842 hectares under biodynamic production in 55 countries. Germany, with 34 percent of the total, is the country with the most biodynamic hectares, followed by Australia (20 percent) and France (6 percent). It is also estimated that between 2000 and 2018, the number of certified biodynamic agricultural operations grew by more than 47 percent (Beluhova-Uzunova and Atanasov 2019).

The term regenerative agriculture, meanwhile, began to be used in the United States in the 1980s, based on the publications of the Rodale Institute, a think tank that has for several decades been one of the theoretical strongholds of organic agriculture. During the last two decades, regenerative agriculture has generated significant interest, both from the general public and among researchers and academics. However, there is still no agreed-upon definition of what regenerative agriculture is (Giller et al. 2021). The Rodale Institute (2014, 7) notes that regenerative organic agriculture "improves the resources that it uses instead of destroying or consuming them; [and] is a holistic system that promotes continuous innovation for environmental, social, economic and spiritual well-being." According to this idea, regenerative organic agriculture focuses on maintaining soil nutrients, promoting biodiversity, opting for fewer annual and more perennial crops, and depending more on internal rather than external resources.

Thus, the spirit of regenerative practices is to take care of the quality of the soil based on the logic that raising multiple crops (as opposed to monoculture), together with other regenerative practices, helps feed the microscopic biodiversity of the soil, which in turn increases its capacity to absorb water and carbon. This strengthens resistance to floods and droughts and increases the ability to absorb greenhouse gases.

Both the biodynamic and regenerative models will be highlighted in some of the case studies presented later in this chapter.

### *Agroforestry Models*

These models are referred to as agroforestry because they combine the presence of trees with agricultural production, regardless of whether they are organic, regenerative, or use another environmentally responsible practice. They include silvopastoral models

that combine trees and livestock production. In these models, forest cover is useful for its production of timber, firewood, and non-timber products (for human or animal consumption), or simply as shade and protection for livestock production. However, importantly, forest cover also provides other environmental services such as water regulation, soil fertility maintenance, erosion reduction, and prevention of collapses and landslides. In particular, trees are crucially important for capturing and sequestering greenhouse gases (Beer et al. 2003).

Marais et al. (2019) show that in addition to enhancing the provision of ecosystem services, agroforestry practices can improve agricultural productivity. Rosati et al. (2021) also find that adopting agroforestry practices contributes to increasing the environmental benefits of organic agriculture. For example, the shade-grown coffee model, which has been widely adopted in Mexico, Central America, and Colombia, is recognized for its potential for productive recovery of slopes with degraded soils (Cessa-Reyes et al. 2020; Farfán 2014). This model is combined with an organic production model, such as the organic agroforestry coffee produced in the states of Chiapas and Veracruz in Mexico (Farfán 2010).

#### *Models that Leverage Waste from the Production Process*

The economic logic of this production model is based on transforming waste from food production processes into marketable products, thus diversifying production. Waste that potentially contaminates soil and water sources or is dumped into landfills and contributes to the production of greenhouse gases is therefore reduced. This is a win-win situation: a company avoids having to pay for waste disposal (for example, transportation to a landfill, permits, and sewage treatment), and the environmental damage caused by the waste is prevented, with the waste instead used profitably by the same or another company.

This production model adopts elements of the circular economy, a production and consumption model based on recognizing the limits of the planet's resources and the importance of understanding the world as a "system" where pollution and waste are considered undesirable. It is a promising paradigm for reducing pressure on global sustainability. This approach is in contrast to the traditional "take-make-use-discard" production model, as the circular economy model looks for economically viable ways to reuse products and materials on a continuous basis (Bocken et al. 2016; Korhonen et al. 2018).

### 7.3.2 Mechanisms to Enhance the Economic Value of the Models

As has been shown, in many cases agrifood companies and producers adopt more environmentally responsible models to take advantage of market opportunities, increase profits, or respond to the demands of buyers. In these cases, it is important to be able

to show other actors (such as consumers, clients, or other links in the chain) that certain productive processes or activities comply with certain standards that guarantee the absence of environmental damage or the presence of an environmental commitment or contribution. Whether or not to adopt a standard is a decision that each actor in the value chain must make, and although the lack of a certification is not a limitation to entering a market, it may affect an enterprise's level of participation in a specific market niche, depending on consumer preferences for certain characteristics (WTO 2013). Interestingly, a recent IDB study, using data from Chilean companies, shows that since consumers in high-income countries value clean environments more than consumers in developing countries, exporters targeting high-income countries are more likely to improve their environmental outcomes than exporters that target destinations with lower environmental value (Blyde and Ramírez 2022).

This section presents two ways of extracting economic value from the production models in question, as identified in the case studies: environmental certifications, and payments for environmental services. In the case of payments for environmental services, another objective is to internalize the externalities that the productive activities create in the ecosystem.

### *Environmental Certifications*

Consumers often cannot see how the food they eat has been produced or where it comes from. At the same time, there is a growing niche of consumers—particularly from developed countries—who have an increasing amount of information about the impact the agriculture sector can have on ecosystems, the well-being of rural communities, and their own health from consuming products containing excessive chemicals. These consumers are increasingly aware of the impact of their consumption choices on the environment and climate change (and sustainability in general) and are willing to pay a price differential or premium for unobservable attributes related to the sustainability of the production model of the food they consume (Mosser et al. 2011; Katt and Meixner 2020).[11] In fact, there is abundant literature on the willingness of consumers to pay a price premium for foods with organic attributes and low environmental and social impact (Li et al. 2021; Codron et al. 2006).[12]

[11] Willingness-to-pay estimations measure the maximum markup or amount that a current or potential consumer is willing to pay for a product (Tully and Winer 2014). Willingness to pay has also been estimated for other types of attributes, such as fair trade and animal welfare.

[12] In a recent meta-analysis of 80 studies at the global level focused on sustainable food products, it was found that the implicit willingness-to-pay premium for sustainability is an average of 29.5 percent (Li and Kallas 2021). The authors find that willingness-to-pay estimates are independent of food categories, region, or production methods. Within the sustainability categories analyzed, organic products obtained the highest market premium (38.1 percent).

The need to show consumers the origin and certain characteristics of the food production process gives rise in turn to a need to certify the process or, using the concept presented in Chapter 2, to obtain credentials for certain attributes. Companies and producers can then access this premium by certifying some of their production practices that have a lesser impact on the environment. This process largely explains the appearance and development of a large number of standards and certifications in the agricultural world (Liu 2007).

Voluntary standards are rules, principles, or recommendations regarding a product or process. Unlike regulations put in place by national or international entities, their adoption is not mandatory (FAO 2014). For their part, certifications are documents provided by accredited entities following an audit process. The third-party certification process is the most common form of certification: it involves hiring accredited entities to audit the agrifood production and transformation processes and compare them with the written or agreed-upon standards established by governments or private entities (Pons and Sivardière 2002). Certification processes are expensive and, therefore, pose a barrier to entry to niche markets with environmental standards, especially for small producers (FAO 2014). As was explained in Chapter 4, one solution to this is group certifications that anchor companies can obtain for their supplier network, bearing the cost of certification themselves, as it is beyond the reach of individual producers.

### *Internalizing Externalities through Payment for Environmental Services*

Another way to capitalize on productive activities or practices that contribute in some way to the environment is to participate in the market for an environmental service or product of interest, independent of the market for the main agrifood product. In this way, the producer or company seeks to internalize the environmental benefits and/or costs generated by its agricultural production processes for which there is no established market (externalities). These transactions are called payments for environmental services.

Payments for environmental services reward the positive externalities generated by agrifood producers, such as carbon sequestration, water provision, and biodiversity conservation. International development organizations, investment funds and NGOs, among others, act as facilitators, driving the transaction processes of these environmental services in markets that are still incipient in most cases.

Example of this process are practices to reduce emissions or capture and sequester greenhouse gases in agroforestry chains and their integration into the voluntary carbon market, which is perhaps the best developed market for environmental services to date. The cost of reducing emissions through reforestation is low compared to other sectors (e.g., transportation), so there are profitable opportunities for both buyers and sellers of carbon credits (Gillingham et al. 2018). Agricultural producers that engage in certifiable greenhouse gas capture and sequestration activities (such as reducing

deforestation or forest restoration) can benefit from the sale of carbon credits. These certificates can be sold or bought, generating a payment for environmental services. Thus, the producer obtains a financial benefit that is in addition to the trade of the food that it produces, diversifying its sources of income. The environmental service—in this case, the capture and sequestration of greenhouse gases—becomes a certifiable and marketable byproduct.

On the other hand, although the sale of environmental services is a possibility when engaging in practices that generate these services, the purchase of environmental services is often also a strategy to guarantee the provision of natural resources in the future. For example, there are cases of companies producing beer and carbonated sodas that pay for ecosystem conservation around their water sources (Calvache et al. 2012).

In addition to the income from environmental byproducts and the security of future access to these environmental services, the companies that participate in these environmental markets also in many cases obtain branding benefits, since they send an important signal to customers and other actors in the value chain regarding their level of environmental commitment. The activities involved in buying or selling environmental services are related to transparency and the monitoring of productive activities, as well as to social responsibility. This generates a potential branding opportunity with differentiating elements, as in the case of certifications.

## 7.4 Case Studies

### 7.4.1 Cases of Organic Production Models

This section presents the cases of several agro-export firms in the region that have implemented organic production models in different types of markets: non-differentiated or commoditized food products, such as peanuts (Mizque Peanut Producers Association); products of high value and differentiation, such as fine aromatic cocoa (Corporación Fortaleza del Valle); and industrialized products, such as fruit puree (Fenix. S.A.).[13]

#### *Bolivian Organic Peanuts in Germany: Asociación de Productores de Maní Mizque (APROMAM)*

The Fundación para el Desarrollo Tecnológico y Agropecuario de los Valles (Fundación Valles), located in Bolivia, created the Peanut Project in 2004 to help small producers in Bolivian valleys modernize their farming techniques and build capabilities to enter the organic production niche (Zeballos 2021). The project provided technical assistance to

[13] Fine flavor cocoa is a type of high-quality cocoa in great demand for producing premium or gourmet chocolate.

producers throughout the production cycle (for example, for seed selection, soil management, good fertilization and pest management practices, storage, etc.), and helped identify market opportunities and develop a business strategy. Within the framework of the project, Fundación Valles provided support for the emergence in 2012 of APROMAM SRL, dedicated to producing organic peanuts for export. The company is comprised of 380 small peanut producers located in the municipalities of Mizque (Cochabamba) and Villa Serrano (Chuquisaca).[14]

APROMAM has created its own production and trading skills that have enabled it to enter the foreign market through the export of certified organic peanuts. Since 2013, the association has been exporting approximately 40 tons per year to Germany. APROMAM's connection to Fundación Valles has been central to building capacity throughout the production process—from the collection, selection, and classification of peanuts to their transformation, packing, and export—and including control of farmers' organic practices. Twelve members of APROMAM trained to monitor crops and issue the necessary recommendations play the role of internal control inspectors, ensuring that production is chemical-free in terms of both fertilizer and pest control, and that crops are rotated to avoid soil degradation. Likewise, they supervise waste management and irrigation water use. APROMAM pays producers an additional 15 percent for their organic production. This price differential is an incentive for producers to start producing organically, get certified, and market through the cooperative. The strategy has made it possible to build a successful model to integrate small-scale producers in the international organic market.

### *Ecuadorian Cocoa in High-Value Markets: Corporación Fortaleza del Valle*

Corporación Fortaleza del Valle (CFV) is an Ecuadorian cooperative made up of 1,000 members who produce and export around 600 tons of fine aromatic organic cocoa per year to high-value markets (80 percent is sold to Switzerland for the production of gourmet cocoa-based products) (Villacis et al. 2022). Producing under a certified organic system gives CFV a competitive market advantage by being able to market its cocoa production as environmentally responsible and supportive of biodiversity conservation. The CFV model in the organic cocoa production market is based on providing financial support, training, and strict quality controls to associated producers. The corporation itself pays the costs of these certifications, with the producers later reimbursing these expenses. CFV has field inspectors who regularly visit cocoa plantations and provide technical assistance to members on topics including pruning practices, pest and disease control, manure management, composting, crop rotation, and

[14] The organic peanut market has significant demand from the international market, which consumes at least 21,000 tons per year, particularly in Europe. Germany stands out as the main destination market, with consumption of 17,000 tons per year.

crop management in agroforestry systems. The training focuses on organic production using quality standards set by the government through the Agency for the Regulation and Control of Plant and Animal Health (Agrocalidad).

### *Fruit Purees from Argentina to the Five Continents: Fénix S.A.*

Fénix S.A. is an Argentine SME with 150 employees that started off selling fruit puree to Brazil as an industrial input for producing baby food and juices. The firm produces conventional and organic purees of different types of fruit (apple, pear, apricot, plum, peach, quince, and pumpkin). Today, the company is one of the world's most important players in the fruit puree market. This input is increasingly used to replace synthetic ingredients that add flavor and color to processed foods, in response to the increase in demand for natural and healthy products.[15] Its most important clients are large multinational food companies (Danone, Coca-Cola, etc.). Currently, Fénix S.A. exports 90 percent of its production to 38 countries on five continents. Forty percent of its production is organic.

Fénix S.A.'s growth within the global fruit puree market—reflected in an increase in its annual production from 1,000 tons in the 1990s to 30,000 tons today—is thanks to the company's installed capacity with cutting-edge technology that it operates following international best practices, continually making process improvements in order to be competitive in a highly commoditized market. One of the milestones in its growth was the decision to produce and certify organic in order to supply this expanding market niche in the food industry with the highest quality standards (Stubrin et al. 2022).

Fénix S.A. began winning customers and markets thanks to its certified organic purees both for the European Union (International Federation of Organic Agriculture Movements – IFOAM) and the United States (National Organic Program – NOP), among other certifications (including Kosher, Halal, and FSSC 22000 quality certification). The firm not only adopted and certified organic practices, but also worked with Argentina's National Institute of Agricultural Technology (INTA) to develop microbiological control agents for pest control. This enables it to produce organic, in line with its customers' requirements.

## 7.4.2 Cases Beyond Organic Production Models

This section examines three cases of firms that have implemented production models that create environmental value that goes beyond organic, including biodynamic (Patagonian Fruits Trade) and regenerative (Sol Orgánica and Guayakí Yerba Mate)

[15] It is estimated that between 2004 and 2018, the fruit puree market expanded 2.7 times from US$1.112 billion to US$2.992 billion, and an average annual growth rate of more than 6 percent is projected for 2019–2025. See Global Market Insights at https://www.gminsights.com/industry-analysis/fruit-concentrate-puree-market.

production models. The three companies have environmental certifications, and one of them (Guayakí Yerba Mate) is also beginning to implement innovative initiatives associated with payment for environmental services.

### *Breaking Ground in Organic and Biodynamic Fruit Exports: Patagonian Fruits Trade*

Patagonian Fruits Trade (PFT) is an Argentine company that is a leader in exports of conventional, organic, and biodynamic apples and pears, with 80 percent of its sales going abroad. PFT blazed a trail in the production and export of organic apples and pears beginning in the early 1990s (Stubrin et al. 2022). The area where PFT and its suppliers are located, Alto Valle de Río Negro, has exceptional agro-ecological conditions for this type of production, thanks to low rainfall and extensive exposure to sunlight and cold. The company entered the organic market looking to take advantage of these favorable environmental conditions and capture the price premium offered by this market. Today, PFT is the largest exporter of organic apples and pears in the southern hemisphere, obtaining a premium of between 30 and 40 percent over conventional production. The company has been able to take advantage of its ability to produce organic fruit competitively to earn international market share. Today, 52 percent of the company's total apple exports and 22 percent of its total pear exports are organic. All the organic apples and 70 percent of the organic pears exported from Argentina to the United States are produced by PFT.

Five years ago, PFT decided to enter the biodynamic products market to meet demand from more discerning consumers and secure a price premium for doing so. PFT is the only Argentine company that uses biodynamic production methods and is certified (Demeter certification), making it one of the largest certified producers in the world. Currently, 5 percent of its production is biodynamic. Given the greater technological complexity required to secure biodynamic certification, the company has moved to take full control of the production process and does all its production internally (thus not using any of the fruit it buys from its 100 suppliers). This biodynamic production is exported to the United States, Europe (mainly Nordic countries), and the Middle East. PFT uses its organic and biodynamic certifications, combined with its access to the world's most exclusive royalty apple varieties, to position itself as offering premium products from the southern hemisphere to niche markets.

### *The Path to Regenerative Certification: Sol Orgánica*

Sol Orgánica, profiled in Chapter 4, is an anchor company that connects 1,079 small Nicaraguan producers of tropical fruits (mango, dragon fruit, coconut, banana, and pineapple) with the international market. The company was founded in 2007 on the initiative of its owner Will Burke, a U.S. citizen. He wanted to create a social enterprise that would allow small Nicaraguan fruit producers to enter international markets (Ordoñez

and Stein 2022). From the beginning, the company's founder was also motivated to promote the adoption of a climate-smart production model to improve producers' resilience to the effects of climate change and reduce the sector's environmental footprint. In the region where his company is located, producers suffer from the impact of climate change in the form of greater frequency of hurricanes, droughts, and heavy rains. The lack of good agricultural practices contributes to a further decrease in soil quality and water quantity and quality. Seeing the phenomenon known as climate migration—where farmers or their children abandon their lands and migrate to the city in search of better living conditions—helped motivate Burke to found a company that combined economic, social, and environmental sustainability.

From the start, Sol Orgánica encouraged its suppliers to adopt organic practices and certifications through a process that included training, technical assistance from its own agronomists, and management and payment of group organic certifications. The company also provides financial assistance for the process of migrating producers to organic practices. Currently, more than 70 percent of the company's production is certified organic. This certification enables producers to obtain a premium of between 30 and 50 percent over conventional production, although this fluctuates by product and time of year. This attractive market opportunity led to a fivefold increase in certified organic farmers among its suppliers between 2013 and 2019. Guided by its stamp of environmental sustainability, in 2016, Sol Orgánica made the leap from organic to regenerative production. It was encouraged to do so by its client, Patagonia Provisions, which found in Sol Orgánica not only a supplier but a reliable partner for developing Patagonia Provisions' sustainable projects, including the promotion of regenerative agriculture through the selection of its own suppliers.[16]

Sol Orgánica decided to embark on the path to regenerative certification in 2019 through a pilot project organized by Regenerative Organic Certification (ROC) in which 22 agricultural companies participated. The objective of the pilot process was to develop a greater understanding of how to implement the ROC standards on the farm and ranch, as well as to assist in the creation of training materials, audit tools, and guidance documents. Sol Orgánica chose its banana and mango suppliers—which were already producing using agroforestry systems—to obtain regenerative certification in the pilot program, becoming one of the first companies in the world with this certification. In monetary terms, the greatest cost of obtaining the ROC certification was producer training. Currently, Sol Orgánica has around 450 certified regenerative producers, and in 2020 it made its first export with regenerative certification of dehydrated and puréed bananas and mangoes, obtaining a 15 percent price premium over the price of the same organic products.

[16] See the Patagonia Provisions website at https://www.patagoniaprovisions.com/pages/inside-provisions.

### *Shade-Grown and Organic Yerba Mate: Guayakí Yerba Mate*

Guayakí Yerba Mate is a firm created in 1997 to offer infusions and beverages made from shade-grown, organic yerba mate. The product is grown by the indigenous peoples of the Paranaense Forest in Argentina, Brazil, and Paraguay, and then exported to North America for processing and sale as yerba mate soft drinks. The company's success—it has been growing steadily since its founding—is based on two factors: first, having identified early a market niche for energy product alternatives to coffee with growth potential in northern markets, such as yerba mate; and second, having been able to combine economic, social, and environmental objectives in a new and groundbreaking way (Alwang et al. 2022). Since its inception, the company has aimed to establish a system of production that helps restore the ecosystem while also being economically profitable. From its founders' perspective, conventional production systems have a negative impact on the environment and must evolve toward a form of agro-ecological production. With this as their goal, the company founders developed a production model that includes payment for environmental services and that seeks to inspire other companies to move toward more sustainable models.[17]

The Guayakí Yerba Mate production model is based on producing organic yerba mate within the undergrowth, enabling less impact on the environment and contributing to ecosystemic health, compared to the yerba mate grown as a monoculture. With shade-grown yerba mate, it is not necessary to cut down other forest species, thus helping to prevent deforestation and preserve balance in the ecosystem. Also, shade-growing provides greater protection from droughts, torrential rains, and hail, along with the ideal humidity for microorganisms to free nutrients from the soil that feed the plant. However, lower exposure to sunlight means the yerba mate plants grow more slowly than they do in large-scale plantations in deforested fields. This initial drop in productivity causes producers to resist migrating from conventional production systems to this alternative shade-grown production model. To address this reluctance, Guayakí Yerba Mate offers producers a price that compensates them for protecting the environment and provides them with a healthy and dignified way of life. This premium is a valuable tool for raising environmental awareness and communicating that protecting forests is essential.

Guayakí has had an organic certification for shade-grown yerba mate since 1997. More recently, it obtained the regenerative organic certification (ROC).[18] The latter was obtained through a pilot project—the same one in which Sol Orgánica participated—under which the company was awarded a gold medal for having obtained the

[17] This section on the Guayakí case is based on an interview conducted by the authors of this chapter with the CEO of the company in September 2021.

[18] Other certifications obtained by the company have included certification as a "B" company in 2007, the Non-GMO Project accreditation for not using genetically modified organisms, and the fair trade certification in 2009.

highest possible level of regenerative agriculture. According to Guayakí, the impact of adopting this production model has been remarkable. In 2019, the company showed positive results associated with the acquisition of yerba mate produced by indigenous communities and small producers certified fair trade and organic in Argentina, Brazil, and Paraguay. Specifically, 174,000 acres of forest are protected through its production system (a 20 percent increase in one year); 43,000 farmed trees and 48,000 native trees have been planted; more than 400 species of flora and fauna are monitored in cultivated forests; and 4.6 times more water conservation capacity has been achieved compared to traditional sun-grown systems (Guayakí 2020).

Guayakí is also on the cutting edge with its design of a mechanism for payment for environmental services. The company understands that it must provide economic compensation in recognition of the environmental service provided by the water sources it needs for production. The payment seeks to protect the northern corridor of the Amazon, where the rains originate and then move through the watershed to the southern part of the continent, where the company's plantations are located. With this in mind, in April 2020, Guayakí signed an agreement with a Colombian NGO (Fundación Gaia) to provide financial compensation for the use of water. Fundación Gaia will use these resources to fund its Amazon Indigenous Leadership and Innovation Initiative, which seeks to help indigenous communities manage Amazonian water and land resources in a 25 million hectare area that the Colombian government has recognized as their territory. With this agreement, the firm seeks to manage and mitigate climate change risks, as well as use it symbolically to draw attention to systemic interdependence within the ecosystem and achieve a demonstration effect for other actors. The agreement is in the pilot phase, awaiting a determination of how to calculate the economic compensation.

### 7.4.3 Cases of Agroforestry Models

There are many agroforestry production systems in the region. Among the case studies, in addition to Guayakí Yerba Mate, there is the Mercon Group, whose suppliers in Central America produce shade-grown coffee. Through their contribution to climate change mitigation, these models can help offset greenhouse gas emissions from key global players in the coffee sector.

#### *Mercon Group and Its Support for Sustainable Coffee Production*

The Nicaraguan Mercon Group is the largest green coffee trader in Latin America. It participates in all phases of the coffee chain: production, trading, logistics, and risk management activities. It buys most of the coffee it sells from small producers with whom it has established long-term relationships and which it supports with technical assistance, financing, and support for renovation of coffee plantations, among other activities (Cornick and

Ordoñez 2022). The group has gone international as a diversification strategy in order to provide its customers—leading global roasters like Starbucks, Nestlé, and Lavazza—with coffees from different origins. Currently, the firm has its corporate headquarters in the Netherlands and production and export subsidiaries in Brazil, Guatemala, Honduras, Nicaragua, Panama, Ethiopia, and Viet Nam, as well as its own nurseries and plantations in Nicaragua.

The Mercon Group encourages its producers to change their agricultural practices, aiming for higher yields through its support program for small producers in Central America, known as LIFT. LIFT was created in 2016 with the goal of improving tree coverage and reducing greenhouse gas emissions on farms. Forest conservation, reforestation, and reduced fertilizer use have been at the center of its strategies to increase carbon sequestration and reduce emissions. In a new initiative within the LIFT program, the Mercon Group seeks to quantify the carbon savings of each farm and create credits that allow farmers to receive payment for additional carbon stored or mitigated. In this way, it aims to recognize the environmental value created by its agroforestry coffee producers, while at the same time collaborating on the carbon-neutrality objectives of many of its clients who are driving important transformations in agrifood markets.

In the coffee sector, the medium-term carbon-neutrality goals set by the world's leading roasters have encouraged climate change mitigation strategies within the production chain. For example, Nespresso has committed to becoming carbon-neutral by 2022 by reducing emissions, promoting agroforestry on coffee farms, and investing in high-quality offset projects.[19]

To carry out this project, the Mercon Group turned to the U.S. environmental organization Conservation International for advice on how to estimate carbon storage and greenhouse gas emissions on the coffee farms participating in its LIFT program. In addition, the Mercon Group seeks to identify and promote better carbon storage and greenhouse gas reduction practices and design economic incentives for farmers participating in the program.[20] The lessons learned from this initiative, which is in the implementation phase, are expected to be shared with Conservation International's Sustainable Coffee Challenge, an alliance of coffee companies with widely shared sustainability goals.

### 7.4.4 Models Using Waste Products

This section examines cases of companies that have implemented models for using waste products that, when discarded, have a significant impact on the environment.

[19] See Salomón Asmar Soto, "Nespresso apuesta por ser carbono neutro en toda su cadena de suministro para 2022," La República, October 29, 2020, available at https://www.larepublica.co/responsabilidad-social/nespresso-apuesta-a-ser-carbono-neutral-en-toda-su-cadena-de-suministro-para-2022-3081389.

[20] This program is being supported by a technical assistance grant of US$85,000 from IDB Invest, the private investment arm of the Inter-American Development Bank, as part of a loan granted to the Mercon Group in 2021.

The use of such models has enabled the companies to access high-value food markets. Gihon Laboratorios Químicos in Argentina produces functional and nutraceutical foods using waste from fish processing, and Biofortune in Honduras has developed a strategy to use coffee by-products.

### *The Value of Waste from Fish Processing: Gihon Laboratorios Químicos*

Gihon is an Argentine technology-based company created in 1990 that specializes in producing and developing chemical compounds for the pharmaceutical industry. It diversified into the food market in 2010, developing products based on concentrated omega-3 fish oil. Its entry into this new market is part of the company's deliberate foray into the circular economy (Stubrin et al. 2022). Gihon was looking for market niches related to recovering fishing waste products from the area around Mar del Plata (the largest coastal city in Argentina), where waste from the industrial fish processing on the open ocean (on factory ships) and on land poses a considerable environmental problem. Before Gihon entered this market, the waste from the industrial processing of fish on land was sold to mills that, by cooking the waste, were able to obtain two low-price products with value added: fishmeal and raw fish oil concentrate. Gihon has entered this value chain by adding value to the raw fish oil by using it as the main ingredient for products rich in omega-3 fatty acids, sold as functional and nutraceutical foods.[21]

The global market for omega-3s is growing due to greater social awareness about the health benefits of its consumption in terms of the cardiovascular system and brain function. Over the last 20 years, the value of international trade in this product has grown by 400 percent, and volume sold has increased by 65 percent. This reflects a significant increase in the value per kilo of fish oil over that time period, which rose from US$0.73 in 2002 to US$2.2 in 2019. This increase in demand fueled the interest of companies around the world in refining crude fish oil to produce functional foods and dietary supplements based on omega-3s. Gihon currently exports around 60 percent of its total sales, 5 percent of which corresponds to the omega-3 product line. However, the company expects the business unit focused on omega-3s to be its fastest-growing unit going forward, given the expected growth of the global nutraceutical market.

### *Innovating with Coffee Production Waste: Biofortune*

Biofortune is a Honduran coffee company that innovated in the use of waste from coffee production—such as the pulp from the fruit and coffee tree leaves—to develop high-value-added products for export (Cornick and Ordoñez 2022). Coffee processing

[21] Functional foods are natural or processed foods with certain components that have been added, removed, or modified by technological or biological means. Nutraceuticals are dietary supplements in the form of pills, capsules, powders, etc. of a concentrated natural bioactive substance, usually present in food. Taken in a higher dose than what exists in those foods, such supplements can have a more favorable effect on health.

uses only the bean, leaving the pulp and husk as waste products. The pulp and husk account for 45 percent of the biomass of the coffee cherry, but less than 0.5 percent of it is used despite being a rich source of antioxidants, vitamins, and other bioactive compounds that could be used widely in different industries (beverages, cosmetics, pharmaceuticals and/or nutraceuticals). These waste products also have a harmful impact on the environment. Discarded coffee pulp pollutes water sources by decomposing and reducing oxygen levels as a result of the oxidation process it undergoes when it comes into contact with water (Montoya et al. 2020). Alternatively, it can be used as compost or animal feed. However, through scientific and market research, Biofortune explored the possibility of using this waste product in nutrient-rich beverages intended for high-value global markets.

For these reasons the company embarked on the production of dehydrated coffee pulp, whose price is at least four times that of Honduran coffee. Biofortune shipped its first exports in 2020. This required an investment of more than US$2 million in equipment. Using waste from coffee production to make a higher-value product is a first step in Biofortune's diversification process, which itself is part of a strategy based on the idea of the circular economy. First, dehydration is only one option for processing coffee pulp. When it is powdered, for example, its market value quadruples (from US$5 to US$20 per pound). Additionally, using the powdered pulp to produce a highly concentrated liquid can fetch an even higher price (US$60 per pound). Potential clients from other countries, such as the United States, visited the Biofortune plant and committed to buying all the concentrate production available. Second, the dehydration, powdering, and concentrating equipment—part of which the company has yet to install—will enable it to carry out these same processes for other crops and their waste products.

## 7.5 Final Thoughts

In a context in which climate change has become an urgent issue, consumers are demanding products with less environmental impact. At the same time, regulations in this area are increasingly strict, and food production models aiming to strengthen the sector's resilience to climate change and reduce environmental footprints are becoming increasingly common in the region. These models are found in different types of markets and companies (small producer associative arrangements, SMEs, anchor companies, and vertically integrated companies) and in multiple countries. This shows that these are not strategies associated with a particular type of market or actor; rather, they are permeating and spreading throughout the region's exporting productive system.

Based on the multiple case studies analyzed, this paper has found that agro-export companies in Latin America and the Caribbean have the potential to be relevant agents of change in a transition to production models with less environmental impact.

The motives leading to the adoption of these models vary. The objective of accessing market niches that pay a price premium for certain environmental characteristics of the production processes is, without question, a great incentive for firms. Currently, organic certification—which is widespread among agricultural producers in the region—gives access to a clear price premium. But that premium can also be volatile and in some cases may not offset the transition costs. Beyond-organic production models are not yet widespread, nor is it clear how much consumers are willing to pay for them.

The transition to more sustainable production models usually entails an initial price that not all producers can or want to pay without the assurance that they will be rewarded for the environmental benefits of their practices and investments, either through a price premium or additional income from the sale of environmental services like carbon credits. This is where the important role of public policy and international development organizations is clear. Support for the transition toward production models with less environmental impact can take multiple forms, including access to financing, technical assistance for producers, environmental education, dissemination of the importance of more sustainable production, and a wide range of other productive and innovation policies. Big global food processors with large supply chains also have an opportunity to influence the adoption of these models by paying premiums or providing technical assistance and financing to suppliers selected based on environmental criteria.

As these case studies show, developing production models with less environmental impact promotes innovation at the firm and market levels, generating new internal capacity and fostering the diversification of exports toward differentiated goods that target high-value niches. These are innovations in products and in productive and organizational processes. For companies entering the world of payment for environmental services, innovation is directly contributing to the creation of an almost non-existent market, which is important for spreading these production models that seek to mitigate the impact of climate change.

Looking forward, understanding in more depth what is driving the different types of producers to adopt environmentally responsible production models will help to identify barriers and opportunities for promoting these models. It is also important for the sector to recognize the importance of estimating and monitoring its own environmental impact in order to communicate that impact transparently to consumers, traders, and funders, leveraging innovative platforms that collect standardized information.

8

# Innovation in Modern Agriculture

## The Growth of Knowledge-Intensive Companies

• Gustavo Atilio Crespi

This chapter addresses different models of innovation by analyzing five knowledge-intensive companies in Latin America that have developed strategies to drive improvements in the market through biotechnology, data science, and other technologies.

Innovation in agriculture has a long history with similarities to manufacturing but differences from it as well.[1] As in manufacturing, innovation in agriculture is the result of a collective process involving a variety of actors and their interactions. However, certain characteristics of agriculture—such as its much more atomized nature of production, focus on production of poorly differentiated commodities, and long learning periods necessitated by biological cycles—have meant that the sector has not traditionally been considered one that is particularly innovative.[2] In fact, according to the innovation literature on sector-specific patterns of technological learning, agriculture has been viewed as a sector dominated by suppliers, in which the source of technology is external, with producers that are very price-sensitive and whose main objective is cost reduction (Pavitt 1984; Dosi and Nelson 2010).

This traditional perspective has significantly simplified the understanding of technological learning processes in agriculture. In fact, the evidence shows that the last few decades have seen a far-reaching transformation in the sector's technological and productive organization. This is due to several factors. First, there has been a significant

[1] In this text, "agriculture" is used broadly to include livestock production activities as well.

[2] In this text, "innovation" is understood as a product or process (or their combination), whether new or improved, that differs significantly from a unit's previous products or processes and that is available to potential users (product) or implemented within the unit (process) (OECD 2018).

increase in global demand for products based on natural resources (e.g., food products and industrial raw materials), associated with the rapid growth of China, India, and other countries in Southeast Asia. Second, progress in new technologies—such as molecular biology, genetics, immunology, and data science, among others—has expanded the natural resources production frontier and transformed how agricultural activities are carried out. Indeed, new technologies involving the use of genetically modified seeds, precision agriculture, molecular markers, and artificial intelligence provide clear current examples of structural changes that are moving forward quickly.

The disruption caused by these changes has opened up space both for converting existing companies and for the entry of knowledge-intensive companies—many of them new ventures—that are central to disseminating new technologies and organizational models in agriculture. This development enables regional agriculture to converge progressively with international productivity standards, providing access to new international markets. Essentially, agriculture is becoming the epicenter of technological modernization and high-quality job creation in Latin America, replacing the conventional manufacturing industries that were essential to dynamic technological progress in the 1970s and 1980s.[3]

The objective of this chapter is to document the structural transformation that is taking place in agriculture in Latin America and to explore its implications for innovation policies. The first section outlines a conceptual framework as a means of understanding the reconfiguration of agriculture in the region. The next section documents some of these changes using a case study approach. The case studies cover a wide range of technologies and sectors, looking at two companies in the field of genetics (one that develops improved seeds for soybeans and the other that develops seedlings for new varieties of blueberries) and three companies that could be considered agtech (one that assists in the process of genetic improvement of various crops, another that optimizes agricultural water use, and a third that assists in the management of livestock facilities). The final section puts forth some conclusions from the chapter.

## 8.1 The Agriculture Sector's Innovation System: Conceptual Framework

The existing literature on sector-specific innovation systems establishes that they consist of three foundational blocks, each one comprised of a complex set of phenomena (Malerba 2004):

[3] These changes are reflected in sector-specific innovation indicators. Global spending on agricultural research and development (R&D) doubled from US$21 billion in 1981 to US$47 billion in 2016. This growth was basically driven by the private sector, whose share of global investment in agricultural research grew from 21 to 26 percent over the same period. Additionally, spending on R&D as a percentage of the sector's gross product in developed countries reached 2.8 percent in 2016 (Beintema et al. 2020), similar to that of the economy as a whole.

1. Knowledge, learning processes, and technologies: The cognitive basis of a system, its subject matter, etc.
2. Actors and networks: The organizations and individuals engaged in acquiring, producing, and using knowledge, along with the knowledge-focused interactions between them.
3. Institutions: The set of norms, routines, established practices, rules, regulations, laws, etc. within which both the cognitive actions and the interactions of the actors take form and place.

This section focuses on changes to the first and third of these blocks. The second block focuses specifically on innovative firms and their interactions with the other actors in the system and is addressed later in the chapter.

### 8.1.1 Knowledge, Learning Processes, and Technology

Understanding innovation processes in agriculture is impossible without first reviewing some of the technological and organizational characteristics of production that are specific to this sector. In particular, this section addresses the role played by four central qualifier characteristics: local distinctiveness, technological change, consumer preferences, and subcontracting (Crespi et al. 2017).

First, local distinctiveness has to do with the fact that the biological characteristics of the land, forests, rivers, and other environmental settings strongly predetermine the context in which agricultural activities take place. This influences how production is organized, learning dynamics, and the sector's performance. The ecological characteristics of the environment play a major role in determining agriculture's growth process, depending on location. For example, the varieties of soybean seeds that are best adapted to the southern part of Argentina's Pampas region are different from the ones that work best in the northern part of that region, which, in turn, are different from the ones that are best in southern Brazil (Marin et al. 2021). This also happens with blueberries, where the varieties that perform best in Chile are not productive on the Peruvian coast.

Local distinctiveness has to do with the fact that the biological characteristics of the land, forests, rivers, and other environmental settings strongly predetermine the context in which agricultural activities take place.

These environmental forces seem to have more intense effects on agriculture than they do on manufacturing. Indeed, a shoe factory remains a shoe factory regardless of where it is located. While learning by doing supposedly takes place pari passu while the

shoe factory operates, the plant and equipment will remain the same over time. In contrast, the production of soybeans in Argentina and blueberries in Peru (continuing with the same examples) is constantly changing because production processes must respond to new ecological and environmental challenges, such as the presence of new viruses, pests, and droughts. The biological ecosystem is a moving target in which adaptation to local conditions is a sine qua non condition for companies to develop. Consequently, a minimum innovative effort is required simply to maintain crop yields so that they do not decline due to changes in biological ecosystems (Adusei and Norton 1990). The result is that, in agriculture, there is always steady demand for context-specific knowledge and solutions that the producer companies themselves seek to meet.

Given the atomized nature of production, the long research cycles, and the lack of natural appropriation mechanisms in agriculture, the aim has traditionally been for this knowledge to be provided directly by the State. Thus, during the second half of the 19th century, first Germany and then the United States began setting up public universities with a focus on agronomic sciences tasked with developing human capital and conducting applied research. This was done in conjunction with public networks of agricultural experimentation stations engaging in adapting, testing, and transferring technology. The model gradually spread to the rest of the world, including the countries of Latin America, where the first agricultural experimental stations were established towards the end of the 19th century.[4] Over time, these networks of experimental stations evolved into public agricultural research institutes.[5]

In short, until well into the 20th century, a characteristic of the agriculture sector's innovation system was that the State played the role of the main source of innovation by directly providing the knowledge necessary for such purposes. Over time, clusters of local companies developed around this infrastructure to act as disseminators and adapters of the technologies developed.[6] However, this demand

[4] In the United States, the role of the federal government in applied research in agriculture began in 1862, with the creation of the U.S. Department of Agriculture, although the practice of bringing seeds and adapting them to American soil began much earlier. This was accompanied by the growth of experiment stations by states, with the first one established in Connecticut in 1875 (Pardey et al. 2010). This model was replicated in several countries of the region, including the Agronomic Institute of Campinas in Brazil (1887); the Agricultural Station of San Jacinto in Mexico (1908); the Obispo Colombres Experimental Station in Tucumán, Argentina (1909), and the La Estanzuela National Plant Nursery Institute in Colonia, Uruguay (1911) (Baptista 2016).

[5] Such as the National Institute of Agricultural Technology (INTA) of Argentina, created in 1956; the Brazilian Agricultural Research Company (EMBRAPA), created in 1972; and the National Institute for Agricultural Research (INIA) of Uruguay, created in 1989.

[6] The cluster of agricultural machinery specializing in direct seeding in Santa Fe, Argentina is a case that illustrates this to the extent that the companies in the cluster develop the complementary technology necessary to apply and disseminate the no-till paradigm developed by the National Institute of Agricultural Technology's Manfredi experimental station with influence in the area (https://cecma.com.ar/).

for applied knowledge changes, and for the reasons described below, this change is often faster than the response capacity of public research institutes. When this happens, a space is created for the entry of private companies that provide solutions for these needs.

The second central qualifier characteristic, technological change, has always been a key factor in the great transformations of modern agriculture. Practically since humanity ceased to be nomadic, agricultural innovation—understood as the domestication of wild plant species—has been a central focus. For thousands of years, the practice of setting aside seeds from one year's production to plant the following year has been joined by informal processes to select for varieties that performed best under certain environmental conditions. These genetic improvement processes have gone hand-in-hand with the search for and adaptation of new species brought from other biological ecosystems in order to increase the variety of production or its resistance to specific local environmental conditions. This process of exchange of genetic material dates from the very beginning of human migration. People moving from one place to another for economic, political, or religious reasons took with them the seeds of the varieties with which they had worked, spreading and enriching the genetic material over practically the entire planet.

Technological change has always been a key factor in the great transformations of modern agriculture. Practically since humanity ceased to be nomadic, agricultural innovation—understood as the domestication of wild plant species—has been a central focus.

For centuries, these improvement processes were carried out ad hoc, often as unintended consequences of other decisions. The scientific foundations for this process did not emerge until the middle of the 19th century, when a series of discoveries in genetics (Mendel), organic chemistry (Liebel), and microbiology (Pasteur) made it possible to think about possibility of controlling the process and accelerating and improving the returns of genetic improvement. These scientific advances resulted in the development of hybridization techniques at the beginning of the 20th century in Connecticut in the United States. Not long after, progress in mechanical engineering and inorganic chemistry enabled the development of mechanization and agrochemicals (fertilizers and pesticides), which were behind the green revolution of the 1970s. These cutting-edge developments clearly had an impact on Latin America as the natural provider of food goods.

Today, the agriculture sector is going through a new cycle of technological transformation, adopting new methods for organizing production and process engineering technologies arising from new advances in biology, genetics, and data

science. One of the most outstanding examples is the current transition from conventional to science-based agriculture, which includes genetically modified seeds, insect-resistant biocides, molecular markers, and the use of artificial intelligence applications in agricultural work.

Without a doubt, this transition to science-based agriculture can be considered a fundamental revolution whose impacts will be felt in the long term in the structure and performance of agriculture in the region and throughout the world. A technological revolution in an industry entails a break with its long-term development trend, impacting how companies enter and exit and how incumbents restructure (Klepper 1996). Schumpeter has described these scenarios in detail through the concept of "creative destruction" to characterize the shock experienced by an industry as a result of technological transformation. In short, a radical technological change normally results in industrial reconfiguration and the emergence of new companies that specialize in the new technological paradigm. Undoubtedly, emerging new insights from the life sciences underlie the rise and subsequent development of the two specialist genetics companies discussed later in this chapter. Similarly, the advancement of the leading data science and artificial intelligence technologies underlies the development of the agtech firms also reviewed there.

Consumer preferences are the third central determinant of innovation in agriculture. The shocks are not just technological in nature—there are also demand shocks. An example is the changes in consumer preferences from relatively homogeneous mass consumer products towards more diversified products focused on the functional, organic, and nutritional properties of food, with the associated quality premium. This segmentation and sophistication of demand produces significant opportunities for private sector innovation, with the emergence of new market niches and new companies that specialize in providing the type of product with certain attributes valued by consumers or implementing the type of production process that these niches require. These changes in consumer preferences generate not only demand for innovation in the technological sense, but also demand for non-technological innovations related to new forms of organization, distribution, packing, and trading to supply the different market niches. In fact, these innovations also end up fueling companies' internationalization strategies (see Chapter 2). As will be seen in the next section, these changes in consumer preferences underpin the innovation process in the case of the blueberry genetics company profiled.

Consumer preferences are a central determinant of innovation in agriculture. The impacts are not just technological in nature—there are also demand shocks.

Finally, subcontracting is a traditional practice of many agricultural activities. Through it, the company interacts throughout the production chain with other firms from various sectors of the economy. Firms located higher up the value chain work in the production of basic raw materials, such as soybeans, wheat, avocados, or blueberries. This segment deals with the biological, environmental, and ecological forces that influence the organization of production, the biological transformation of inputs into biomass, and the economic product that is the result of the production campaign. As discussed in Chapter 3, firms that produce basic raw materials may be vertically integrated to varying degrees or alternatively subcontract production inputs and services to independent contractors.

Subcontracting is a traditional practice of many agricultural activities. Through it, the company interacts with others from various sectors of the economy throughout the production chain.

Subcontracting is a growing trend in agriculture. It is gradually becoming the main form of organizing production in the case of cereals and oilseeds in the Southern Cone, and increasingly for fruit companies in the southern Pacific area. This is a result of the technological change mentioned above. The challenges of adapting an increasingly complex and rapidly evolving technological package to the local context make vertically integrated production organization models less and less viable, although they are still profitable in the short term. This creates spaces for developing increasingly dense networks of companies that supply knowledge-intensive inputs and services (Crespi et al. 2017). An example of this growing subcontracting of knowledge-intensive suppliers is the increased spread of open-innovation organizational practices in which a large agricultural processor collaborates on innovation with its entire network of suppliers and related companies.[7]

In short, the acceleration of technological change, the need to adapt these packages to the characteristics of local biological ecosystems, changes in consumer preferences, and the spread of new organizational models in the field of open innovation are generating a very significant structural change in Latin American agriculture, which is accelerating its transition to an increasingly knowledge-intensive sector.

[7] The Peruvian agro-export company Damper has recently launched a series of challenges to the innovation system on issues that include differentiating the customer experience, digital crop monitoring, increasing the shelf life of products after distribution, operational efficiency, and environmental sustainability (https://danper.com/challenge/). Along the same lines, the forestry companies UPM and Montes del Plata in Uruguay launched a challenge to measure, optimize, and certify the use of water in cultivated forests (https://www.anii.org.uy/apoyos /innovation/challenges/4/forestry-and-water-upm-montes-del-plata-fas/).

### 8.1.2 Institutional Changes Reshaping the Agriculture Sector's Innovation System

Agriculture is increasingly sensitive to changes to the sector's rules of the game. Agricultural activities are usually located near common goods (like rivers, lakes, native forests, or population centers), such that horizontal transmission of diseases via vectors and pathogens (viruses, insects, and bacteria) is quite frequent. Under these circumstances, collective action by companies is an important feature of the sector that facilitates the process of dynamic adaptation to recurrent ecological changes. However, this collective action does not arise naturally from market forces and therefore depends on a community's social norms and behavioral habits (i.e., trust, reciprocity, associativity, etc.), which can differ from one country to another.

In this context, a central public good is the sector-specific regulations related to two societal concerns. First, to the extent that the main purpose of agricultural production is, in large part, to meet the need for food, there is concern about the possible impacts that new agricultural technologies might have on human health. This has led to the development of a variety of regulatory systems (regulatory frameworks and compliance agencies) to review and approve new technologies in the sector. The second concern has to do with the environmental impacts of these technologies and how the biological ecosystems with which they interact respond to them. These two concerns mean that virtually every aspect of agricultural production is subject to a host of regulations designed primarily to protect food safety, worker health, animal welfare, and the environment. These regulatory processes affect not only the efforts of companies in terms of innovation but also the direction of technological change, since compliance with these regulations operates as a sunk cost in the innovation process that ends up inducing companies to develop innovations that can be applied on a large scale (for the main markets and crops) (Pardey et al. 2010), ignoring private companies' interests in emerging crops or small markets.

Increased consumer concern about the environmental sustainability and food safety of agriculture is also leading to increased involvement of advocacy groups in verifying that crop environmental standards are being met, leading to sector regulatory agencies taking a much more active role.[8] This has had two effects. First, it has put greater pressure on processing companies to adopt biosafety standards and more environmentally sustainable production practices. Second, it has led to opportunities for the emergence of knowledge-intensive companies that carry out research, development, and innovation (R+D+I) and pilot experiments with the

[8] Such as sector-specific services for plant and animal health, compliance assessment bodies, or traceability systems. On the latter, see Hallak and Tacsir (2021).

purpose of providing regulatory agencies and producers with the knowledge they need for regulatory compliance (Crespi et al. 2017). A clear example of this is the case of the agtech company specializing in livestock traceability services that is discussed later in this chapter.

A second sector-specific public good relevant to innovation in agriculture is the intellectual property protection regime. Although agriculture is traditionally a sector where appropriability of the results by innovators is low, institutional reforms regarding intellectual property rights have been gradually developed that tend to encourage the private sector to participate more in agricultural innovation. The origin of these reforms is the International Convention for the Protection of New Varieties of Plants of 1961 and the establishment of the International Union for the Protection of New Varieties of Plants (UPNVP). The UPNVP grants protection to a new variety subject to two conditions: that it be different from existing varieties and that it be uniform, stable, and unique. Until the convention was revised in 1978, the protection granted to innovators under the UPNVP was relatively weaker than for patents, since two important exceptions were established: the farmers' privilege and the breeder's exemption. Under the farmers' privilege, the innovator's rights do not include preventing farmers from replanting their seeds. The breeders' exemption established that owning a plant variety does not entail a right to prevent third parties from using it to create new plant varieties (Marin et al. 2021).

The intellectual property rights system in the agriculture sector became more restrictive after a revision to the convention in 1991 that eliminated the farmers' privilege and limited the breeders' exemption to "non-essentially derived varieties." Currently, both the 1978 ad 1991 versions of the convention are in force. Most developed countries have adopted the 1991 UPNVP protocols, while developing countries have tried to maintain the 1978 version to facilitate their processes of technological convergence and to preserve the farmers' privilege.

Another factor strengthening the sector-specific intellectual property rights regime came from the changes in the patent system after 1980, when the U.S. Supreme Court ruled to allow the patenting of living organisms or plants. Patents therefore gave innovative companies various rights over plants that, under the UPNVP system, they did not have. For example, companies can control the use of future generations of seeds if the patent covers a trait that is passed from one generation to the next, overriding the breeders' exemption (Marin et al. 2021).

Despite the increased protection conferred by intellectual property rights, enforcing these rights has been complex and costly from the point of view of innovators. Much of the agriculture sector in Latin America involves informal and subsistence activities, which generates very limited opportunities for developing sufficient private incentives to search for new varieties, even when they would be protected (Pardey et

al. 2010). Consequently, the granting of intellectual property rights is strongly concentrated in developed countries for crops of relatively high value, and in developing countries that produce relatively high volumes of those crops (such as Argentina, Brazil, and Uruguay for cereals and oilseeds). Essentially, although the protection conferred by sector-specific intellectual property rights has been broadening over time, its applicability and, therefore, the incentives it provides, is limited to certain countries and crops.

Given the persistence of the problems of appropriation of innovation in agriculture, the space for sector-specific public innovation policies continues to be very relevant. Accelerating technological change, growing concern among consumers regarding the safety and sustainability of these changes, the need to adapt technological change to local conditions, and the subcontracting trend have led to the emergence of new models of innovation that are based on collaborating on and sharing intellectual property rights. The dissemination of open innovation models in which the network of clients, producers, suppliers, and scientific-technological institutions cooperate to address the sector's techno-productive challenges without question opens up new spaces for public policy intervention. Indeed, a company's decision to solve a given problem, either with its internal capabilities or by turning to the ecosystem, depends on how severe the coordination failures are that inhibit demand for knowledge from being met by the supply of it. The existence of information asymmetries, misalignment of incentives (e.g., between researchers and entrepreneurs), differences in risk aversion (between those who develop innovation and those who adopt it), and the lack of different capabilities in the supply of and demand for knowledge mean that open innovation is not pursued with the intensity one might want. Systemic innovation policies, in this case, can be important tools for kick-starting this ecosystem of interrelationships. An example of these systemic public policies is seen in efforts to encourage the development of sector-specific innovation consortiums, as described below. It is clear that the agtech companies studied in the next section emerged from these ecosystems.

## 8.2 The Actors Behind Innovation in Agriculture: Business Case Studies

An obvious aspect of innovation in agriculture is the process of learning together within the framework of a network of producer companies that represent demand for knowledge and a series of actors that supply it, including public and private actors, domestic and foreign actors, and actors specializing in knowledge-intensive inputs and services. To study the emergence and development of these specialized suppliers, a series of case studies is presented below. The analyses aim to identify the

main business strategies employed to adapt and take advantage of the opportunities emanating from the new technological developments and institutional changes described above, with a particular focus on the internationalization strategies that these companies have followed.

### 8.2.1 GDM: A Company that Designs Seeds

Grupo Don Mario (GDM) is an Argentine seed company that exemplifies the importance of adapting to local conditions as a key element of innovation in the agriculture sector (Marin et al. 2021). Precisely because of its ability to adapt seeds to the conditions of each market, GDM has become a major player in the global market, supplying 20 percent of the soybean varieties used in the world. Created in 1982 in Chacabuco, Buenos Aires as a soybean seed company focused on improving varieties, the company has diversified into other crops (wheat, corn, and alfalfa) and grown exponentially in the last three decades. In 1993, GDM operated only in Argentina, had 20 employees, and held an insignificant portion of the Argentine soybean market. Currently, it has subsidiaries in six countries (Brazil, Uruguay, Paraguay, Bolivia, South Africa, and the United States), 800 employees, and has captured 55 percent of the Argentine soybean market and 50 percent of the Brazilian market and is gaining an increasing share of the U.S. market. Due to both the sector's characteristics and the company's business model, GDM's internationalization has taken place fundamentally through foreign direct investment.

GDM's expansion took place during a period when the global seed market was concentrating in a few international companies through an unprecedented process of mergers and acquisitions that led to the disappearance of hundreds of independent seed companies (Fernandez-Cornejo and Spielman, 2002; Schenkelaars et al. 2011).[9] In a market where the growth of global companies has been based on the development of genetic modifications and the strengthening of associated intellectual property rights, GDM chose a different technology strategy. The company does not compete by providing genetic modifications but rather by developing new seed varieties that are well adapted for each planting location each year. For some crops, like soybeans, GDM acquires the genetic modifications of other companies (e.g. glyphosate resistance), which it then incorporates into its own seed varieties. Adapted varieties generate significant gains in terms of yield.

Between 2000 and 2014, the improvements introduced to GDM's varieties enabled a 22.8 percent increase in productivity, according to company estimates. A

[9] Only four companies account for 62.5 percent of the global seed market (Bayer, Corteva AgriScience, Chem China, and BASF).

central element of success in providing diversity to the market is what is known as the "first mover advantage." To seize this advantage, GDM's strategy is based on a combination of:

- **A broad base of genetic diversity combined with strong investment in research and development (R&D).** GDM currently has the fourth-largest soybean germplasm bank in the world. It also invests 15 percent of its annual sales in R&D and assigns 45 percent of its total employees to these tasks. About 10 percent of the staff has graduate degrees. The R&D activity is organized into four global improvement programs (soybean, corn, wheat, and alfalfa) with a presence in different markets—Brazil (60 percent), Argentina (29 percent) and the United States (11 percent)—and three biotechnology laboratories. The laboratories are equipped with state-of-the-art biotechnology tools and equipment (e.g., a DNA sequencer). These capabilities enable the company to significantly reduce the time needed to launch new varieties.
- **A large testing network.** Experimental tests in the field are essential to evaluating the genetic material developed in laboratories and to developing seeds adapted to local conditions. These tests require a large investment in equipment and specialized human resources (mainly agronomists). GDM currently has 18 greenhouses and 1 million test plots located in 316 locations (37 percent in Argentina, 33 percent in Brazil, and 30 percent in the United States).
- **Investment in capabilities to collect, process, and interpret data.** In recent years, GDM has made significant efforts to increase its ability to read and interpret data collected in the field through investments in equipment, processes, and human resources specialized in data science for collecting and interpreting data on genes, phenotype, and environmental characteristics. These capabilities allow the company to increase the precision of the processes to develop new varieties.
- **Links with the scientific system.** GDM has made more than 50 collaboration agreements with higher education and scientific-technological institutions in all the countries where it operates. This has enabled it to both access scientific knowledge and find and train human resources, in some cases through PhD fellowships financed by the company.

The internationalization of GDM involves reproducing its business model in each country where it is based. Entering a market begins with evaluating the agronomic characteristics of the region, testing genetic materials already developed by GDM for areas with similar agro-ecological characteristics, and forging strategic alliances to access local installed capacity for testing the genetic materials. Based on these initial steps, GDM develops seed varieties adapted to each location. In larger and strategic

markets, GDM installs its own R&D capabilities on the ground, while in countries with smaller markets it meets their genetic needs using the R&D departments of other countries. On the market, it sells its products both under its own brand (85 percent) and through licenses (15 percent), depending on the characteristics of each market. In some ways, not just the product but also the integration strategy depends on the conditions of each individual market.

In terms of future growth, in addition to the macroeconomic problems and foreign exchange policies that negatively affect the opportunities for international expansion of any company in Argentina, GDM must deal with important challenges. First, the system of intellectual property rights for seeds in the region puts the company at a disadvantage with respect to multinational producers of genetic modifications since it cannot protect its innovations through patents as multinationals do. Second, illegality in the seed market is widespread in the region, directly reducing the returns for companies like GDM. Third, a lack of public policies that facilitate access to the scientific system makes it difficult to align incentives between researchers and companies. Despite these challenges, GDM today is an important player in the global soybean genetics market thanks to a strategy of local adaptation and rapid response to changing situations.

### 8.2.2 EIWA: Automation of the Genetic Improvement Process

EIWA is an Argentine agtech company founded in 2014 by two entrepreneurs who saw an opportunity to digitize agricultural testing and provide analysis services to make the innovation process more precise (Bisang et al. 2021). Clients are companies engaged in genetic improvement of crops (corn and soybeans), as well as companies that develop inputs for the sector (fertilizers, insecticides, herbicides, fungicides, etc.). EIWA has operations in the United States, Brazil, and Argentina, and its clients include the main input companies in the sector such as GDM, Nidera, BASF, Syngenta, Stine, Limagrain, KWS, and Beck's Hybrids, among others. For EIWA, the importance of adapting to local conditions as a central element of driving innovation is combined with the development of new data science and artificial intelligence technologies that enhance the capability of clients to adapt their products to these conditions.

EIWA's founders noted that at a certain stage of the innovation process, seed companies had to conduct experimentation activities in the field in order to be able to evaluate the growth process of the crop under real conditions and select the most successful plants. This required exhaustive monitoring, with teams of agronomists conducting frequent tours and inspecting test plantings in thousands of plots. In addition to being expensive, this laborious work is prone to measurement errors. The founders of EIWA thought that if they were able to digitize the information generated

in these plots, customers would be able to monitor these field tests more accurately and at a lower cost. EIWA's local and international growth accelerated thanks to two central factors:

- **Connections to the actors in the sector's innovation system.** Although both founders already had previous entrepreneurial experiences, EIWA was their first venture in agriculture. Using their networks of contacts, in 2013 they began to explore the agricultural value chain to identify a digital-based service that would add value. It was through multiple meetings with managers of seed companies like GDM, Nidera, and Syngenta that they found their business opportunity. In fact, the willingness of these companies to share information about their innovation processes was vital for the founders to be able to move forward with the project. Another important source of information was meetings with the Regional Agricultural Experimentation Consortiums (CREA),[10] which enabled the founders not only to receive feedback on the service they wanted to develop, but also to accelerate the process of attracting trailblazer clients. Connecting with these good-quality early adopters was key to EIWA having trade operations abroad just one year after presentation of its first prototype.[11] The first country where the company landed was Brazil, and a year later it arrived in the United States.
- **Development of the agricultural entrepreneurial ecosystem in Argentina.** This development was key for the emergence and local and international expansion of EIWA. Thus, three years after the company was founded, it went through its first acceleration process with The Yield Lab Latam, an accelerator focused on agtech.[12] This enabled EIWA to improve certain operating dynamics, define its business plan more precisely, and prepare itself to successfully participate in investment rounds. In fact, following this process, the company was able to raise all the financing it needed from Brazilian and U.S. funds. In 2018, the company benefited from funds granted by the Fondo Fiduciario para el Desarrollo de Capital Emprendedor (FONDCE), an Argentine fund of funds with co-investment from the Glocal accelerator.

Since EIWA offers a high-precision service, it is important for it to have a significant base of human capital with experience in big data and artificial intelligence.

[10] CREA is an Argentine civil society association founded in 1957 that has approximately 2,000 agricultural companies as members. CREA finances experimentation, training, and knowledge-transfer activities.

[11] The company also submitted its technological proposal for review to researchers from INTA Pergamino, which specializes in genetic improvement and was able to identify new functionalities that would add value to users.

[12] The Yield Lab, which operates globally, was established in 2014 in St. Louis in the United States.

Currently, 20 of its 30 employees focus on data science R&D. Maintaining and growing this critical mass is always a challenge for technology-based companies. One way to mitigate these limitations is to connect with different universities and research institutes, a strategy that the company has attempted but not always with good results. The biggest problems encountered had to do with the fact that institutions did not have programs focused on technology-based enterprises. However, the company did have positive experiences connecting with Argentina's National Science and Technological Research Council (*Consejo Nacional de Investigaciones Científicas y Técnicas* – CONICET) and National Institute of Agricultural Technology (*Instituto Nacional de Tecnología Agropecuaria* – INTA), entities that have more developed transfer offices.

Going forward, the company sees a need to improve exploitation of its business model and technology platform by developing new functionalities and expanding its supply of services to companies that develop products for crop protection (herbicides, insecticides, etc.) and for a wider range of crops. In sum, EIWA combines accelerating technological change in the areas of data science and artificial intelligence with the development of increasingly open innovation models in the seed sector and the strengths of the local and sector-specific entrepreneurial ecosystems.

### 8.2.3 Inka's Berries: The Blueberries that Conquered the Desert

Peruvian agricultural exports increased from US$400 million at the beginning of the century to US$7 billion in 2019.[13] Regarding blueberries, Peru has gone from not producing them at all at the beginning of the last decade to producing 162,000 tons in 2020, making it the world's largest exporter (about US$1 billion in exports in 2020). A standout company in this process has been Inka's Berries, a trailblazer in bringing blueberries to Peru that specializes in plant genetics and production (Ghezzi and Stein 2021). In 2002, after a group of Peruvian businessmen took a tour of Chile—where the blueberry boom was already under way—the father of the founder of Inka's Berries asked him to research the possibility of growing blueberries in Peru. As a result of this exploration, and despite lack of knowledge about blueberries in local agricultural research centers, the company founder reached two conclusions: blueberry production in the country was potentially very profitable (especially during the low production season in the Northern Hemisphere), but quick access to seedlings adapted to local conditions was needed, and at reasonable costs.

[13] Geographic and climate conditions in Peru are favorable to agro-exports, particularly along the coast. In addition, certain sector-specific public policies enabled the development of large, high-productivity companies, facilitating endogenous learning and innovation processes. The boom in avocado, asparagus, mango, grape, and blueberry exports took place in this context (Ghezzi and Stein 2021).

In 2006, 14 blueberry varieties were brought from Chile that did not work well there, and research began on how they performed in Peru. Four varieties performed well, producing in vitro propagation protocols. Inka's Berries was founded based on this genetic material in 2009 to market blueberry seedlings and plants. The goal was to secure plants that grow faster and at half the price of what was available in other countries. The anchor client was Camposol,[14] and Inka's Berries worked with it to plant the pre-selected varieties. Of them, Biloxi was the one that best adapted to local conditions.

Although the objective was commercial production of blueberries, the high fixed cost of cultivation and the lack of financing led Inka's Berries to concentrate on producing seedlings and plants, which did not require the purchase of large tracts of land. The idea was that this would enable the company to earn money and, eventually, integrate itself into blueberry production, which is in fact what happened. Through an association cooperation agreement with the Universidad Nacional Agraria de La Molina (UNALM), Inka's Berries was able to develop a nursery, critically important given the company's limited financing. By 2014, its growth as a supplier of seedlings to large local agro-export companies enabled it to buy 250 hectares north of Lima with the aim of using the land as large-scale demonstration plots for the blueberry plant varieties it developed and to start scaling to commercial size.[15]

Inka's Berries' competitiveness strategy is based on two pillars:

- **The business model.** Inka's Berries' comparative advantage lies in its genetics. Its objective is to sell genetics in multiple countries throughout the year. Currently, Inka''s Berries exports to Spain, Portugal, Morocco, Mexico, the United States, Namibia, and South Africa. This is an important achievement, as it is not common for Peruvian companies to export genetics, and Inka''s Berries is the only company in the country to export blueberry genetics. In commercial terms, the first generation is comprised of UGA varieties tested in Peru. With these varieties, growers only pay for the plants. The second generation is boutique varieties developed by Inka''s, which are ready to be planted. In this case, royalties will be charged both for the plant and for each kilogram exported by the client. For the third generation, the marketing is to be carried out through Inka's trading channels. Indeed, in addition to its laboratory and nurseries, the company also has production fields and a packing house that enables

[14] Camposol is the leading agro-export company in Peru and at the time already had experience with adapting crops such as asparagus and avocado to production conditions in Peruvian coastal areas. In fact, Camposol later replaced its asparagus with the blueberries produced by Inka's Berries.

[15] The company has continued to expand its production by acquiring new land in both the area around Lima and the northern part of the country. Company sources estimate that Inka's Berries will have 800 hectares planted by 2022.

it to export its own fruit directly. At present, about 20 percent of the production is sold directly to supermarkets, and another 70 percent is committed to programs with international middlemen, and the rest is sold on the spot market.

- **Genetics and collaboration with universities.** Although the Biloxi adapted very well to local conditions, it is not a variety that will be sustainable over time, both because it is an old plant that requires continuous productivity improvements, and because it is very acidic due to the country's climate. The focus of the genetic program is therefore on developing new varieties to improve quality (flavor, size, shelf-life), adapting them to increasingly stringent consumer demands, and maximizing productivity. Achieving productivity improvements and blueberry characteristics that are more in line with consumer preferences is key to maintaining profitability, despite the drop in prices due to greater supply. Toward this end, in 2012, Inka's Berries began collaborating with the University of Georgia (UGA) in the United States on genetic blueberry development in Peru. The idea was to produce new varieties with UGA parents so that when Peruvian farmers dropped Biloxi, they could replace it with these varieties. One of these varieties is the Salvador, launched in 2017 with a better flavor, a longer shelf life (80 days compared to 46), and a larger size than the Biloxi. Genetic improvement is done by using mass selection to identify strains with the best characteristics.[16] As a result of the work with the UGA, it was discovered that the potential for local genetic development is greater than in the United States, since in Peru the plant bears fruit after seven months compared to the year and a half it takes in the United States. This allows for a much faster learning process. An additional advantage is that importing genetic material is relatively simpler and faster in Peru than in other countries. Peru's National Agricultural Health Service (*Servicio Nacional de Sanidad Agraria* – Senasa) has protocols for importing genetic material that work well. Inka's Berries is now the early production arm of UGA, with which it shares intellectual property rights in an arrangement under which the percentage of UGA's royalties decreases over time, and as new generations are produced, Inka's Berries' share increases.[17] In addition, the company continues to collaborate with UNALM, which exclusively provides propagation services through the biotechnology laboratory. This model of innovation through collaboration between universities and companies is increasingly common in the fruit sector, reflected in the emergence of various sector-specific research consortiums that help align incentives by combining participant efforts more effectively (Box 8.1).

[16] Genetic improvement can also be done faster by going the modern biotechnology route (genetic engineering). However, this is not acceptable for the international market.

[17] In this way, the intellectual property contract is aligned (dynamically) so that the percentage of those who make greater efforts and take on more risks in development processes increases.

### Box 8.1 The Chilean Fruit Consortium

In recent years, advances in plant breeding, combined with new production organization models, have given rise to the emergence of consortiums of public and private producers and breeders dedicated to developing new varieties of fruit trees (Maas et al. 2012; Harsh 2007; Legun 2015). These consortiums innovate to produce new varieties with differentiating characteristics, which function as "club goods"(Buchanan 1965). The consortiums license these varieties to a limited set of producers and establish strict trading rules for them (e.g., the total number of hectares planted per producer and country), in order to maintain the variety's niche character and price differential on the international market. Each plant variety is also associated with both an intellectual property registry and a specific brand. The latter is essential to positioning the variety in the market by associating the brand with a particular food experience.1

The dissemination of royalty varieties can be interpreted as a response by producers to overproduction of the commodity, with associated tightening profit margins. The Argentine company Patagonian Fruits Trade, the main Argentine exporter of seed fruit, is the exclusive licensee in the country of the world's leading apple and kiwi royalty varieties. The company began producing royalty varieties in 2002, seeking to decommoditize production. Currently, this type of variety accounts for 15 percent of its production. Its significant financial capability has been key to being able to cover the costs of entering this type of market, which involves not only the cost of the license but also the investment necessary to incorporate, adapt, and multiply the genetic material of the new varieties, a process that can take up to 10 years.

In Chile, the establishment in 2006 of the Fruit Technology Consortium (*Consorcio Tecnológico de la Fruta*) as a public-private partnership to develop new national fruit tree varieties has been central to designing a differentiation strategy for international markets that smaller local producers can access.2 Mi Fruta, a Chilean company comprised of 28 small partners producing table grapes and raisins, has begun a variety replacement process to move towards royalty varieties that are more in demand, starting with planting 20 hectares of the Maylén grape variety. This is the first table grape variety of Chilean origin exported to China, the United Kingdom, the United States, Korea, and Japan. Mi Fruta accesses this variety by paying an annual royalty of US$8,000. This type of strategy for promoting variety switchover based on differentiation and using genetic material accessible to all is central to future competitiveness in markets where differentiation is an increasingly important factor.

[a] A recent example is the Cosmic Crisp apple launched on the market in 2020. Developed by a consortium led by the University of Washington, it has outstanding flavor characteristics (sweet, crunchy, and juicy) and shelf life (it can be kept fresh under refrigeration for more than a year). The variety's premium status is reflected in its market price: it is worth three times the value of standard apple varieties.

[b] This consortium was formed by the Asociación de Exportadores de Chile A.G. (ASOEX), the Pontificia Universidad Católica de Chile, and 27 fruit producing and exporting companies, with the aim of implementing and managing a long-term research, development, and innovation program for the national fruit industry focused on five types of fruit: table grapes, apples, stone fruit, cherries, and raspberries.

The most important challenges facing Inka's Berries are associated with the expansion of its internationalization model. The company is therefore employing a forward integration strategy by establishing agreements with supplier programs for large international clients. In this way, producers are not only offered high-quality and

high-yield genetics, but also guaranteed markets. However, to expand the network of producers, financing is required, which continues to be hard to come by in the sector despite the company's success.

### 8.2.4 TrazUR: Innovation from Regulation

Established by law in 2006, Uruguay's National Livestock Information System (*Sistema Nacional de Información Ganadera* – SNIG) is a mandatory traceability system under which all cattle are registered with information on the changes in ownership, movement, and processing of each animal, from the pen where it is born to the slaughterhouse.[18] In this way, the system provides comprehensive information on the health, tax status, and quality of the country's livestock establishments (Hallak and Tacsir 2021). The launch of the SNIG created demand for technological services throughout the sector's value chain. Initial demand was from the need of the actors in this chain to comply with the new regulations. The SNIG created new actors (known as operators) responsible for ensuring that the information recorded in the databases meets integrity standards. To do this, the SNIG has security controls that only authorized firms or technicians can use after obtaining the necessary permits and associated mandatory training. Naturally, these operators were the first to see the opportunities that the information system offered for providing innovative services.

One of these operators is TrazUR, a veterinary services enterprise created in 2007 (Rius 2015). Its founder is a doctor in veterinary sciences with more than 35 years of experience. The business opportunity came in the form of demand from producers, who realized that the SNIG database contained very important information about their own businesses that could be used to improve farm management. However, the clients needed some type of software that would enable them to process it. To make this possible, TrazUR established a line of software products, which enabled it to register its first customers.[19] Since 2014, the company has had six employees: two data science experts, two marketing experts, an executive assistant, and a director who also provides veterinary science expertise. Additionally, temporary workers are hired, mainly for data collection in the field. To date, TrazUR has compiled about 40 million traceability records.

[18] Traceability is the process by which, using individual identification devices with a national code, an animal is registered in the official database, where its movements, changes of ownership, and other relevant productive and sanitary events in the animal's life are recorded. This makes it is possible to produce a report containing its entire history, from birth to death (Law 17997, 2006, Article 1). As the saying goes in Uruguay, "not every Uruguayan has a passport, but every cow does."

[19] Currently, the company offers three software products: TrazUR Server (for traceability management), TrazUR Movil (for information registration), and TrazURDB (for database analysis and management) (https://www.trazur.com.uy/trazabilidad- animal-2/).

Currently, the company provides a wide range of goods and services. TrazUR solutions combine professional technical support with leading technological tools suitable for primary production establishments, feedlots, livestock collection centers for pre-shipment and quarantine, fairs, transportation, cold storage plants, industrial production processes, and logistics. At each of these links, TrazUR aims to provide the client with the best traceability solution for the company. To do this, it offers diagnostic services on the status of a facility's traceability; collection of information in the field; preparation of regular reports for producers; replacement of *caravanas*;[20] and collection of observations from the regulator, among other things. TrazUR has also developed advanced services like TraZanidad, which combines health protocols with traceability to provide support to producers and minimize losses due to deaths, low weaning percentages, disease, categories in poor condition with fluctuating growth, and finishing—all of which represent productivity losses that are not easy to recognize. Half of the company's revenue comes from the sale of regulatory compliance support services and the other half from the sale of software and hardware associated with traceability and advanced services. The companies' growth strategy is based on two key elements:

- **Early entry into a new market created by regulation.** As TrazUR was established in 2007, a year after the launch of the SNIG, the company founder's extensive experience in veterinary services enabled him to create a growth strategy based on developing support services to aid his clients with regulatory compliance. "Selling compliance" is seen as a way to "enter the gates" of these clients' facilities. This allows the company to generate a personalized and interactive working dynamic with the producers when it comes to using the information generated by the SNIG to promote the development of modern farm management practices. Being practical business persons, producers need to see the concrete benefits of the SNIG if they are to incorporate more information into their business decisions or move towards some form of automation.
- **Lateral diversification into new traceability markets.** The success of the SNIG in the beef market has led the authorities to develop similar systems in other segments of the sector, guaranteeing that TrazUR will see growing demand for traceability services. There are two especially promising markets. One is the opening of the U.S market to Uruguayan sheep meat, which will require the deployment of a mandatory traceability system similar to that of the SNIG. The second is growing demand for traceability services for potentially dangerous agricultural inputs, particularly the ones whose use is prohibited in certain areas or that have to comply with specific

[20] The ear tag containing the identification chip specific to the animal.

disposal regulations. There are likewise other traceability experiments in markets as diverse as hospital waste disposal, medical records management, and sturgeon processing in the fish farms of the Río Negro. There is also a market for voluntary traceability services, in which the company already has clients in transportation, logistics, and solid waste treatment.

Looking ahead, TrazUR seems more likely to grow by expanding into existing markets with similar goods than by innovating to create new markets by changing the definition of the good. Expanding in this way means dealing with a series of challenges. In the beef market, the main obstacle involves the characteristics of the potential for growth in demand for traceability services. The move towards developing more sophisticated services will require working increasingly with smaller and less sophisticated producers. There are limitations to how far the company can go with these producers in a context of insufficient government investment in education regarding continuous innovations and the benefits they bring. In fact, to partially address this problem, the company offers more than 30 training courses, several of which use virtual platforms. There are also regulatory design issues that need to be addressed.

According to the company, the SNIG is excessively legalistic, resulting in an inflexible system because of inclusion of too many details in the law (which can only be changed by another law) instead of leaving those details to administrative decrees (which are likely to be issued more quickly and be more technically sound). As an example, the law stipulates that for exports of live cattle, eartags must be removed just before leaving the port, even though there are buyers interested in taking the individual identification to the destination country. Precisely because of this limitation, the company is taking its first steps towards greater internationalization very carefully. In short, traceability systems such as the SNIG can be viewed as enabling infrastructure that makes it possible for innovation to emerge from a sector. However, to make full use of that infrastructure, complementary public policies are needed (Box 8.2).

### 8.2.5 Kilimo and the Art of Digital Irrigation[21]

Kilimo is an Argentine agtech company that provides irrigation management services via a digital platform. The fully remote service reduces water use by up to 30 percent. Using meteorological data and satellite images, the platform calculates the water balance and growth rate of the crop. This makes it possible to devise irrigation strategies that reduce water use as much as possible or that complement irrigation with fertilization. Currently, Kilimo has more than 200 clients distributed across

[21] This section is based on Bisang et al. (2021).

### Box 8.2 The Hereford Consortium of Uruguay

The Hereford Consortium is a joint initiative between the Sociedad de Criadores de Hereford, Sociedad Rural, Ministry of Agriculture, Livestock, and Fisheries, National Institute for Agricultural Research (INIA), Instituto Clemente Estable (Uruguay's main institute for basic scientific research), and the Universidad de la República. The initiative, which was launched in 2014, aims to integrate traceability with recent advances in genomics to accelerate selection of the highest-quality and most feed-efficient Hereford sires.

The key assumption of the initiative is that integrating Uruguay's National Livestock Information System (*Sistema Nacional de Información Ganadera* – SNIG) with genomics can, first, deliver more feed-efficient livestock populations, which also means lower methanol emissions and water use. Second, genomic selection can improve beef quality. Meeting both goals (efficiency and quality) will strengthen the country's position as an exporter of high-quality beef that is produced using environmentally sound techniques.

The Consorcio Hereford focuses on two animal characteristics of significant value: the rate of conversion of feed and water to beef, and the (technically defined) quality of the resulting meat from the point of view of the end consumer. Both of these traits are "moderately heritable" but difficult to measure (especially before processing the individual animal). In this context, genomic selection using molecular markers is employed to predict the genetic merit of animals against phenotypic characteristics of interest. Using artificial intelligence tools, it is possible to estimate each marker's effect and also to estimate prediction equations for each desirable productive trait, estimating a genomic value for each animal for selection. Within this framework, access to SNIG information makes it possible to substantially speed up R&D processes.

One way the SNIG contributes to the experiment is by being included in the bulls' nutrition. The animals' food and water intake must be measured, which can be done using automated feed chutes with radio frequency identification readers. The SNIG readers also make it possible to document the frequency of trips to the feeding station, the duration of the trips, and the time spent there, among other elements of the process. This information, which can be captured wirelessly by readers, is crucial for estimating conversion rates. In addition, in slaughterhouses, meat quality indices can be calculated for each animal of interest, which are then uploaded to the SNIG in order to trace the history of the animal and its progeny selecting the better quality individuals.

Source: Rius (2015).

eight countries, with service provided for more than 40 crops. The company has 43 employees, all professionals and several with graduate degrees. Customer support and service are for the most part handled by agronomists, while technological innovation is handled by data science professionals. Thirty percent of sales revenue goes to R&D activities.

Kilimo was founded in 2014 in the province of Córdoba. The founding team was comprised of two professionals with degrees in computer engineering and an agricultural engineer. All were under age of 30 when they founded the company. To start, they toured the country for three months to talk with different actors in the agricultural chain and search for market opportunities for services based on digital technologies. This is how they identified irrigation as a process that could be greatly improved. At the

time, only large agricultural companies contracted such services, while other producers managed irrigation with very little information. In addition, the owners found that much of the information companies used to provide irrigation services was based on publicly accessible data,[22] and that satellite imagery could replace field visits. With this knowledge, they developed the technology and moved to launch the first prototype as fast as possible to test it with local growers they recruited through their networks of contacts. Interaction with these early adopters was very valuable, not only for developing the technology, but also for shaping the business model. For example, Kilimo's owners learned it was important to offer a service that provides a variety of irrigation strategies, understand agricultural payment cycles, identify a viable price they could charge, and understand the types of assistance the producers wanted. Kilimo's subsequent growth was based on two main factors:

- **Connections to the different actors of the agriculture sector's innovation system.** An array of actors in the system were key to Kilimo's development, including CREA, three business accelerators, and INTA. With CREA, Kilimo organized informal meetings with the R&D department. In addition to discussing technical issues, this interaction gave Kilimo access to large processing companies. One of them, Aceitera General Deheza,[23] decided to test the service on a small scale and provided financing. Kilimo also connected with INTA to analyze the technology developed in the station's experimental fields located in Manfredi, Córdoba. This not only provided the young firm with new agronomic knowledge, it also enabled Kilimo to participate in a number of events for agricultural producers organized by INTA and aimed at disseminating technologies. Kilimo participated in two business accelerators, the first with NXTP Labs[24] and the second with The Yield Lab. In 2018, Kilimo received financing from the Fondo Fiduciario Para el Desarrollo de Capital Emprendedor (FONDCE) through the Glocal accelerator. Through these processes, Kilimo obtained new financing that was mainly used to strengthen its data science area in order to improve the quality of the technology developed. These links to the sector's innovation system were central to validating and developing the technology and to obtaining financing in a context in which financing for new technology companies is in short supply.
- **Born to be global**. The launch of a rapid internationalization process enabled Kilimo to obtain the financing it needed to grow and diversify its client portfolio by geographic location and type of crop. This process began in 2017, when the company had already covered approximately 10 percent of the area of extensive crops under

[22] From the weather stations of the Servicio Meteorológico Nacional and INTA.

[23] A large national exporter of vegetable proteins, vegetable oils, biodiesel, and refined glycerin.

[24] NXTPlabs is a regional early-stage investment fund.

irrigation in Argentina. From there, it became more costly to incorporate new users at the rate the company had been doing it up until then. Internationalization was an obvious outlet for further expansion. In 2017, Kilimo was accepted into an acceleration program in Tennessee in the United States. The result was very positive—by the end of the year Kilimo had 20 paying customers located in two states. The experience not only enabled the company to secure new financing and new clients, it also had a significant impact on its reputation, which is key when operating in a very competitive market.[25] In 2018, Kilimo entered the Chilean market with the help of a private investor and focused on perennial crops.[26] In this market, growth was very rapid, and the company was able to end the year with five paying customers, and then nine more in 2019. That year, Kilimo was accepted by the Start-Up Chile program as a triple impact company. In 2018, the company also entered Uruguay and Paraguay, and in 2019 it began operating in Peru, Colombia, and Brazil.[27] In some cases, these markets were served directly by the founders, while in others they were developed through alliances with local partners. As a consequence of the COVID-19 pandemic and its related mobility restrictions, the strategy for attracting new clients abroad was fundamentally based on social media and webinars. This digital-media-based internationalization strategy enabled Kilimo both to expand its client base in Peru and Colombia and to enter the Mexican market.

Currently, Kilimo's main challenges center on furthering its internationalization into other countries, such as the United States and Brazil, with greater scale and complexity, and continuing to grow on the extensive margin once each country's early adopters have been reached. Reaching less sophisticated and smaller producers will surely require further adaptations to the platform and the business model. However, the biggest challenge remains the abilities these producers (and potential clients) to use the platform effectively.

## 8.3 Conclusions

Understanding the development of modern agriculture requires a conceptual framework that includes ecological, technological, consumption pattern, environmental, and institutional factors that are not normally taken into account in conventional manufacturing-based theories of innovation. These elements must be considered explicitly to understand how the agriculture sector's system of innovation actually works.

[25] This operation was closed, given that because of its scale, it was not profitable to maintain a subsidiary there.
[26] Including grapevines, blueberries, kiwi, plums, and nuts.
[27] In Brazil, the operation was closed for reasons similar to the case of the United States.

Given these considerations, the innovation process in agriculture has evolved into a system of relationships in which innovative companies increasingly interact with their clients, the public scientific system, intellectual property agencies, sector regulators, and affected communities. These different actors play central roles, influencing both the magnitude and the direction of the sector's innovative effort. Once these structural factors are taken into account, it turns out that agriculture in the region clearly offers space for opening new opportunities for domestic technological learning, characterized by the emergence and development of knowledge-intensive companies that provide solutions to the needs of agricultural producers. However, exploiting these opportunities is not without its difficulties. Based on the case studies presented in this chapter, six areas of intervention can be identified that need to be addressed by public policy.

First, because of the acceleration of technological change and its enhanced complexity, innovation processes in agriculture are increasingly science-intensive, evidenced by the fact that the companies studied took steps to connect with universities and public scientific systems. Thus far, however, such attempts are informal and unsystematic. This has high transaction costs and means that many potentially good matches are not made in the end. Public policies must be advanced that facilitate and induce these collaborations by strengthening the technology transfer offices of universities and the public scientific system to better align the incentives between researchers and companies and increase the use of open innovation models. The agtech ecosystems offer good examples of effective initiatives in this regard. One suggestion is to disseminate the technology consortium model to universities, research centers, and companies, making it possible not only to internalize externalities but to resolve coordination shortcomings by aligning incentives. A good example is the Cooperative Research Centers (CRCs) Program in Australia.[28]

Second, public agricultural technological institutes must be reformed, including by adjusting their governance and financing models so that they function as search engines for the new opportunities presented by the agricultural productive space and generate capabilities and research in emerging or new products and crops. In several countries, these institutes are financed by collecting taxes from the sector, taxing existing activities, and having governance models under which producer representatives

[28] Established in 1990, the Australian government's CRC Program emphasizes the importance of collaborative arrangements to maximize the benefits of research through improved utilization, marketing, and technology transfer. It also has a strong education component with a focus on producing graduates with skills relevant to industry needs. Most research centers offer scholarships to graduate students as part of collaborative research projects. In 2012, an independent impact study found that from 1991 to 2017, the CRCs generated a net economic benefit equivalent to an annual contribution of US$278 million, or about 0.03 percentage points of GDP. Although the CRC is a cross-cutting program, it has been particularly active in the agriculture sector, where 27 CRCs have been funded since 1990 (https://www.industry.gov.au/).

tend to reinvest these resources in the same crops as always. Finding budgetary arrangements in which even just a small part of the institutional budget can be oriented toward non-traditional crops could pay off big in the long term. It is also necessary to release information currently contained in public databases, a process that so far seems to have been stymied by the notion that activities that have been funded with public money should not be shared with the private sector.

Third, in terms of intellectual property rights, the imbalance must be addressed between the UPNVP system of 1978 and the patent system that tilts bargaining power in favor of large multinational companies to the detriment of local plant breeders. This means strengthening the intellectual property rights that apply to germplasm improvements by methods other than genetic engineering. Thus, for example, local agricultural biotechnology companies in Argentina are pressing for the seed law to be modified to require farmers above a certain size to pay to reuse autogamous seed (wheat or soybeans). The possible signing of a trade agreement with the European Union would make it necessary to implement changes in this regard, since it would require Argentina to consider plant varieties as a category of intellectual property rights. However, although negotiations on the agreement have been ongoing for several years, it has not yet been ratified.

Fourth, there is a need to steadily strengthen the agriculture sector's regulators (agricultural health services, national seed institutes, food safety agencies, traceability systems, etc.) so that they can advance and improve their certification and inspection processes for phytosanitary and animal health standards, both for exporting new products and for importing new genetic material, while simultaneously preserving the sustainability of natural resources and ensuring food safety.

Fifth, explicit policies are needed to strengthen the sector's innovative entrepreneurship ecosystems. Several of the companies reviewed in this chapter have emerged thanks to a set of services—both tangible and intangible—provided to them by such ecosystems, and without which these companies would likely not have been successful. Networks of contacts, the opportunity to test technology with trailblazing adopters that are also reference firms in their sectors, incubation and acceleration services that provide access to intelligent capital, and the opportunity to test solutions in public sector experimental stations are all examples of the input vectors these companies need to take advantage of the opportunities offered by the technological revolution in the sector.

Sixth, making the most of the opportunities arising from technological disruption in agriculture require a substantial improvement in public-private dialogue in the sector. This would make it possible to identify coordination and market failures that severely affect private sector development, guiding sector-specific policies and making them relevant. However, in order to be effective, this dialogue must occur very

close to policy and program implementation and must include permanent feedback mechanisms, since both technological evolution and the dynamics of ecosystems are moving targets. Lastly, implementation must be accompanied by enhanced monitoring and evaluation capabilities, as these are the main counterweight to the potential for capture.

Finally, it is worth emphasizing that actions to stimulate the agricultural sector innovation system must be accompanied by a business climate that allows for the development of innovative companies. This includes the design of tax policy that encourages investment, labor legislation that takes the sector's peculiarities into account, development of free trade agreements with other countries, and implementation of the necessary infrastructure.

9

# Public Goods to Support the Integration of Agribusinesses into International Agrifood Value Chains


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This chapter discusses the main public goods that support or even enable the integration of agrifood enterprises into international value chains. Some particularly important areas that have been identified include trade policy, animal and plant health services, policies to support compliance with foreign technical requirements, research and development, infrastructure, regulation, and producer support.


Previous chapters have documented a series of successful examples of international integration by agrifood enterprises into value chains, emphasizing different production models—vertically integrated firms, anchor firms, cooperatives, and partnerships of small producers (Chapters 3 to 5)—and different integration strategies (Chapter 2). However, successful integration into international value chains does not depend solely on the efforts and strategic decisions made by companies. The provision of public goods by the State also plays a fundamental role. "Public goods" refers to goods or services that benefit a large number of people or companies, such that it is generally difficult to prevent someone from benefiting from them. In addition, the fact that someone is benefiting does not reduce the benefit that someone else may receive from a public good.[1] Providing a public good (such as large infrastructure works) can be very expensive and not profitable for a private agent. State intervention in the provision of public goods is therefore generally necessary.

[1] A formal definition of public goods and its different forms can be found in Oakland (1987).

Irrigation districts are one example of a relevant public good.[2] Infrastructure that channels and regulates water to an agricultural area benefits a large number of producers who, with relative ease, can extract water from the system without affecting other producers (provided that the system is well designed and operates under normal conditions of water availability and rational use). This provides an enormous advantage that can be instrumental for commercial success, as the recent experience of Peru illustrates. Starting in the 1980s, the Peruvian government began to develop irrigation infrastructure in areas that were practically desert, eventually covering an area of 250,000 hectares by 2017. Thanks to this initiative and other public goods (such as those provided by Peru's National Agrarian Health Service and the new labor and land tenure regulations), the Peruvian fruit and vegetable sector developed very quickly. Today, the country is a leading exporter of grapes, asparagus, avocados, blueberries, and other agricultural products (Ardila et al. 2019; see also Chapters 3 and 4 of this volume).

This chapter discusses the main public goods that support or even enable the international integration of agrifood companies. Based on this project's case studies and the extensive external literature, some particularly important areas have been identified, including trade policy, animal and plant health services, policies to support compliance with foreign technical requirements, research and development, infrastructure, regulation, and producer support.

## 9.1 Promoting Trade Policy to Improve Market Access

The experience of agrifood companies in the region clearly shows that trade agreements lead to improved market access by reducing tariffs, increasing quotas, facilitating sanitary and phytosanitary protocols, or reducing bureaucracy at the border. But there are other elements of trade policy that have an impact on internationalization by businesses, including export promotion, participation in trade fairs, development of "country brands" and quality seals, and facilitation of trade by reducing paperwork and costs inside the country.

Multiple public agencies and private actors participate in trade policy. They act within a certain institutional framework to set priorities and define specific strategies and actions. Public sector coordination mechanisms, in cooperation with the private sector, are therefore essential to generate virtuous processes for integration abroad (Zelicovich 2020; Cornick, Frieden, and Stein 2019).

### 9.1.1 Trade Agreements for Broader Access under Better Conditions

Setting tariffs and quotas and implementing other technical trade measures continues to be central to trade policy. However, over the years, regional trade agreements

[2] Irrigation infrastructure is not a pure public good, but rather a "club" good (Oakland 1987).

(RTAs) have grown in both number and scope, expanding the benefits they provide to signatories. These agreements can significantly improve access conditions for exporters from the signatory countries (Buzo de la Peña 2004).

The empirical literature is conclusive: trade agreements increase trade flows of agribusiness products (Bureau and Jean 2013; Huchet-Bourdon et al. 2016; Ferrari et al. 2021; CAFTA 2021). In Latin America, it is worth highlighting the experience of Chile, where each new trade agreement has led to an increase in export volume. In 2001, when Chile had four free trade agreements (FTA), its fruit and vegetable exports stood at US$1.3 billion. In 2019, with 26 agreements, those exports exceeded US$7.1 billion (Chibbaro et al. 2021). Peru also began an intensive trade negotiation process to extend its integration abroad. This has benefited exports of avocados, grapes, blueberries, and chestnuts, among other products (Ghezzi and Stein 2021; Pérez and Gómez 2021; Hidalgo Campero 2021).

On the other hand, a lack of trade agreements means less competitiveness against international competitors that have signed agreements with destination countries, leading to a loss of market shares in those countries. This is clearly reflected in the case of the Amazon chestnut. Despite being the main producer of such chestnuts (with about 80 percent of world production), Bolivia was unable to take advantage of the price premium paid by the South Korean market because it did not have a trade agreement with that country. In the absence of such an agreement, the same leading company that operates in Bolivia exports what it produces in Peru from its subsidiary there, because under a trade agreement in force in Peru, tariffs are 0 percent, compared to the 30 percent tariff on chestnuts from Bolivia (Hidalgo Campero 2021). In Argentina, a country with few trade agreements, exporters of multiple categories of products face these types of trade disadvantages, resulting in losing out to exporters from other countries and limiting Argentina's export capability. For example, powdered milk and pork exports to China face tariffs of 10 percent and 8 percent, respectively, compared to the zero tariff enjoyed by New Zealand. For fresh lemons exported to the European Union, Argentina must pay a 9.6 percent tariff, while other international competitors like South Africa and Chile have no tariff thanks to trade agreements (González et al. 2021). These disadvantages are also observed in the case of blueberries (Aggio et al. 2021; González et al. 2021) and cherries (Jaureguiberry and Tappata 2021) from Argentina; honey from Uruguay (Bisang et al. 2021); and sesame from Bolivia (CADEX-IICA 2021).

Competitiveness losses are particularly significant in the case of agricultural products, since import taxes are usually higher than for other sectors, with high tariff peaks (WTO, UNCTAD, and ITC 2021). However, the negotiation of an agreement goes beyond merely cutting taxes. It also improves access to markets by reducing other technical barriers to trade (such as standards and protocols, which are increasingly relevant) and reducing paperwork at the border.

The policy recommendation would thus seem obvious: sign more trade deals. However, negotiation processes are complex, and sector-specific as well as political sensitivities within countries can generate resistance. Although the negotiation processes are led by the foreign ministries and trade ministries, the scope of the issues being negotiated requires the participation of a significant number of public bodies and strong coordination at the national level. In some cases, as with the Southern Cone Common Market (Mercosur), the form that the trade agreement takes (a customs union) prevents member countries from moving forward individually with their own FTAs with other countries.

When there are obstacles to negotiating broad trade agreements, access to outside markets can be improved through quotas. This strategy was used by Uruguay to secure a powdered milk export quota from China of 4,000 tons per year tariff-free (González et al. 2021). For its part, Argentina obtained a quota of 20,000 tons of beef exported to the United States with preferential tariffs.

### 9.1.2 Sanitary and Phytosanitary Protocol Negotiations: Crucial for International Integration

Sanitary and phytosanitary protocols (SPS) are the procedures implemented in the exporting country to comply with the plant and animal health requirements set by an importing country. These protocols are the first trade barrier that exporters must deal with. As shown by several of the studies in this volume, negotiating these protocols is not only necessary to open up the markets, it is also effective for taking advantage of certain market niches or sales windows that make it possible to capture greater value for agrifood production. In this way, through the work of its National Service for Agrifood Health, Safety, and Quality (Senasica), Mexico got Japan to individually certify each Mexican state as free from classical swine fever. The sector was then able to take advantage of the price premiums the Japanese market provided for these products (Ardila et al. 2019).[3]

Foreign ministries and national animal and plant health organizations play a central role in these negotiations, but public-private interaction is essential to prioritize negotiations of SPS protocols and their adaptation to local productive and agro-ecological conditions. This strategy was effective, for example, for the entry of the Argentine cherry into the Chinese market. Following Argentina's approval of the phytosanitary protocol in 2018, exports to China went from accounting for 3 percent of the total that year to 38 percent in the 2020/2021 season, despite the fact that the cherries face an

[3] The combination of trade agreements and the SPS protocols that sometimes accompany such agreements can be a very powerful tool. As an example, in 2019, Mexico accounted for 9 percent of pork imports in Japan, but less than 2 percent of imports in South Korea, a country with which it was not able to finalize an agreement that was being negotiated. See the Observatory of Economic Complexity website at https://oec.world/en/visualize/tree_map/hs92/import/jpn/all/10203/2019/.

import tariff of 10 percent, compared to 0 percent paid by competitors such as Chile, New Zealand, and Australia (Jáureguiberri and Tappata 2021).

Argentina is an interesting case in this sense because, given the technical and political difficulty involved in moving forward with more comprehensive trade agreements,[4] it launched an ambitious SPS protocol negotiation program known as "Abriendo Mercados" ("Opening Markets"), supported by business intelligence studies and regular exchanges with the private sector. In this process, the role of the Ministry of Agriculture, Livestock and Fisheries in leading the negotiations and identifying priorities through talks with the private sector turned out to be the catalyst for a process in which the Ministry of Foreign Affairs and the National Health and Agrifood Quality Service (*Servicio Nacional de Sanidad y Calidad Agroalimentaria* – Senasa) played a central role.

Agricultural research centers also play an important role in validating and amending protocols. Argentina once again offers a clear example. Tests on changing the quarantine treatment for exporting lemons to Japan and China, conducted by the Obispo Colombres Agribusiness Experimental Station (*Estación Experimental Agroindustrial Obispo Colombres* – EEAOC),[5] enabled Argentina to guarantee elimination of the fruit fly and improve the quality of the fruit arriving at its destination. For example, the quarantine originally requested by China called for keeping the lemons at 1.5° C for 18 days. Doing this eliminated the fruit flies, but the excessive cold threatened the quality of the fruit. EEAOC tests proved that keeping lemons at 3° C for 24 days eliminated any fruit fly risk without compromising quality. This protocol was presented by Senasa and accepted by the Chinese authorities (González et al. 2021).

The adaptation of SPS protocols has meant that during 2017 alone, 26 international markets were opened to 37 Argentine agrifood products (Senasa 2018). This strategy should be particularly prized by countries that export (or could potentially export) agricultural products differentiated with credence attributes, where the barriers associated with sanitary and technical measures are usually more significant than tariff barriers (Li and Beghin 2012; Galperin 2013; Piñeiro and Elverdin 2019; Villacis et al. 2021).

### 9.1.3 Strengthening Trade Promotion through Reputation and Positioning Strategies

Several case studies show the importance of trade promotion to facilitate connections with potential clients. Export promotion includes tools ranging from business intelligence to marketing strategies, training programs, identifying potential buyers, and participating in fairs and missions. These tools complement the "country brand," for which interaction between the public and private sectors is essential. This national identity

[4] Mercosur's regulatory framework does not allow its member countries to sign trade agreements bilaterally.
[5] The EEAOC is an independent body of Tucumán Province's Ministry of Productive Development.

element captures the country's business reputation and projects it onto its exporting companies, allowing them to penetrate foreign markets more easily and potentially tap into specific high-value niches.

For foreign markets, there have been successful experiences of marketing of agrifood products, both at the public and mixed levels. Among the former is the Fund for the Promotion of Silvo-Agricultural Exports administered by ProChile, which promotes the consumption of Chilean fruit in external markets. The fund has had a significant impact on, for example, penetration abroad of Chilean avocados (Chibbaro et al. 2021). Among the mixed initiatives, there is the Institute for the Promotion of Beef in Argentina, a non-State public entity with broad participation from the private sector that is financed with a percentage of the price of the animal sent for slaughter. The institute's objectives include identifying and creating demand for Argentine meat in national and international markets, and designing and implementing marketing strategies to improve the positioning of these products abroad (Bisang et al. 2021). There have also been promotion efforts with the support of external agencies. An example is the assistance from non-governmental organizations (with support from the German and Swiss governments) that built links between producers of Ecuadorian dragon fruit and European importers (Villacis et al. 2021).

All countries have at least one national agency that works on trade promotion. Some are more involved in exporter training and support, helping exporters participate in fairs and missions, while others offer more comprehensive support for such activities as opening offices abroad or achieving certification schemes required by destination markets, as is the case of Costa Rica's Procomer (Jordana et al. 2010). In particular, trade promotion agencies play a very important role in supporting small and medium-sized enterprises (SMEs), given that they face greater obstacles to export (Prunello 2014).

A new undertaking that has produced good outcomes is establishing trade promotion offices dedicated exclusively to searching for businesses while working more closely with the private sector than with the public sector. Despite the benefits of opening trade offices abroad, only a few countries in the region have a clear strategy to do so. Among them, Chile, Mexico, Peru, Ecuador, and Colombia stand out, with more than 30 trade offices abroad between them (Olmos 2019). In some cases, ministries of agriculture also play an important role in promoting exports of agrifood products through agricultural trade offices. Such is the case of Brazil, which has agricultural trade offices in 24 countries (MAPA 2021).

### 9.1.4 Streamlining Procedures and Promoting Digitization to Facilitate Trade

There are also tools aimed at facilitating trade by streamlining and digitizing administrative export processes, sometimes replacing face-to-face procedures with remote ones.

The benefits can be significant, especially for SMEs and export companies far from both the ports of departure and the administrative offices where export paperwork is done.[6] In fact, export processing times have a negative impact on countries' exports by increasing operating costs and logistics times (United Nations 2017), particularly for perishable products, which includes many agricultural products.

Some countries in Latin America and the Caribbean have simplified their export procedures and have facilitated access to information. For example, the Chilean Agricultural and Livestock Service (*Servicio Agrícola y Ganadero* – SAG) has implemented 11 online systems to facilitate export procedures and processes (Chibbaro et al. 2021). In Brazil, such efforts reduced the deadlines to obtain a phytosanitary certificate from seven days to 24 hours, and reduced approvals for meat exports from three days to 15 minutes, which is extremely important because meat is a perishable product (Ochoa 2020).

## 9.2 The Challenge to Provide Animal and Plant Health Services

Good animal and plant health is essential to develop the agriculture sector and access international markets. Exporters must be able to demonstrate to external buyers that animal and plant health meet the standards they require. Regardless of whether there is a trade agreement, noncompliance with these requirements poses a barrier to accessing a market.

Achieving good plant and animal health status requires individual efforts (that is, at the level of each farm) and geographically broad collective efforts (regional, national, or even international). In terms of individual efforts, the benefits can include positive externalities. For example, when a cattle ranch vaccinates its animals against a contagious disease, it benefits from the losses avoided, but it also lowers the risk of infection for nearby ranches. In terms of collective efforts, the benefits usually constitute public goods, and it is therefore essential for the State to provide them.

Good animal and plant health are essential to develop the agriculture sector and access international markets. Exporters must be able to demonstrate to external buyers that animal and plant health meet the standards they require.

When one talks about animal and plant health services, one is referring to an extensive array of activities that impact agricultural productivity and trade, public health (via food safety and zoonosis control), and animal welfare.[7] Some services affect international trade almost

[6] The benefits are particularly important for SMEs, since the procedures involve fixed costs that are diluted by the size of the shipments.

[7] Although it may vary across countries, export food safety supervision, especially for unprocessed foods (e.g., fresh fruits), often falls to the animal and plant health services. Once the products have undergone processing, the responsibility usually falls to the entities dedicated exclusively to food safety or the ministry of health.

exclusively, as was discussed in the section on trade policy. This section looks at quarantine inspection, surveillance, control, and eradication services for pests and diseases.

- **Quarantine inspection** services seek to prevent pests and diseases—both plant and animal—from entering a specific country or region. It involves verifying that all products that are about to enter and are potential carriers of pests or diseases are rejected, destroyed, or placed under observation (in quarantine) until it is certain they do not pose any risk. These services therefore constitute a measure of protection for maintaining domestic sanitary conditions and preventing impacts on production and export levels or on public health. This is important because pest or disease outbreaks can have significant financial costs. In April 2001, Uruguay lost its status as a foot-and-mouth disease (aphthous fever) free zone without vaccination, and economic losses amounted to 1.9 percent of GDP between 2001 and 2003 (Ilundain, Lema, and Sader 2004).
- In a situation like that of Uruguay, it is likely that the disease came from abroad, meaning a failure in quarantine inspection services. However, the problem does not lie solely there. **Surveillance services**, charged with detecting pest and disease outbreaks, may also be responsible if they fail to detect a problem or detect it late, thus allowing the pest or disease to spread and become more difficult to control and eradicate.
- **Control and eradication services** play an important role in reducing the impact of a pest or disease, as they are specifically intended to control or prevent their spread and, where possible, eradicate them.[8] Health authorities can establish checkpoints in public places and implement vaccination campaigns or disseminate health management practices, among other measures. In Peru, the IDB supported a campaign by the country's National Agrarian Health Service (*Servicio Nacional de Sanidad Agraria* – Senasa) for several years to eradicate fruit flies. The campaign eliminated the pest in at least two coastal regions of the country (51,000 hectares) and made progress in another four (334,000 hectares).[9] The campaign included actions that directly benefit all producers (such as releasing sterile flies and setting up quarantine centers) as well as many producers individually (such as training on prevention, pest control, and application of insecticides). This has led to increases in productivity, production, and sales, and has facilitated fruit exports (Salazar et al. 2016). Regarding avocados, for example, declaring an area to be fruit fly-free has been crucial for Peru's exports to the United States (Pérez and Gómez 2021).

[8] Producers also have the important responsibility of ensuring they comply with the measures set by the health authorities. Without their cooperation, the capabilities of the authorities for action are severely limited.
[9] See Solagro, "Mosca de la fruta: conoce las regiones libres de ella," blog post, January 8, 2019, available at https://solagro.com.pe/blog/mosca-de-la-fruta-conoce-las-regiones-libres-de-ella/.

Actions that directly benefit individual producers—like the actions in Peru—tend to be aimed at small producers that have less technical or financial capability to take the steps needed to help them achieve the objectives set by the health authorities. For example, the National Fine Flavor Coffee and Cacao Reactivation Project in Ecuador focused on increasing the productivity of the cocoa crop. Its activities included training in phytosanitary control (specifically, removal of diseased plants and the use of pruning to minimize the spread of fungus). This program is recognized as having positively contributed to the Ecuadorian cocoa industry's performance and exports over recent decades (Villacis et al. 2021).

Technical assistance and other direct support to producers in animal and plant health matters can be justified from an equity perspective, but its main motivation lies in the importance of everyone taking the sanitary actions required by authorities. Indeed, the failure of a single producer to do so can have large negative externalities. Therefore, the indirect impact of this assistance is an important public good.

Several of the case studies analyzed demonstrate the importance of animal and plant health services for entry into international markets. In Argentina, for example, the National Program for the Control and Eradication of Fruit Flies has been fundamental to securing and maintaining fruit-fly-free status and enabling exports to the United States, China, and Chile. Also in Argentina, the National Codling Moth Suppression Program is of significant economic importance because the presence of the codling moth poses an obstacle to trade in pears and apples (especially with Brazil, which has been declared codling moth-free).[10] This program was launched by Senasa in 1995 to reduce and eradicate the moths, certify and protect codling-moth-free zones, increase exports of Argentine fruit and vegetable products, and improve sanitary status. The program implements controls on the fresh fruit production process to determine the incidence and prevalence of codling moths, establish the necessary quarantine measures, and encourage the use of techniques to control them (Stubrin et al. 2021). In Chile, fruit fly eradication programs have been in place for more than 50 years, linking the country's natural geographical barriers with the strength of its health institutions to give it the good sanitary status that has enabled consistent exports to demanding markets like the United States and Europe (Chibbaro et al. 2021).

SPS regulations are public goods that can help producers meet the demands of foreign markets. They include systems establishing certifications to guarantee the health and quality of the biological material used in production. In Uruguay, the presence of viruses and bacteria in citrus plants was identified in 2010 as one of the main limitations to exporting to the United States and Asia. The National Citrus Sanitation

[10] The codling moth or carpocapsais an insect whose larvae live inside apples and pears, feeding on them and damaging them irreversibly. See the Senasa website as https://www.argentina.gob.ar/senasa/programas-sanitarios/cadenavegetal/frutales/frutales-produccion-primaria/carpocapsa.

and Certification Program was then launched to establish the requirements that must be met to have a certified "healthy" plant and to require that only certified plants be sold. The program has provided the Uruguayan citrus sector with seedlings and seeds free of viruses and bacteria (covering 100 percent of the new plantations) and has also established a response mechanism for when new diseases enter the country (Bisang et al. 2021). In Argentina, Senasa and the National Seed Institute (*Instituto Nacional de Semillas* – Inase) regulate and control import and reproduction of seeds in order to ensure that nurseries provide plants and seeds of certified varieties and sanitary condition (Aggio et al. 2021).

Following up on these export requirements is difficult, so putting in place easily accessible consultation mechanisms for agrifood exporting companies can serve as a valuable public good. Such is the case for Chile's SAG, which has an online mechanism for checking the phytosanitary export requirements by destination country.[11] Likewise, identifying efficient and reliable customs inspection services that act as overseers at the destination on behalf of exporting companies can be decisive for obtaining the price agreed upon previously with exporters, particularly in markets with untrustworthy customs processes.

## 9.3 Promoting Public Goods to Support Compliance with External Requirements

Beyond animal and plant health requirements, foreign markets can have other increasingly demanding requirements that exporters must meet. These can be many, and while they are mainly associated with food safety, quality, and nutritional content, they can also involve other aspects of production and distribution, such as social and environmental impact. The requirements may impose standards that can become new barriers to trade and place enormous pressure on the agrifood systems of exporting countries to adapt to them (Piñeiro and Elverdin 2019; Papendieck 2021). It is therefore crucial to provide companies with a wide variety of public goods to help producers meet these multiple external requirements and take advantage of existing opportunities to add value.

The requirements affect all food products, both fresh and processed. They are imposed by both the governments of the destination countries and the purchasing companies in order to satisfy customers who increasingly want to know who produces goods, where, and how, as well as the environmental footprint of the production process. At the same time, governments and private customers impose different procedures for evaluating compliance with the requirements, including a matching quality assurance

[11] See the following SAG website posts: http://www.sag.cl/ambitos-de-accion/productos-vegetales-diferentes-paises and https://reqpecuaria.sag.gob.cl/.

infrastructure with metrological laboratories and bodies that can provide internationally accredited certifications. Meeting these types of requirements is essential to all the business strategies to add value (as analyzed in Chapter 2), and is also central to strategies based on meeting the basic requirements of foreign markets and obtaining credence attributes.

### 9.3.1 Good Practices as a Safety Control Mechanism

External markets impose strong safety requirements that usually include, at their most basic, a requirement to adopt good agricultural practices (GAP) and/or good manufacturing practices (GMP). Both are a set of principles, standards, and recommendations applicable to the production, processing, and transportation of food, aimed at guaranteeing sanitation to protect human health and the environment. They are included in the Codex Alimentarius.[12] GAP applies to primary production, while GMP applies to processed foods. Control of these requirements for export products falls mostly to private certification companies, but because of increasing domestic and foreign requirements, national plant and animal health services are playing a bigger role. In any case, effective control of GAP and GMP protocols is essential to maintain fluid access to external markets.

At the same time, plant and animal health services control the safety requirements for domestic sales, at least for some types of products. In Latin America, domestic regulations vary on which aspects of Codex Alimentarius companies must adopt. In some countries, local regulations impose GAP and GMP only on exporters, with the national health services overseeing compliance. In other countries, however, local regulations also require good agricultural and manufacturing practices for domestic marketing. In any case, the promotion of good agricultural and manufacturing practices involves much work in disseminating, training, and providing assistance to companies to take advantage of opportunities to access international markets. At the same time, good convergence of the local requirements with the good practices required in the leading international markets provides agrifood systems with a solid basis for compliance with more complex or sophisticated international certifications, such as the GlobalG.A.P. and British Retail Consortium (BRC).

Another set of safety requirements in international markets involves controlling the use of chemicals and genetically modified organisms. Many materials used in agrifood production are considered pollutants in foreign markets. Each country or bloc of countries defines the materials it considers pollutants, the agrochemicals allowed

[12] The Codex Alimentarius is a set of international standards, codes of practice, and guidelines on various topics such as hygiene, labeling, additives, inspection, certification, and waste and pesticide management, as well as standards applied to products or groups of products. The food safety requirements imposed by countries are based on the Codex Alimentarius.

per crop, the maximum residue limits for each pollutant (e.g., pesticides), and the use of genetically modified organisms. For example, in the meat sector, China does not allow the use of ractopamine, a growth-promoting feed additive that is allowed by other markets. Therefore, companies that want to export to China must eliminate that additive, impacting the cost not only of the cuts shipped to China but of the other cuts from those animals (see Chapter 3).

In this context of foreign safety requirements, export-oriented agrifood producers must use the agrochemicals authorized in the destination markets, which, at the same time, must be authorized in the countries where they produce. For this reason, it is important for the national health services in charge of authorizing agrochemicals to have a comprehensive and updated agrochemical registry so that producers can make use of the latest-generation products and not be restricted in their options for mitigating diseases and pests. Domestic regulations on agrochemical residue for products to be exported must also be aligned with current regulations in destination markets, especially as regards procedures for documenting compliance, in order to reduce costs for exporters. Exporters sometimes face higher costs because the tests requested in foreign markets to prove that their products comply with the residue limits for an agrochemical are not valid for complying with local export requirements, even when they are more rigorous.

National health services must also play a central role in building traceability systems. These mechanisms are information systems that enable tracing the history, attributes, and location of a lot in the value chain through information registries that are organized, credible, and secure. The most basic function is to guarantee that products can be recalled from the market in the event of a health or phytosanitary risk, a requirement that is often stipulated. In order to provide this function, the sanitary authority or other authorized oversight entity often uses numerous "individual" traceability systems for control, each one organized and controlled by a single corporation or organization. However, there are also integrated systems for the entire value chain that offer clear advantages in terms of economies of efficiency, scale, standardization, exploitation of information, and reputation (Hallak and Tacsir 2021). Some important examples in Latin America are the Integrated Citrus Traceability System (SITC), organized by Argentina's Senasa, and the National Livestock Information System (SNIG) for beef in Uruguay, organized by the National Meat Institute (Bisang et al. 2021).

At the same time, traceability systems can become a tool for differentiation if they incorporate more advanced information that allows the customer—whether a consumer or distributor—to obtain specific data about the product, such as its environmental footprint or the working conditions under which it was produced (Hallak and Tacsir 2021). There are multiple instances of these types of traceability systems in the region, both voluntary and individual, even in smaller companies or cooperatives. An example, explained in Chapter 5, is the traceability system that Coopsol is developing in Argentina

in collaboration with the Universidad Católica de Santiago del Estero and IBM to provide greater information transparency to the value chain on the honey it produces and sells (Marín et al. 2021). However, advanced information can also be incorporated into the chain's integrated systems. In particular, in addition to the information requested by health authorities, the aforementioned SNIG in Uruguay offers information on the living conditions of each of the animals, such as their feeding history. Faced with a growing number of emerging requirements regarding security, food safety, quality, and other attributes, which will surely become mandatory in the medium term (Hallak and Tacsir 2021), designing national traceability strategies that highlight attributes or address potential international requirements should be a priority. In this scenario, and despite institutional divergence and the number of actors involved, the coordinating role played by national health agencies cannot be delegated, and the need to cooperate with the private sector is unavoidable and increasingly urgent.

### 9.3.2 Good-Quality Infrastructure Is Critical to Meeting Export Requirements

In order to comply with mandatory or voluntary requirements of both a sanitary or phytosanitary nature, as well as with the food safety, quality, labor requirements and environmental protection demanded by foreign markets, exporting companies need a national quality assurance infrastructure. This State network must provide metrology services, offer adequate laboratory testing capability, and have standardization and accreditation bodies. Good metrology is particularly important to provide exporting companies with the sophisticated measurements necessary to meet the demands of foreign markets and ensure they are considered valid. It is also crucial that an official network of accredited laboratories (public or private) be provided to guarantee the external validity of the tests conducted.

Oftentimes, in addition to the safety requirements imposed by other countries, companies must comply with the requirements of purchasers. For example, Coca-Cola, the largest buyer of Argentine lemon derivatives, requires compliance with stricter standards than those imposed by the government regarding limits on agrochemical residues allowed in essential oils and juices, which therefore requires producers to control their agrochemical use and establish quality-control procedures. Although the Chilean firm Citrusvil profiled in Chapter 3 has its own laboratories to control the level of these residues, other companies have to carry out the corresponding analysis in EEAOC quality laboratories, since the necessary equipment is very expensive for smaller firms. The availability of such equipment in an applied research center like the EEAOC is critical for the lemon agrifood system because it enables the companies in the industry to meet these requirements.

### 9.3.3 Coordination Mechanisms to Obtain Sector-wide Seals of Quality

Beyond sanitary, phytosanitary, or safety aspects, product quality understood broadly is a crucial element for exporting. International consumers of agribusiness products increasingly value attributes such as the appearance of fresh fruits or the distinctive characteristics of products' place of origin. The public sector can support agrifood systems by building tools that demonstrate that export products have these prized attributes. Specifically, it can lead public-private initiatives to develop sector-specific seals, geographical indicators, or controlled denominations of origin and promote regulations for their effective implementation, as in the case of organic honey from Uruguay (Bisang et al. 2021).

Examples of sector-specific seals are the All Lemon quality seal developed by the Chamber of Citrus Exporters of Argentina (González et al. 2021); the Ecuadorian Agrocalidad seal, which certifies the use of good agricultural practices in export production (Villacis et al. 2021); "Responsible Soy Production" from the Round Table on Responsible Soy Association (RTRS);[13] "Carbon-Neutral Beef" in Brazil (Villa Alves et al. 2015); and the Argentine Carbon Neutral Program (*Programa Argentino de Carbono Neutro* – PACN).[14] All are valuable tools for product differentiation. Although companies do not always receive a price premium for showing that they have these seals, they can be recognized as priority suppliers ahead of competitors that do not have them. Sometimes, sector-specific seals guarantee a minimum standard of quality in products and processes, while at the same time offering an economic benefit to those that acquire it. Such is the case of the quality seal "Alimentos Argentinos, una elección natural," which guarantees that the companies that hold it meet minimum quality standards and grants them an additional 0.5 percent of the returns on exports. An important point is that all these sector-specific seals, which companies acquire voluntarily, respect internationally accepted methodologies (and generally require passing a quality audit, thus making their validation and international recognition simpler).

Geographical indications and controlled appellations of origin are other tools for SMEs to add value to their export products based on the distinctive character of a product associated with its geographical origin. Bolivia, for example, has established a Denomination of Origin for the Royal Quinoa of the Southern Altiplano of Bolivia, improving the international positioning of this quinoa (Valdivia et al. 2021). Although these tools are widely disseminated in Latin American countries, not all agrifood systems have managed to work in coordination with the public sector to secure such recognition. For example, Argentina lost the opportunity to obtain recognition of "Argentine dulce

[13] See the RTRS website at https://responsiblesoy.org/soja-rtrs.

[14] See the PACN website at https://carbononeutro.com.ar/.

de leche" for its distinctive way of making this dairy product before producers in other countries began using this form of production (González et al. 2021).

Once these value-adding tools are created and made available to companies, it is essential that they be positioned in international markets so that they can generate better export opportunities for the companies that use them. Good international positioning of these sector-specific seals, geographical certifications, and denominations of origin requires intense trade promotion efforts to disseminate them and add value to the attributes they highlight. This includes coordinated public-private work on everything from identifying the attributes to be highlighted to establishing the communication strategy.

### 9.3.4 Access to Information and Training: Other Public Goods to Support Compliance with External Requirements

As with the sanitary and phytosanitary requirements described above, another public good important for the expansion abroad of Latin America's agrifood systems is identifying, processing, and standardizing all relevant information on the other public and private requirements in place in foreign markets—as well as the processes for evaluating compliance—in order to disseminate them to producers in a format that is useful and reliable. For example, dairy exporters in Argentina have had to bear unnecessary export costs because they did not have the correct information on the updated 2020 protocol for selling their products in Canada (González et al. 2021).

At the same time, just as it is important for producers to access information on requirements abroad, they must be able to understand their implications in terms of the actions they must take to comply and secure international certification. In this regard, training is crucial for guiding companies to this process. Because of the importance of training, and because the need for it exceeds the scope of matters of compliance with external requirements, the provision of these public goods will be discussed more generally in Section 9.7 on support for producers. That section will also look at how to approach the need for financing, which is important to enabling companies to handle the cost of meeting the demands for audits made by international certifiers, as well as the cost of certification in order to obtain the corresponding credentials. These costs often include significant investments that can be difficult, especially for smaller producers with less technical and financial capability (Piñeiro and Elverdin 2019; Papendieck and Idígoras 2017; Villacis et al. 2021). In Colombia, for example, thanks to State support, avocado producers from two cooperatives quickly began to obtain GAP certifications. However, when the support stopped, in 2017, producers within these cooperatives stopped seeking new certifications because of the cost of the process (Pérez and Gómez 2021).

## 9.4 Research and Development: Strengthening the Commitment to Innovation

Both the conceptual discussion of the previous chapter and the experience of agricultural companies in Latin America and the Caribbean show that innovation is important for developing agrifood exports, and that in many cases, the public sector has played a fundamental role. For example, this has been the case with the improvement of production costs for Andean fruit and cacao in Ecuador as a result of reductions in the use of inputs enabled by the implementation of comprehensive pest management programs, an essential component of the agenda of the National Institute for Agricultural Research (Villacis et al. 2021).

Contrary to fairly common perception, agriculture is a highly innovative sector where new varieties and biotechnologies are constantly being adopted, along with new inputs, machinery, and handling techniques, among other things. Of course, behind all this are scientific research (basic or applied) and technological development (R&D).

As argued in Chapter 8, contrary to a fairly common perception, agriculture is a highly innovative sector where new varieties and biotechnologies are constantly being adopted, along with new inputs, machinery, and handling techniques, among other things. Of course, behind all this are scientific research (basic or applied) and technological development (research and development – R&D). The State has an important role to play in performing and promoting R&D because, as agricultural production tends to be quite dispersed, the externalities associated with R&D are large. Furthermore, the State can actively disseminate the knowledge generated by R&D, ensuring that it reaches even producers with lower levels of formal education and less access to information (agricultural extension agencies play a fundamental role in this) in a way that benefits everyone (Mogues et al. 2012).

The economic benefits of agricultural R&D are difficult to precisely quantify but are estimated to be large (Pardey et al. 2016). Hurley et al. (2014) find an average internal rate of return of 39 percent per year, based on a return estimate for 2,200 cases of investment in R&D. The evidence from comparative studies indicates that investments in agricultural RD&I (research, development, and innovation) have produced greater increases in productivity than investments in irrigation, extension, and fertilizer subsidies (Díaz-Bonilla 2015). RD&I investments also represent an effective and durable way to promote agricultural growth and reduce poverty (Fan 2008).

Many investments in RD&I affect productivity through innovations that increase yields, reduce the use of inputs, or minimize losses in crops and livestock. Such is the case, for example, for lemons in Argentina, where the EEAOC—a state agricultural

research and experimentation center with significant private participation—has advised Senasa on quarantine and risk mitigation treatments, in addition to having promoted innovations for primary production and laid the groundwork for the sector's foray into exports with technology packages and solutions (González et al. 2021).

An issue that is increasingly relevant for agricultural R&D is environmental sustainability, discussed in Chapter 7. Studies on greenhouse gas emissions, water use, and impact on biodiversity are increasingly relevant to how export products can be positioned. Here is where national research services, in conjunction with private sector associations, play a fundamental role. For example, Argentina's National Institute of Industrial Technology (INTI) has made progress in the study of the water use of cheese-making (Falabella et al. 2018). It is also making progress, in conjunction with the National Institute of Agricultural Technology (INTA), on incorporating water and carbon footprint analysis for other products such as wheat and beef.[15]

The benefits of investments in RD&I extend beyond the farm to improving the supply chain and the virtues of the products. Applied research can find more efficient and safer ways to transport and store agrifood products, reducing costs or losses, as in the case of Chile, where the Pome Center of the Universidad de Talca, a regional public university, has done research on improving the packaging of pome fruits (such as pears and apples) and cherries. This has contributed to improving the quality of export fruits (Chibbaro et al. 2021).[16]

Research can also be directed toward developing products with characteristics sought by consumers and for which they are willing to pay higher prices. One example is the research Uruguay's National Institute for Agricultural Research (INIA) has been doing since 2011 to create a mandarin orange variety that is more attractive to consumers abroad and will enable Uruguayan producers to gain competitiveness through differentiation. The INIA managed to develop seedless, easy-to-peel mandarins with high sugar content. This variety is already available and has been well received by local producers, who can access it through commercial nurseries to which INIA provides the license for genetic development (Bisang et al. 2021). In the case of the Argentine lemon, prices have increased by 14 percent, which can be partly attributed to improvements in taste, aroma, and physical appearance as a result of the new varieties and to packaging improvements developed by the EEAOC. The price differential can also be partially attributed to the greater guarantee of traceability provided by the system developed by Senasa and the private sector, as mentioned earlier (González et al. 2021).

[15] On wheat, see Agrositio, "Huella de carbono de la cadena de trigo argentina," March 22, 2021, available at https://www.agrositio.com.ar/noticia/215611-huella-de-carbono-de-la-cadena-de-trigo-argentina.

[16] Additionally, this can be used in negotiating sanitary protocols.

In an almost inverse sense, research can serve to reveal to the consumer the virtues of an existing product, making it more valuable without having to change any of its characteristics. Such is the case for New Zealand manuka honey, whose market value has reached US$419 per 500 grams due to research demonstrating its medicinal properties. Following this example, beekeepers from the Coopsol cooperative in Argentina have turned to the National University of Tucumán to discover the properties of monofloral atamisqui honey. Its research has found that the honey has an anti-inflammatory analgesic effect. Of course, for these findings to be translated into trade benefits, they need to be widely disseminated (Marín et al. 2021).

The speed of technological change, the constant emergence of new areas of innovation, and the growing role of the private sector as a promoter of technological change require a new institutional framework to promote R&D that involves the participation of multiple public and private actors and that connects research to innovation processes and facilitates coordination.

One example of the success of these innovation systems can be found in Chile, where cutting-edge technological consortia have been established to explore genetic improvements and innovation in the fruit and vegetable sector. They include the Biofrutales Consortium and the Fruit and Vegetable Center, in which the private sector, academia, and the INIA all participate.[17] Under this collaborative public-private model, and as part of the Grapevine Genetic Improvement Program, the first registered variety of Chilean export grape, Maylen, was developed. The variety has met with great commercial success and is protected in nine countries (Chibbaro et al. 2021). The Uruguayan National Citrus Consortium operates similarly. It is composed of the private sector (Upefruy), the INIA, and the Ministry of Livestock and Agriculture, and its main objective is to manage the adoption of new technologies, both for plant varieties and crop management.

Another interesting initiative is the Grupo Don Mario innovation system for producing seeds in Argentina and Brazil, discussed in detail in Chapter 8. Although Grupo Don Mario has good informal ties with INTA and the Brazilian public agricultural research corporation (Embrapa), it does not have a joint working agreement with them, nor does it use national innovation financing programs. Nevertheless, it makes intensive use of the training and research infrastructure and signs agreements with the local scientific community (researchers, universities, and research centers) (Marín et al. 2021).

Given the evidence of success from the case studies, governments across Latin America and the Caribbean should promote a public policy to establish these types of virtuous associations, facilitating dialogue with the private sector to prioritize actions and facilitate technical, physical, and financial tools for R&D. In most of the case studies, the private sector has become a strategic actor for innovation (as a developer of R&D

[17] See the Biofrutales website at https://biofrutales.cl/.

or as a channel for demand), especially in export processes, since most agricultural R&D has focused on productivity issues.

Governments should also promote cooperation and the capture of dispersed capability in order to integrate them into a national innovation system with clear guidelines. Doing so would tailor the governmental role to the development of specific research based on its expected impact, its appropriability, and the private sector's incentives to promote it. In particular, public innovation systems should focus their agendas on promoting agricultural research on and extension of the public goods that are of greatest interest to the private sector, or on the issues that are most important for developing rural areas that are of no interest to the other actors in the innovation system (Trigo and Elverdin 2019).

## 9.5 Transportation, Connectivity, and Logistics Networks: The Impact of Infrastructure as an Essential Public Good

Infrastructure is another public good essential for economic activity. As shown in the case studies, for the agrifood sector, some infrastructure works can be decisive for productivity and competitiveness. This is illustrated by the case of Peru, where large irrigation projects using water that originally discharged into the Atlantic have turned thousands of hectares that were previously desert into arable land. This infrastructure was complemented by labor market and landholder regulatory reforms, opening the way for private investment that has included highly technical irrigation systems that have made it possible to achieve high productivity. These regions (particularly Chavimovic and Olmos) have subsequently become the heart of Peru's agro-export boom (Ardila et al. 2019; Ghezzi and Stein 2021).

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Transportation infrastructure significantly affects export costs. In the case of the Pacific Alliance countries, transportation and logistics costs have often exceeded tariffs, becoming the main obstacle to international trade. A 10 percent reduction in the cost of transportation, for example, would increase exports per municipality by a range of 13 percent in Mexico and up to 45 percent in Chile (Molina et al. 2016).[18] But this is not simply a matter of cost. Infrastructure development can also increase the value of export

[18] Latin America and the Caribbean is not the only region where this holds true. Rehman et al. (2020) have found a similar situation for the economies of Southeast Asia, and Moisé et al. (2013) estimate that a 10 percent improvement in transportation and trade-related infrastructure could increase agricultural exports from developing countries by up to 30 percent.

products by enabling producers to take advantage of windows of opportunity in destination markets. A good example is the case of blueberries in Argentina, where the extension of the Tucumán Airport runway enabled international shipments to be sent directly from there, without needing to be shipped first by land to Buenos Aires (Aggio et al. 2021).

Physical connectivity can also be essential to successfully enter value chains. The Westfalia Fruit Peru (WFP) company, for example, one of Peru's main avocado exporters, signs contracts with individual producers through which it acquires the right to be the first to buy their production at market prices. In exchange, producers receive technical assistance and financing to buy new trees and to obtain Global G.A.P. certification (which they repay with the harvest). However, WFP only signs these contracts with producers that offer the company a minimum expected profitability in areas where there is a sufficient critical mass of producers, which tends to exclude producers located in remote areas that the company cannot easily access (Ghezzi 2021).

Telecommunications infrastructure is also increasingly important not only to facilitate transactions and increase productive efficiency (such as precision agriculture and the use of agricultural technology) but also as a key element for the traceability systems required by foreign markets. An indication of this is the efforts by the Coopsol beekeeping cooperative in Argentina to provide connectivity to its associates and thus be able to build the aforementioned traceability system (Marín et al. 2021). This does pose a risk, however, of widening the gap between the producers who lag the most and the more advanced producers, since only 37 percent of the rural population of Latin America and the Caribbean has significant connectivity (Bert 2021). The public sector therefore faces the challenge of improving that access, either through public investment or by promoting private investment.

Packaging and cold chain infrastructure is also crucial for exporting fresh products like fruits and vegetables (Villacis et al. 2021; Chibbaro et al. 2021; Aggio et al. 2021; Ghezzi and Stein 2021; Jáureguiberri and Tappata 2021), as is the storage and milling infrastructure for products like yerba mate, chestnuts, and quinoa (Villacis et al. 2021; Hidalgo Campero 2021; Valdivia et al. 2021). In most cases, this infrastructure is private, but in some cases the State has played a decisive role in establishing and financing it. In Chile, for example, the Production Development Corporation (CORFO) worked to gauge sector potential and designed a cold and packing chain for exporting products that could meet that potential (Chibbaro et al. 2021).

Effectively, developing a diversified export matrix requires establishing specialized logistics networks (Barbero and Castro 2013), which in turn requires careful planning of both "hard" investments (physical infrastructure) and "soft" investments (regulation, facilitation of private investment, and so on). This type of planning constitutes a public good, and the State plays a central role as coordinator, as will be discussed in the next chapter.

## 9.6 Regulatory Reforms to Facilitate Exports

Analysis of multiple agrifood value chains reveals that for many companies, success of their exports depends, to a large extent, on a variety of regulatory issues. Some are cross-cutting, like those related to macroeconomics, legal certainty, investment promotion, and financial market regulation. Others are more sector-specific, like the land tenure regime, environmental regulation, labor legislation, and taxation (if there are sector-specific tax regimes). The approach of the regulatory framework can facilitate or hinder export processes in the agriculture sector.

In practice, regulatory reforms can be of significant value, especially when improving conditions for sector competitiveness. Peru's success in foreign markets is one example of this. In Peru, upper limits on land ownership were increased and a special tax and labor regime was established for the agriculture sector, giving rise to the formation of successful agro-export companies (Ghezzi and Stein 2021). Even other institutional arrangements can be valuable, as illustrated by the case of Uruguay, where the free zone regime and the investment law attracted foreign direct investment to develop exports in the meat and forestry sectors, among others (Bartesaghi and Silva 2021). In the same vein, the arrival of multinational companies in Argentina was decisive for the development of lemon production and subsequent export growth, for which Coca-Cola's initial interest in the product for its beverages was important (Bisang et al. 2001). This was also the case with potatoes, for which export volumes from Argentina took off after McCain settled there as an export platform to Mercosur, going from 1,236 tons in 1995 to 131,852 tons in 2016 (Ferraro et al. 2021).

As mentioned above, streamlining and digitizing customs procedures are other regulatory reforms with a significant impact on exports. During Argentina's sector roundtables (*mesas sectoriales*) from 2017–2019, the Secretary of Productive Streamlining was in charge of identifying opportunities for streamlining and regulatory improvements that would be important for sectors that had roundtables. In addition, it worked with the agencies in charge of these regulations—customs, the tax agency (*Administración Federal de Ingresos Públicos* – AFIP), Senasa, and others—to implement the improvements identified. This amounted to an extremely important public good for these sectors, several of which were involved in agro-exports (Obaya and Stein 2021; Stubrin and Stein 2021).

## 9.7 Promoting Equity and Avoiding Negative Externalities through Direct Producer Support

In general, direct producer support usually involves public investments implemented for reasons of equity (e.g., supporting the development of small and medium-sized

producers) or to avoid negative externalities (e.g., health or environmental). Producer support programs vary in their scope and objectives, but among the most relevant to this discussion are agricultural extension and financing. Although the provision of these services takes the form of private goods, there are also public goods associated with these activities. For example, in the case of agricultural extension, identifying skills where training is necessary, analyzing them and deciding on what kind of training is necessary, and developing training and communications materials are public goods or club goods.

Agricultural extension programs are key for developing innovations and for technology transfer to producers, and may in some aspects also extend to companies that process raw agricultural materials. In general, these extension programs enable access to multiple innovations in genetic material, primary production practices, or packaging and industrialization processes, whereby producers or companies can diversify or add value to their production. To a large extent, agricultural extension programs are led by the public sector, in coordination with the private sector, as is the case with INTA and EEAOC in Argentina and INIA in Chile and Uruguay. Other times, they are developed entirely through agricultural associations, as in the case of quinoa in Bolivia and blackberries in Ecuador.

Agricultural extension can address a wide range of issues and take different forms to assist producers and businesses. For example, it covers training and assistance aimed at improving crop health or productivity, guaranteeing food safety, increasing the "cosmetic" attributes of products, and adopting good agricultural and manufacturing practices, as well as undertaking other practices to obtain international certifications or address sustainability. Much of this support has a direct impact on the export opportunities of those that receive it. In some cases, producers learn of new varieties suitable to grow in their region and learn to work with them, enabling them to differentiate themselves in external markets when the varieties meet consumer demand regarding, for example, fruit taste, color, size, or acidity (Chibbaro et al. 2021). In other cases, producers are provided with training on new practices such as technologies for high-density plantations, the identification and control of diseases and pests, or the adoption of quality-control practices to obtain internationally recognized certifications such as the Global G.A.P. or BRC. Identifying which issues are relevant and a priority for each agrifood system in terms of increasing export capabilities is an important challenge for agricultural extension. Another challenge is to find the best way to disseminate this information to producers and companies and help them incorporate it appropriately into their production and business decisions.

This project's case studies include several examples of the benefits of agricultural extension for orienting agrifood systems toward exports. Thanks to agricultural extension, exporting companies have developed new strategies, adapted

and diversified products, adopted processes, and incorporated services in order to meet the growing demands of foreign markets. Such is the case for lemons in Argentina, where extension services provided by the EEAOC and INTA made it possible to steadily improve the quality of both fresh and processed lemons for export (González et al. 2021). In terms of the development of agricultural technology, agricultural extension enabled the development of new digital export technologies through technology testing in the experimental fields of INIA in Uruguay and INTA in Argentina (Bisang et al. 2021).

Of course, the quality and orientation of the extension are important to success in obtaining the desired economic benefits. The technical experience of those who design and implement the extension, and the mechanisms for coordination and dialogue between agricultural extension agencies and programs and the private sector, are key to successful programs.

Access to financing is another extremely important element of producer support to facilitate the integration of businesses into agrifood value chains. Between 80 and 90 percent of global trade is supported by some type of financing or payment insurance (WTO, 2016). However, the agrifood sector in Latin America and the Caribbean often lacks the public financial tools to facilitate export processes that are appropriate to the particularities of the sector (Villacis et al. 2021; Ghezzi and Stein 2021; Hidalgo Campero 2021). In many cases, exports are financed with exporters' own capital. In Ecuador, for example, only 4.2 percent of dragon fruit exporters have access to bank financing (Villacis et al. 2021). In other cases, financing is provided through the private banking system, which is not adapted to the particular needs of agricultural production and often requires complicated and slow application processes (Chibbaro et al. 126; Villacis et al. 2021; Ghezzi and Stein 2021).

Even development banks are focused on traditional tools—like pre- and post-export products—without prioritizing the sectors to support and lacking in-depth development of specialized elements in the agrifood sector. Furthermore, development banks acting as first-tier banks have little territorial penetration, so access to credit for producers is very limited (Pérez-Caldentey et al. 2014). In fact, in several cases, the financing comes from the importers themselves or from other companies within the value chain. This is the case with Ecuadorian cacao, for which the Fortaleza del Valle Corporation finances producers through contract farming (Villacis et al. 2021). Likewise with pork in Mexico, for which the Kekén company helps pork farmers and businesses obtain financing, signing long-term contracts with them that can be used as collateral to access a bank loan (see Chapter 3).

The poor supply of financing has a particularly harsh impact on smaller producers (Ferraro et al. 2021). Taking into consideration that the role of export credit is increasingly prominent (IDB Invest 2021; Trânet al. 2020), national financial systems should

work to develop and encourage a clear credit strategy aimed at improving export competitiveness by reducing systemic deficiencies (WTO 2016).

## 9.8 Conclusions

The evidence collected through numerous studies confirms that public goods are often decisive for the successful integration of agrifood businesses into international value chains. But the discussion in this chapter reveals two classes of public goods, with different levels of impact. First are "general" goods or services that benefit practically the entire agriculture sector and provide the basic conditions for accessing international markets. These include signing trade agreements, installing connectivity infrastructure, and providing animal and plant health services, among other measures. These public goods are extremely important, as they tend to be decisive for the competitiveness of agrifood products and can even serve as a key that opens or closes the door to external markets. To illustrate the point, consider how important a free trade agreement between Bolivia and South Korea could be if it reduced the tariff on Amazonian chestnuts from 30 to 0 percent, enabling Bolivia to compete with Peru on a level playing field. As for opening or closing markets, recall how the fruit fly eradication programs in Argentina and Peru have allowed those countries to export fresh fruit to markets such as the United States, the European Union, and China.

A second class of public goods corresponds to goods and services that benefit a specific production area and offer favorable conditions for integration of those products into international markets. A clear example is the development and negotiation of sanitary protocols to export a specific product, as in the case of lemons in Argentina, for which a new sanitary protocol was developed to guarantee food safety and ensure that the lemons retain their quality until they reach Japan and China.

An issue not covered, as it is beyond the scope of this chapter, is the quality of public goods, which is directly related to the robustness and capabilities of the institutions that provide them. In Latin America and the Caribbean, public institutions are heterogeneous both in the functions they perform and in their strength and capability. The differences between countries emerge not only in terms of the institutions' financial, material, and human resources, but also in terms of institutional density. In other words, in some countries, the number of institutions is such that practically all public goods are provided, while in other countries, the institutional fabric has gaps that result in the absence of a significant number of public goods.

Of course, there is also heterogeneity in the private sector, which can also vary from one value chain to another, even within the same country. In fact, the degree of coordination between the public and private sectors also varies greatly between countries. This is a key issue to successfully access international markets. As stated earlier,

there are a series of more specific public goods that can be key to generating favorable conditions for integration into international value chains. The list can be long, and no government would be able to provide them all at the same time and in the quantity or magnitude necessary. Significant coordination between the public and private sectors is needed to identify priorities and combine them in an appropriate way. This is the subject of the next chapter.

10

# Identifying, Prioritizing, and Efficiently Providing Public Goods

• Piero Ghezzi
• Ernesto Stein

This chapter reviews how to identify and prioritize the public goods needed for private production. This requires solving multiple coordination problems between public and private entities, and having the tools to do so.

The previous chapter discussed the public goods that the State can offer to facilitate agribusiness growth and, in particular, agribusiness exports. As was seen, it is a long list that includes everything from opening markets to providing phytosanitary services, research, regulatory approval, infrastructure, technical assistance and financing for small producers. How can the critical public goods be identified at different times and for each value chain? How can they be prioritized and sequenced? How can it be ensured that, once identified, the public goods are provided effectively? These are the questions we try to answer in this chapter.

The answers, of course, will depend on the public policy objectives. The chapter focuses on two specific objectives. The first is to coordinate agribusiness value chains to ensure that they are strengthened and expanded with the appropriate public policies.[1] In the absence of policy deliberately to the contrary, it is very likely that these value chains will be made up mainly of modern companies—typically large and medium-sized ones—that are highly productive and even vertically integrated. For this reason, a second objective is necessary: to ensure that the largest possible number of small producers participate in dynamic and modern agribusiness chains. In other words, it is not just about facilitating the creation and strengthening of efficient and competitive value chains—it is also vital for those value chains to be inclusive.

[1] This strengthening includes developing the innovation ecosystem around agribusiness.

There is complementarity and even a certain sequencing between the two objectives. A prerequisite for integrating small producers into modern agribusiness value chains is that those chains must be articulated. At the same time, participation by a greater number of small producers strengthens the articulation of the chain. For example, it increases the exportable supply in terms of both quantity and the months of the year for which local production is available (as seen in Chapter 4 in the case of avocados in Peru), and it makes greater use of processing and packing plants. It also helps to diversify the stakeholders, which increases the probability that sound public policies that support the sector will be maintained beyond the administration that establishes them, and will improve over time.

Naturally, the answers as to which public goods and policies to prioritize and provide to achieve the complementary objectives of productive articulation and inclusion vary from country to country (and by region within a country), by type and size of producer, and by crop or value chain. They also depend on the existing public capacity and budget constraints.

Finding these answers requires solving multiple coordination problems between the public entities themselves, between private actors, and between both the public and private sectors. The following section explains how increasingly stringent international standards on environmental, safety, and health issues, along with how modern agribusiness value chains are organized, mean that coordination problems are especially acute for agribusiness (and certainly more than in traditional agriculture). The second section shows how these and other problems are even more challenging to solve when it comes to including small producers, which require ad hoc policies. The final section discusses the issue of designing public-private coordination and cooperation processes that help prioritize and provide adequate public goods and presents some proposals on how to achieve this.

## 10.1 Coordination Problems in Agribusiness: The Need to Align the Public and Private Sectors

As has been seen throughout the book, the agricultural sector is heterogeneous, with companies that are very different from each other. Modern, typically large companies with very high (and growing) productivity levels are at one extreme. They are often vertically integrated and sell to the most demanding international markets. At the other is subsistence farmers oriented toward self-consumption. In the middle is a range of agricultural producers with diverse capacity levels, including those who have escaped from subsistence farming (that is, who engage in commercial activity and produce surpluses) and those who make greater use of technology.

Agribusiness value chains can grow when modern large and medium-sized companies expand and “absorb” labor employed in the informal sector or in traditional

agriculture—the closest thing to structural change as it is traditionally understood. Agribusiness value chains also grow when small producers of traditional agriculture who engage in commercial activity transform their production methods and integrate into those value chains. In other words, agribusiness grows because companies that use advanced production methods expand, or some smallholder farmers migrate from traditional into advanced production methods. These methods are typically characterized by short learning cycles, continuous improvement, and strengthening of the production process that reduces (or even eliminates) the trade-off between physical productivity and quality.

Identifying the complementary public goods that facilitate these structural changes and productive transformations requires accepting that participation in modern agribusiness chains requires meeting certain standards (quality, labor, environmental, safety, health, social, ethical, delivery reliability, etc.). That is, producers must get over a "quality hurdle" (Sabel and Ghezzi 2021). With different levels of complexity depending on the buyer, these standards are continually being raised and are reflected in international certifications. In addition, local regulations frequently take them into account. All this means that producers who want to participate in global agribusiness chains must have the capacity not only to meet these standards, but also to improve continuously to continue participating.

Participants in modern agribusiness value chains must also coordinate with other companies in their value chain or network and in their sector. For example, small suppliers must meet the standards and certifications (e.g., GlobalG.A.P., Sedex Members Ethical Trade Audit [SMETA], and the different organic certifications, among others) required by the anchor and trading companies that are potential buyers. These anchor companies, in turn, can provide technical assistance or financing to help their suppliers meet these standards and obtain certifications.

However, anchor companies typically provide less than "socially optimal" technical assistance and financing to small producers who are potential suppliers (see Chapter 4). This is often due to the risk that the producers will not comply with the agreements and instead sell to a third party who did not pay any of the costs of technical assistance and financing (and can offer the producer a better price precisely for this reason). These problems, known as "appropriability" problems, partly explain why many producers, who could be integrated into value chains under the right conditions, are not.

This example illustrates the first type of coordination problems: those that occur within the private sector. Not all coordination problems between private actors and companies in the same agrifood system occur between an anchor company and its supply chain. They often involve, for example, competing companies. A comparative study by González et al. (2021) of three value chains in Argentina—lemons, pork, and dairy—identified different results. The authors found that the lemon agrifood system is

part of a private sector cohering around well-defined strategic guidelines. This private sector cohesion has led to establishing a network of specialized business associations, such as the All Lemon seal, described in Chapter 3, which certifies the commercial quality of fresh lemons for export from 16 companies (packers, producers, and exporters).

It is the opposite for the dairy sector. There are conflicts within the chain and a lack of coordination that prevent progress in developing international integration beyond commodities. In this sector, there is significant mistrust between the producers (dairy farms) and the industry related to conflict over the price paid for milk. The chain has been unable to reach a consensus on establishing a trading system that adequately rewards the production of high-quality milk.

Lastly, the pork sector is an interesting case of transition between an uncoordinated system and a system that can coordinate its actors around an agenda of actions allowing for export growth. However, the coordination is nascent and still limited to commodities exports.

In sum, González et al. (2021) argue that differences in the degree of coordination within the private sector explain the varying dynamics of the three value chains.

One reason why performance is so uneven between these value chains is that coordination in the private sector makes it possible to reach an agreement on an international integration strategy, along with an agenda of actions to carry it out. It can also help establish fluid links with State agencies to secure commitments toward that agenda. The State can thus receive clear communication on what public goods it should provide. The private sector is seldom good enough on its own; complementary actions are needed from the State.

However, this essential State participation produces the second type of coordination problem: between the public and private sectors. For the State to identify the public goods and services it must offer (market opening, technology research and extension services, connectivity infrastructure, irrigation of adequate quality, a comprehensive traceability system, etc.), it needs information that often only the private sector possesses. Some of the issues that require public sector action are very specific to a given sector, such as the need for a different quarantine treatment for exporting lemons to Asia, discussed in the previous chapter, something that the public sector could not be aware of ex-ante. Other times, neither the public nor the private sector has the required information, and a collaborative discovery process is needed. Close interaction between the two sectors is therefore required.

But for multiple reasons, including mutual mistrust, this essential interaction often does not occur. The public and private sectors very often fail to communicate or share the necessary information. It is rare to find joint work that identifies the most pressing problems facing a sector or value chain, and the public goods required to solve them. Even less common is for the solutions to be implemented jointly, which would almost

certainly produce new knowledge that could be used to fine-tune the initial diagnoses and solutions. This frequently results in regulations issued by the public sector that do not reflect the productive reality, are inapplicable, or make the sector less competitive.

Of course, there are many examples of effective public-private coordination, as reflected in the case studies on which this book is based.[2] One of them is the opening of the Chinese market for Argentine cherries. This highly successful multi-year effort included multiple public and private actors, as explained later in this chapter.[3] Similarly, Peru's National Agricultural Health Service (*Servicio Nacional de Sanidad Agraria* – Senasa) has closely coordinated with local agro-exporters to ensure that they understand and comply with the phytosanitary restrictions imposed by the European Union and that therefore must be included in Senasa's regulations. Another example, explored in the chapter on public goods, is the tests conducted by Argentina's Obispo Colombres Agribusiness Experimental Station (*Estación Experimental Agroindustrial Obispo Colombres* – EEAOC) to develop a quarantine treatment for lemons that allows them to reach Japan and China without fruit flies while not impacting fruit quality in the process. This positive example notwithstanding, the competitiveness of the agrifood sector requires more and better coordination between the public and private sectors than currently exists in Latin America.

In addition, public entities need to coordinate beyond just with the private sector. They must also cooperate with other public entities to coordinate the provision of public goods that help agribusiness exports compete successfully. For example, Peru's Senasa oversees managing export access to new markets by simplifying phytosanitary requirements. Whether these products enter with a minimum tariff depends typically on the Ministry of Foreign Trade, Ministry of Finance, and Ministry of Foreign Affairs. These entities should coordinate their actions under a common objective to achieve a better aggregate result than if they worked independently. For example, without this coordination, the Ministry of Foreign Affairs might pursue a free trade agreement with Japan instead of South Korea, even as Senasa is focused on opening the mango market in South Korea instead of Japan.

Unfortunately, in Latin America, the public sector is not normally unified to work in coordination to identify the needs of farmers and implement the necessary actions. Traditionally, the State's work tends to be siloed, without information sharing. It is organized vertically, with ministries and public agencies often working in isolation and without coordination. These problems have been exacerbated in recent decades by creating increasingly specialized public entities (partly due to the higher international standards) that fail to coordinate with each other.

[2] Fernández-Arias et al. (2016) explore other successful cases of public-private collaboration.

[3] Based on Jaureguiberry and Tappata (2021).

One of the most frequent and relevant problems is that those who typically communicate with the sector (such as the ministers of agriculture and heads of other public agencies under that ministry) do not necessarily have the leverage needed to "bring to the table" the solutions to the problems identified. For example, improving roads, bridges, and ports (or airports) can improve connectivity to international markets and strengthen the value chain. However, this is not up to the Ministry of Agriculture—instead, public works ministries are usually in charge of it. The Ministry of Agriculture also does not have the budget to perform these tasks, and the Ministry of Public Works may want to devote its limited resources to other priorities. In this sense, public budgets are not necessarily aligned with the needs of agribusiness chains (or other productive sectors). Coordination mechanisms should include allocating resources to facilitate cooperation and provide the solutions needed.[4]

These examples illustrate the third type of coordination problem—one that occurs within the public sector. In general, articulating agribusiness chains may require coordinated actions by the ministries of agriculture, public works, foreign trade, and labor, and with agencies such as customs, Senasa, and others. But coordinating these actions is not easy, given the tendency of different government agencies to silo their work.

The coordination problems cited in this chapter include those that traditionally have been of concern to development economists. For example, there are the problems of the need for large, lumpy, and simultaneous investments upstream and downstream in the value chain to exploit synergies and allow both investments to be profitable. The forestry sector offers a good example. To be encouraged to plant, producers need a relatively nearby industrial plant to mill the wood (in other words, an investment downstream in the chain). At the same time, there need to be enough hectares planted for the mill to be profitable. Large companies can solve the coordination problem by investing in both the forests and industrial plants. But small or medium-sized producers will not invest if this coordination problem is not resolved somehow. Another coordination problem involves simultaneously building complementary public infrastructure (e.g., roads, airports, and ports).

Solving all these coordination problems is not easy. It is not just about putting the actors together and waiting for them to magically coordinate. Deliberate mechanisms needed to stimulate coordination include the following:

[4] This is what Chile did with its Strategic Investment Fund (Fondo de Inversiones Estratégicas – FIE), a competitive fund created in 2015 and funded with about US$160 million to finance public goods identified within the framework of the strategic programs of the Production Development Corporation (Corporación de Fomento de la Producción de Chile – Corfo). To receive FIE financing, the project had to be part of the sector roadmaps associated with the strategic programs. The projects, which required counterpart resources from the private sector, were selected by a committee that was chaired by the Ministry of Economy and included other ministers (including the Treasury) and representatives of the private sector.

- Building coordination capacity with an emphasis on implementation
- Changing regulations and changing the organization, capabilities, and responsibilities of different public entities operating in the sector
- Undertaking joint and ongoing public-private efforts to identify and provide the public goods required to articulate value chains
- Implementing public policies (e.g., extension programs, financing, and particular public goods) to specifically help small producers get over the quality hurdle and integrate into dynamic value chains, as will be discussed in the next section.

In summary, increasingly rigorous international standards, along with how modern agrifood systems need to be organized, require coordination and associativity mechanisms that the typical Latin American country does not have. The final section of this chapter will discuss how these coordination failures can be addressed.

### 10.1.1 Public-Private Collaboration to Open the Chinese Market to Argentine Cherries

In 2012, the Argentine government decided to open the Chinese market to different fruits and established a negotiation sequence. It was determined that pome fruit (apples and pears) would be negotiated first, followed by blueberries, cherries, and, finally, table grapes.[5] The cherry negotiation process could not begin until the pome fruit and blueberry protocols were approved.

Although the negotiations were initially delayed, the Neuquén provincial development agency (SME-Adeneu Center)[6] and business owners who were members of the Argentine Chamber of Integrated Cherry Producers (*Cámara Argentina de Productores de Cerezas Integrados* – CAPCI) moved forward with lobbying efforts parallel to the official channel to facilitate the actions to be taken once the pome and blueberry protocols were approved. These efforts included participation in international fairs; sending of correspondence to both public agencies and Chinese importers to express the private sector's interest in the opening of the Chinese market; and calls and meetings with Chinese authorities and the main chamber of importers in China, as well as with distributors and supermarkets. In addition, the Argentine advocates sent good-quality, in-season fruit to national and provincial governments in China and organized meetings emphasizing that the sector was prepared to export there.

Following the signing of the blueberry protocol in December 2017, formal steps were taken to agree on a cherry protocol. In early 2018, the Chinese and Argentine

[5] Eventually, the table grape negotiation was brought forward in response to industry lobbying efforts.
[6] An independent entity with extensive private sector participation.

phytosanitary agencies began a series of exchanges related to China's requirements for pest management during cherry growth and post-harvest treatment in Argentina. A dossier was sent containing all the relevant information on cherry cultivation, from production areas to pest management, along with information from the phytosanitary agency. China then established a list of pests of interest that must be included in the phytosanitary protocol with requirements for their management. In parallel, and to anticipate future requests or conditions, CAPCI and the Argentine National Health and Food Quality Service (*Servicio Nacional de Sanidad y Calidad Agroalimentaria* – Senasa) set up a roundtable to discuss solutions for when pest management requirements are not met. A priority objective was to achieve recognition as a fruit fly-free area.

In Argentina, fruit fly management is administered through Senasa's National Fruit Fly Control and Eradication Program (*Programa Nacional de Control y Erradicación de Mosca de los Frutos* – PROCEM), which coordinates actions between provincial governments, the National Institute of Agricultural Technology (*Instituto Nacional de Tecnología Agropecuaria* – INTA), national universities, producer associations, nongovernmental organizations, and international organizations. The program is essentially based on trapping and sampling possible specimens. For example, in 1999, the Andean Patagonia valley region was declared fruit-fly free. In international negotiations, this declaration by local authorities is a necessary but not sufficient condition to avoid quarantine treatments. The destination country must explicitly recognize the free zone upon compliance with its requirements.

At the roundtable, it was anticipated that China would not quickly recognize the free zone, so to speed up exports, representatives from both countries worked together to formulate an alternative plan. The result was a mitigation plan to increase trap density (wet and dry) per unit area planted with cherries and improve monitoring and inspection resources. This entailed a higher cost both for the private actors (more traps) and for Senasa, since it required establishing a registry in addition to that of PROCEM, among other things.

Following initial negotiations between the phytosanitary agencies, China granted favorable recognition for the management of some pests, but no agreement was reached on the recognition of a free zone. In November 2018, the initial inspection was carried out by a Chinese mission to cherry production and packing facilities in the provinces of Mendoza, Río Negro, and Neuquén. Securing this visit was a joint effort between Senasa (which designed the agenda), CAPCI, and other actors that financed different aspects of it. One of the main objectives of the inspection was precisely to see how fruit flies were managed based on the local proposal to increase the density of the traps.

As the harvest season had already begun, Argentine businesspersons tried to get the protocol signed immediately. Toward this end, CAPCI and other organizations financed the addition of a third member of the Chinese organization to the mission so

that, as the inspection progressed, that person could write a draft of the protocol and finalize it by staying in the country for a few more days. The review was successful. The mitigation plan devised during the roundtable was approved and the negotiations after signing the protocol—to work on China's approval of the free zone—were recognized.

The parallel lobbying efforts paid off. Specifically, the sector managed to involve Argentine President Mauricio Macri, who streamlined the negotiations by proposing to take advantage of the G20 summit held in Argentina and the visit of Chinese President Xi Jinping to sign the joint protocol.

On December 2, 2018, the phytosanitary protocol for cherries was signed by Argentina and China, although it did not directly enable export and still required additional inspections to approve export procedures. In January 2019, the second Chinese mission was carried out to validate the procedure and ensure that the mitigation plan was adequately implemented. The initial shipments from the leading exporting companies were inspected at the customs house in Centenario in Neuquén province, visits were made to facilities with higher trap density, and the effectiveness of the monitoring system was verified. The same tasks were then carried out in Santa Cruz and Chubut. The Argentine exporters then made their first shipments of cherries to China with the quarantine treatment.

However, producers still urgently needed to secure free zone recognition before the 2019–2020 season following the first shipments. With that objective, a third inspection had to be conducted before the end of March 2019, since once the season is over, the traps are discarded, and inspection is pointless. Despite multiple efforts by CAPCI, the visit was not carried out on time. Negotiations between phytosanitary authorities continued throughout the rest of 2019. In particular, Senasa prepared and presented two extensive documents to the Chinese health authorities that described PROCEM's procedures and their implementation in exhaustive detail. The documents were translated with financial support from CAPCI and the Argentine Chamber of Integrated Fruit Growers (*Cámara Argentina de Fruticultores Integrados* – CAFI). However, recognition did not arrive in time for the 2019–2020 season, since the third inspection was completed at the end of November 2019. Exports were made by sea, with the quarantine treatment performed in transit.

Finally, on March 18, 2020, China recognized the free zone, so for the 2020–2021 season, quarantine treatment was no longer needed (and producers could return to the previous mitigation plan, which is less expensive and has a lower trap density). It had direct, positive implications for costs and shipment speed. With the recognition of the free zone negotiated under the cherry protocol secured, and because all the crops in the area that could potentially host the fruit fly were included, a positive externality was generated for the export of pears, apples, and table grapes because, with this recognition, they could be exported to China without quarantine treatment. In

addition, subsequent negotiations applying to other fruit fly host crops—such as plums and other stone fruits—will have recognition built-in automatically, with no additional negotiations needed.

For all the activities, including financing the missions and other aspects of the negotiations, CAPCI participated along with other agencies and organizations. This included the Centro PyME-ADENEU, Senasa, INTA, CAFI, the Mendoza Agricultural Health and Quality Institute (*Instituto de Sanidad y Calidad Agropecuaria Mendoza* – Iscamen), the Fundación Pro Mendoza, the Argentine Investment and International Trade Agency, the municipal governments of Los Antiguos and Sarmiento, and ministerial authorities of the governments of Neuquén and Río Negro.

In the context of the COVID-19 pandemic in 2020, CAPCI continued to support farmers and work closely with Senasa to ensure that air shipments went smoothly and that program operations continued. A model pandemic operations protocol was also drafted, which each jurisdiction then adapted to its needs.

## 10.2 Needs Differentiated Based on the Size of the Producer

The objectives of articulating the value chain and successfully integrating small producers do not require the same combination of public goods or the same type of interaction with the private sector. For example, large (or even medium-sized) companies can successfully integrate into international agribusiness markets if there is an agency along the lines of a Senasa that works reasonably well, export markets that are opened by phytosanitary and foreign trade authorities, adequate road and port infrastructure, and some legal certainty. The companies can compensate for the lack of public research on optimal varieties for local conditions by buying varieties internationally (or even developing knowledge in-house). They can also develop biological pest management in-house. In addition, they do not require extension services, and often they do not need financing or public guarantees either.

Integrating small producers into dynamic value chains, on the other hand, requires a deliberate and more focused public policy effort than what is required for larger companies. Small agribusiness producers face more severe problems than do larger and more modern companies when it comes to successfully participating in these value chains.[7]

Better understanding this circumstance requires going back to the concept of the quality hurdle. Getting over it requires access to certain knowledge and making certain investments. Yet, neither the expertise nor the financing to make the investments

[7] Swinnen (2014) highlights that the tightening production and product standards and the high transaction costs to comply with them can lead to vertical integration or to using larger suppliers, therefore preventing small farmers from supplying value chains. Likewise, based on existing empirical studies, Reardon et al. (2009) find that small farmers are especially excluded if sourcing from large farms is an option.

is often available. Furthermore, overcoming this hurdle has high fixed costs for small producers. The costs are particularly high when there is a need for crop switchover, a decision that carries risks and requires a considerable investment. Even if the process is successful, it means enduring periods of lower income before reaping the benefits of the investment. In the absence of supportive policies, the optimal ex-ante decision by small producers is often not to attempt a transition to the more dynamic chains. However, this is not always due to producers' inability to acquire the knowledge and skills needed to participate in these chains, but rather to structural barriers that public policies have not effectively addressed. As shown in Chapters 4 and 5, small producers can overcome this problem through associativity (vertical or horizontal). But in the absence of complementary supportive public policies, this involves only a limited subgroup of small producers with the capacity to participate in agribusiness chains.

One successful example of overcoming such hurdles is the case of Westfalia Fruit Peru (WFP), which offers small producers technical assistance and partial financing for seedlings. It also helps them obtain GlobalG.A.P. certifications. However, WFP works only with producers with certain characteristics—as discussed in previous chapters, the company requires that small producers be sufficiently clustered such that there are 200 tons of avocado available per year in one location. This is the minimum scale for WFP to cover the fixed costs of establishing reliable marketing logistics and local support services. The company also requires that each producer produce at least six tons per year (which may mean that small farms without access to gravity irrigation need high-tech irrigation). This relates to WFP's need to cover certain fixed costs—for example, expenses related to the need to identify each farmer's production at the packing house, as buyers demand traceability. WFP could extend its efforts if provided with public goods such as rural road and irrigation infrastructure, public financing programs (direct or through guarantees), or extension work or subsidies that reduce the cost of the technical assistance services provided by the company to its suppliers. This would make it possible to significantly expand WFP's supplier network, increasing value chain inclusion.

WFP's case illustrates a more general problem. Integrating small producers into value chains requires simultaneously providing a series of public goods such as connectivity infrastructure (roads and bridges) and irrigation, ongoing technical assistance support (including soil analysis, identification of the right seeds, etc.), support for obtaining certifications, and access to financing. It also requires facilitating associativity between small producers and encouraging the participation of anchor and trading companies. If public entities do not intervene simultaneously, the articulation and integration of small producers will be insufficient and imperfect. In contrast, when the public and private sectors work in coordination and with a shared objective, they achieve an aggregate outcome that, thanks to synergies, is greater than the sum of its parts. Having a common goal makes successful coordination more likely.

Making value chains more inclusive also implies supporting anchor companies, either by strengthening or subsidizing existing anchor companies or by providing incentives to attract more companies of this type. There is a relative scarcity of anchor companies—in other words, there are not as many WFPs, Mercons, or Sol Orgánicas in Latin America as one might like.[8] For this model to scale and for many more MSEs to join value chains, public policies will be required that encourage more companies to become value-chain anchors (e.g., by partially covering the costs of extension work and technology transfer). The model must be comprehensive and should not be limited to companies with a particular emphasis on shared capital.

Part of the value-chain maturation process is that the strengthened small producer associations become independent from the anchor or trading companies and set up their packing or processing plants. The next step is for them to become anchors for other small producers. Public policies can also help strengthen these young enterprises by providing access to financing (reimbursable or not) and pilot plants that help test new products or technologies before the investment is made, or by partially covering the costs of recruiting (and providing technical assistance to) other small producers.

Once the value chain is formed, private financing becomes more viable.[9] One of the problems with traditional farming is that it is costly and carries risks. The "technical" interest rate, which compensates a financial institution for the costs and risks of agricultural financing, is very high and not affordable for small producers (which in turn increases the probability that the loan will not be repaid). There is no equilibrium interest rate. For this reason, many producers do not have access to credit and do not even apply for it. On the other hand, when producers are incorporated into value chains, the productive, technological, and commercial risks decrease. Additionally, information asymmetry problems are substantially reduced by working with an anchor company that understands them.

Thus, incorporating producers into value chains reduces both asymmetric information problems and repayment risk. For example, the anchor company, the small producer, and a financial entity can sign a contract under which the anchor company deducts the repayment amount of the financial entity's loan when compensating the small producer.

This does not mean there is no space for public financing and guarantees. For example, in the case of Kekén, a leading pork exporter in Mexico discussed in Chapter 3, the farmers on *ejido* (communal) lands who do the finishing get loans from commercial

[8] Chapter 4 presents the cases of these three companies.

[9] The opposite is not true. Even if there is financing, the value chain may not be brought together. In fact, it often happens that governments provide funding, but then do not do the additional hard work required, and the money ends up being wasted.

banks to build the farms (which cost around US$1 million). However, the Instituted Agriculture Trusts (*Instituidos en Relación con la Agricultura* – FIRA) provides part of the funding for those loans. This public institution functions as a second-tier agricultural development bank to facilitate credit to the sector.

## 10.3 How Can the Right Public Goods Be Identified, Prioritized, and Provided?

The sections above explained why the changes to international standards and the organization of production mean that achieving the complementary objectives of articulation and productive inclusion require addressing an array of needs for coordination between public and private actors. As discussed, the State cannot do this alone because it does not have the information to identify the obstacles that must be addressed. As was clear from the example of the opening of the Chinese market for Argentine cherries, close public-private collaboration is essential to identify and solve the problems that limit a sector's development.

Even then, a sector's competitiveness is not necessarily strengthened simply by making diagnoses and identifying problems and solutions. As the case of cherries also demonstrates, the success of value chains depends on implementing the solutions identified. Thus, focusing on execution is just as important as identifying problems and potential solutions.

Furthermore, much is learned during implementation, adding to the initial diagnoses. It is, therefore, worthwhile to establish mechanisms to facilitate short feedback cycles, so that what is learned at this stage can be incorporated into better diagnoses. These feedback mechanisms are central to the experimentalist governance approach proposed by Sabel and Zeitlin (2012) and in the problem-driven iterative adaptation (PDIA) approach proposed by Andrews, Pritchett, and Woolcock (2013).[10] These approaches recommend avoiding long deliberative processes to produce initial diagnoses and prescriptions resulting in inflexible plans that just need to be implemented. Instead of this sequential linear approach—which involves implementing a very carefully crafted plan—they propose an iterative or adaptive approach, where what is learned during implementation quickly feeds back to the preliminary plans and diagnoses—in other words, preliminary and flexible plans, implementation, and learning through implementation, leading to updated and amended plans.

What are the specific value chains where public goods and solutions to coordination problems should be provided? Who should participate in these spaces for public-private

[10] These authors characterize PDIA as a "learn by doing" approach that helps organizations build capacity to solve complex problems through the very process itself of solving these types of problems.

coordination? Hausmann and Rodrik (2006) suggest not predetermining the sectors and activities in advance, given that in a constantly changing world, opportunities arise that cannot necessarily be predicted. They propose an open architecture in which the areas that are the focus of policymakers (who by necessity have limited bandwidth) develop as new opportunities appear, and actors organize themselves to take advantage of them. The same concept can be used in defining which actors participate in these coordination spaces. Entrepreneurs with vision, representatives of business associations, and small producers should all be included. This is particularly important given the goal of productive inclusion. On the public side, representatives from all public agencies with some responsibility (direct or indirect) in the sector or value chain should be involved. But it should also be possible to add new actors relevant to the changing problems that arise as progress is made.

Regarding these principles—an emphasis on execution, an iterative or adaptive approach, and open architecture—multiple institutional designs can help identify and provide the appropriate public goods. The most suitable design will depend mainly on the peculiarities of each country, sector, and value chain: the sector's size, the characteristics of the State agencies involved, the type of product, the strength of civil society institutions, and so on. That said, the first step in this public-private cooperation and coordination process must be to identify (jointly) both the constraints that may limit attaining the complementary objectives of articulation and productive inclusion and the possibilities for overcoming those constraints.[11]

Once the constraints and the (likely) solutions to them have been identified, an action plan can be drawn up and execution roles assigned to the different actors (public and private) in the agrifood system. Then implementation starts. Usually, this will require a coordinator (typically from the public sector) who leads day-to-day operations and monitors execution. In addition, mechanisms must be established to provide feedback on the roadmap so that what is learned during implementation can be used to adjust the initial plan. Finally, additional mechanisms (e.g., budgetary) are needed to encourage the cooperation of the different public entities.

The articulation and productive inclusion processes are particularly relevant when carried out at the value chain level and require a sustained effort and the accumulation of knowledge, capabilities to solve problems, and trust between the actors over time. However, to leverage these efforts, public tools and instruments cross-cutting to the agribusiness sector must be generated with the lessons learned in these public-private collaboration processes. These tools include strengthening phytosanitary entities, public funding and guarantees for financing, non-reimbursable public funding (e.g., partially subsidizing investment to install high-tech irrigation systems or reduce

[11] These complementary objectives shared by the different actors provide a shared outlook that helps align the different actors.

the costs of extension work), incentives to strengthen anchor companies, incentives for effective horizontal associativity, and construction of public infrastructure (irrigation, connectivity, etc.).

International experiences offer lessons for thinking about alternative institutional organizations for these coordination processes. As an example, Box 10.1 describes one that has proven successful: Peru's Mesas Ejecutivas. Regardless of the type of institutional organization chosen, it is essential to recognize the central importance of solving coordination problems for economic development.

## Box 10.1 Peru's Mesas Ejecutivas

The Mesas Ejecutivas in Peru were designed by the Ministry of Production to effectively implement productive development policies. The Mesas Ejecutivas are public-private working groups whose main objective is to identify the constraints that limit a sector's productivity and implement solutions to eliminate them. As part of their work, the Mesas Ejecutivas have reformed or created public entities, but the objective is to strengthen and improve the functioning of the State, not replace public entities.

### a. Mesas Ejecutivas Participants and their Institutional Architecture

A typical Mesa Ejecutiva has two levels. The operational-level body comprises the participants who have the best information on the details of the productive problems in the sector that is the focus of the Mesa Ejecutiva. This body has three types of participants:

- Representatives of private-sector stakeholders relevant to the sector
- Representatives of the sector's State stakeholders
- A dedicated team appointed by the public sector entity coordinating the ME.

The public entity that coordinates the Mesa Ejecutivas appoints the dedicated team, which directs daily operations of the ME and ensures the ongoing public-private interaction needed. In many cases, the problems identified are resolved at the operational level. Sometimes, however, the solutions require convening stakeholders, solving problems, or making budget allocations that only the high-level body can do. This high-level body comprises only the ministers relevant to solving the problems. The operational-level and high-level bodies are complementary (see Figure 10.1.1). Each corrects the limitations of the other. The dedicated team serves as a link.

### b. Types of Mesa Ejecutiva Meetings and the Importance of the Dedicated Team

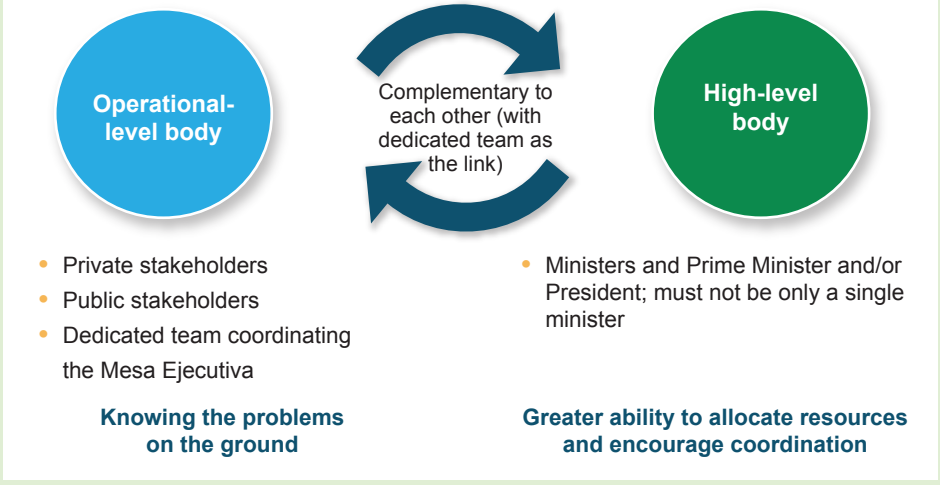
The Mesas Ejecutivas have two types of meetings: regular sessions and inter-session meetings. Operational-level representatives typically attend regular sessions, which a dedicated team representative moderates. During these sessions, problems are presented and progress is reported.

The regular sessions are an essential part of the Mesas Ejecutivas operations, but inter-session meetings are just as or more important. These are smaller meetings in which problems are analyzed in greater detail and the solutions to the problems identified during the regular sessions are worked on and implemented. In practice, the vast majority of solutions emerge from these meetings. The Mesas Ejecutivas team seeks to ensure continual progress from session to session.

*(continued on next page)*

## Box 10.1 Peru's Mesas Ejecutivas *(continued)*

**Figure 10.1.1 • Who Participates in a Mesa Ejecutiva?**




Source: Prepared by the authors.

### c. What Does the State Offer in a Mesa Ejecutiva?

One of the key lessons from the failed industrial policies of the past is that the State must be careful when "picking winners" and then subsidizing and protecting them to compensate for their low productivity. The Mesa Ejecutivas do not pick winners. Instead, they allow the industry to compete based on its true productivity. In other words, the Mesa Ejecutivas operate such that the State provides the specific public goods that it should provide and ensures that there are no cost overruns because of deficient regulations and services.

To do this, a dividing line is drawn between "your problems" and "my problems" from the State's point of view. It is the private sector's job to identify attractive business opportunities where it can compete and win. It is not the State's problem to make a sector profitable without comparative advantages. "My problems" for the State involve providing the public goods necessary for private production, as discussed in the previous chapter.

### d. How Can Mesas Ejecutivas Help with Coordination Failures?

By meeting regularly with private counterparts, the public sector improves its understanding of the bottlenecks affecting the sector. This ongoing public-private interaction enables both sectors to obtain valuable information and work together on learning new information about what the sector needs. Thus, a process of mutual learning and trust-building is established.

The private sector values the Mesas Ejecutivas because they facilitate the adaptation of policies and regulations (and their implementation) to the productive reality. In addition, they enable continuous communication with the authorities, helping build a consensus vision and forcing the public sector to break the inertia and take a proactive, ambitious, and collaborative attitude. The Mesas Ejecutivas also help legitimize public policy decisions by discussing them transparently. In sum, the Mesas Ejecutivas improve public-private coordination.

*(continued on next page)*

## Box 10.1 Peru's Mesas Ejecutivas *(continued)*

The Mesas Ejecutivas also help with public-public coordination. Issues such as duplicate regulatory requirements, implementation gaps, and the need for complementary interventions often become evident during the sessions. To resolve coordination failures within the State, the participation of different public officials is vital. Some will be permanent participants in the Mesa Ejecutivas, while others will be periodic participants.

Mesa Ejecutivas are also useful in the case of private coordination failures. They often encourage (and require) private participants to identify common problems or organize to solve them jointly. For example, the Mesa Ejecutivas for the forestry sector helped micro, small, and medium-sized forestry enterprises that were previously fragmented to coordinate and organize.

### e. An Example: Shrimp Exports to China

Like agro-exports in Peru, the Peruvian aquaculture sector fell under a special regime, starting in December 2013. This included labor flexibility and a lower income tax. However, unlike agro-exports, aquaculture had not taken off. Part of the reason was that several complementary public interventions were missing from aquaculture.

Therefore, the objective of the Mesa Ejecutiva for the sector was to address these gaps. One necessary intervention was to generate regulations and administrative procedures appropriate to the sector. For example, months after the Mesa Ejecutiva was established, a new aquaculture law was implemented, a series of overlapping procedures were eliminated, and the functions of different entities were defined, including those for the Ministry of Production and the Environmental Assessment and Control Agency.

Perhaps the most critical intervention for Peru's aquaculture sector has been strengthening the National Fisheries Health Agency (*Organismo Nacional de Sanidad Pesquera* – Sanipes) created in 2014. Thanks to the Aquaculture Mesa Ejecutiva (created at the start of 2015), Sanipes has become an internationally recognized entity. It implemented decentralized laboratories, purchased specialized equipment (e.g., equipment to detect lipophilic marine biotoxins, high-resolution liquid chromatography equipment, etc.), and intensified inspections, monitoring, and sampling. In addition, permanent inspectors were hired, necessary for greater international credibility. The Mesa Ejecutiva approved the spending decisions required for implementation.

One of Sanipes' most important tasks is to manage the opening of new markets (and ensure that they remain open). For example, it played a fundamental role in facilitating the opening of the Chinese market to Peruvian exports of frozen shrimp, which began in August 2018. The Mesa Ejecutiva facilitated coordination between Sanipes and Peruvian producers to secure the 2015 visit of the Chinese health authority, the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ). It also coordinated a trip to China in September 2016 for the Ministries of Foreign Trade and Foreign Relations, along with Senasa, Sanipes, and private producers. Thus, in October 2017, the Sanitary Protocol was signed, and in August 2018 the first shipment of shrimp arrived in China.

# References


Adusei, E., and G. Norton. 1990. "The Magnitude of Agricultural Maintenance Research in the USA." *Journal of Production Agriculture* (January-March): 1–6.

Aggio, C., M. Lengyel, D. Milesi, V. Verre, and L. Zanazzi. 2021. "Estudio de Caso. Sector Arándano en Argentina." Centro Interdisciplinario de Estudios de Ciencia, Tecnología e Innovación (CIECTI), Buenos Aires.

Alwang, J., A. Villacis, and V. Barrera. 2021a. "Ecuador: Transformation of Traditional and Newly Emerging Agro-Industries in a World of Opportunity." Inter-American Development Bank, Washington, DC. Unpublished.

____. 2021b. "Credence Attributes and Opportunities: Yerba Mate in Paraguay." Inter-American Development Bank, Washington, DC. Unpublished.

Andrews, M., L. Pritchett, and M. Woolcock. 2013. "Escaping Capability Traps through Problem Driven Iterative Adaptation (PDIA"). *World Development* 51(11): 234–44.

____. 2017. *Building State Capability: Evidence, Analysis, Action*. New York: Oxford University Press.

Anllo, G., R. Bisang, and J. Katz. 2015. "Aprendiendo con el Agro Argentino." IDB Discussion Paper No. 379. Competitiveness and Innovation Division, Inter-American Development Bank, Washington, DC.

Ardila, S., P. Ghezzi, T. Reardon, and E. Stein. 2019. "Los mercados agroalimentarios modernos: tierra fértil para la cooperación público-privada." In *De promesas a resultados en el comercio internacional: lo que la integración global puede hacer por América Latina and el Caribe,* edited by M. Mesquita Moreira and E. Stein. Washington, DC: Inter-American Development Bank.

Arias Segura, J., and E. Salazar. 2021. "Las exportaciones agroalimentarias de América Latina and el Caribe crecen 2,7% durante primer año de pandemia." IICA Blog (March 29). Inter-American Institute for Cooperation on Agriculture. Available at https://blog.iica.int/blog/las-exportaciones-agroalimentarias-america-latina-caribe-crecen-27-durante-primer-ano-pandemia.

Artopoulos, A., D. Friel, and J. C. Hallak. 2013. "An Export Emergence of Differentiated Goods from Developing Countries: Export Pioneers and Business Practices in Argentina." *Journal of Development Economics* 105: 19–35.

Avellá, B., G. Landriscini, and O. Preiss. 2018. "Complejo frutícola de Río Negro and Neuquén: Exportaciones, principales competidores and factores que condicionan la competitividad." *Revista Interdisciplinaria de Estudios Agrarios* 48.

Baptista, B. 2016. "Políticas de innovación en Uruguay, pasado, presente and evidencias para pensar en el futuro." PhD thesis. School of Social Sciences, Udelar, Montevideo, Uruguay.

Barbero, J., and L. Castro. 2013. "Infraestructura logística. Hacia una matriz de cargas para la competitividad and el desarrollo sustentable." Public Policy Document 123. Centro de Implementación de Políticas Públicas para la Equidad and el Crecimiento (CIPPEC), Buenos Aires.

Barrera, V., J. Alwang, T. Casanova, J. Domínguez, L. Escudero, G. Loor, G. Peña, J. Párraga, J. Arévalo, J. Quiroz, O. Tarqui, L. Plaza, I. Sotomayor, F. Zambrano, G. Rodríguez, C. García, and M. Racine. 2019. "La cadena de valor del cacao and el bienestar de los productores en la provincia de Manabí-Ecuador." Libro Técnico 171. ARCOIRIS Producciones Gráficas, Quito.

Barrett, C.B., J.A. Berdegué, T. Reardon, and J.F. Swinnen. 2009. "Agrifood Industry Transformation and Small Farmers in Developing Countries." *World Development* 37(11): 1717–727.

Barrett, C.B., L. Christiaensen, M. Sheahan, and A. Shimeles. 2017. "On the Structural Transformation of Rural Africa." *Journal of African Economies* 26(Supplement 1): i11–i35. https://doi.org/10.1093/jae/ejx009.

Barrett, C.B., T. Reardon, J. Swinnen, and D. Zilberman. 2019. *Structural Transformation and Economic Development: Insights from the Agri-food Value Chain Revolution*. Michigan State University.

Beer, J., C.A. Harvey, M. Ibrahim, J.M. Harmand, E. Somarriba, and F. Jiménez. 2003. "Funciones de servicio de los sistemas de agroforestería." In *Proceedings XII World Forestry Congress*. Québec: Ministry of Natural Resources.

Beintema, N., A. Nin, and G. Stads. 2020. "Key Trends in Global Agriculture Research Investment." ASTI Program Note. September.

Beluhova-Uzunova, R., and D. Atanasov. 2019. "Biodynamic Agriculture - Old Traditions and Modern Practices." *Trakia Journal of Sciences* 17 (Supplement 1): 530–36.

Bentley, J.W., and P.S. Baker. 2000. "The Colombian Coffee Growers' Federation: Organised, Successful Smallholder Farmers for 70 Years." AgREN Network Paper 100. Available at https://www.farm-d.org/app/uploads/2019/05/agrenpaper_100.pdf

Bert, F. 2021. "La digitalización de la agricultura, proceso necesario para la transformación positiva de los sistemas alimentarios" IICA Blog (August 23). Inter-American Institute for Cooperation on Agriculture. Available at https://blog.iica.int/en/blog/digitalizacion-agricultura-proceso-necesario-para-transformacion-positiva-los-sistemas.

Bijman, J. 2016. "Agricultural Cooperatives in the Netherlands: Key Success Factors." Paper presented at Quebec 2016: International Summit of Cooperatives. Available at https://edepot.wur.nl/401888

Bisang, R., J. Lachman, A. Lopez, M. Pereyra, and E. Tacsir. 2021a. "Cooperación público-privada para la exportación de limones desde Argentina and cítricos desde Uruguay." Inter-American Development Bank, Washington, DC. Unpublished.

____. 2021b. "Primeros pasos hacia la diferenciación de la producción de miel uruguaya." Inter-American Development Bank, Washington, DC. Unpublished.

____. 2021c. "AGTECH: *Startups* and nuevas tecnologías digitales para el sector agropecuario: Los casos de Argentina and Uruguay." Inter-American Development Bank, Washington, DC. Unpublished.

Bocken, N.M., I. De Pauw, C. Bakker, and B. Van Der Grinten. 2016. "Product Design and Business Model Strategies for a Circular Economy." *Journal of Industrial and Production Engineering* 33(5): 308–20.

Bolivian Ministry of Work, Employment, and Social Security. 2021. "El incremento al Salario Mínimo Nacional del 2% deberá ser pagado retroactivo a enero and hasta al 31 de mayo." Available at https://www.mintrabajo.gob.bo/?p=3251.

Bretos, I., M. Díaz-Foncea and C. Marcuello. 2018. "Cooperativas e internacionalización: Un análisis de las 300 mayores cooperativas del mundo." *CIRIEC-España, Revista de Economía Pública, Social and Cooperativa* 92: 5–37.

Buchanan, J.M. 1965. "An Economic Theory of Clubs." *Economica* 32(125): 1. https://doi.org/10.2307/2552442.

Bureau, J.C., and S. Jean. 2013. "The Impact of Regional Trade Agreements on Trade in Agricultural Products." OECD Food and Fisheries Paper No. 65. Organization for Economic Co-operation and Development, Paris.

Buzo de la Peña, R. 2004. "De la excepción a la regla: el regionalismo en el orden comercial internacional del siglo XXI." *Análisis Económico* 19(40): 119–40.

CAFTA (Canadian Agri-Food Trade Alliance). 2021. Available at https://cafta.org/.

Calderón García, H., T. Fayos Gardó, and J.B. Mir Piqueras. 2013. "La Internacionalización de las cooperativas agroalimentarias. Necesidad and problemática." *Mediterráneo Económico* 24(November): 61–76.

Calvache, A., S. Benítez, and A. Ramos. 2012. "Fondos de Agua: Conservando la Infraestructura Verde. Guía de Diseño, Creación and Operación." Alianza Latinoamericana de Fondos de Agua, The Nature Conservancy, Fundación FEMSA, and Inter-American Development Bank, Bogotá, Colombia.

Cattaneo, O., and S. Miroudot. 2015. "From Global Value Chains to Global Development Chains: An Analysis of Recent Changes in Trade Patterns and Development Paradigms." In *21st Century Trade Policy: Back to the Past? Volume in Honor of Professor Patrick Messerlin*, edited by E. Zedillo and B. Hoekman. New Haven, CT: Yale University Press.

CEBRI (Centro Brasileiro de Relações Internacionais). 2019. "O agronegocio brasileiro no mundo." *Breaking News* 27.

Celbis, M., P. Nijkamp, and J. Poot. 2013. "How Big Is the Impact of Infrastructure on Trade? Evidence from Meta-analysis." UNU-MERIT Working Paper.

Cessa-Reyes, V., O. Ruiz-Rosado, and L. Alcudia-Armida. 2020. "The Coffee Agroforestry System in Mexico." *Agro Productividad* 13(11): 45–52. https://doi.org/10.32854/agrop.v13i11.1811.

Chibbaro, A., P. García, R. Ruiz, and C. Morales. 2021. "Estrategias Privadas and Públicas para el Éxito en los Mercados Agroalimentarios Modernos." Inter-American Development Bank, Washington, DC. Unpublished.

Codron, J.M., L. Siriex, and T. Reardon. 2006. "Social and Environmental Attributes of Food Products in an Emerging Mass Market: Challenges of Signaling and Consumer Perception, with European illustrations." *Agriculture and Human Values* 23(3): 283–97.

Coelho, G. 2017. "Ecosystem Services in Brazilian's Southern Agroforestry Systems." *Tropical and Subtropical Agroecosystems* 20: 475–92. Available at https://www.researchgate.net/publication/322401242_Ecosystem_services_in_Brazilian's_southern_agroforestry_systems.

Cornick, J., J. Frieden, and E. Stein. 2019. "La economía política de la política comercial." In *De promesas a resultados en el comercio internacional: lo que la integración global puede hacer por América Latina and el Caribe,* edited by M. Mesquita Moreira and and E. Stein. Washington, DC: Inter-American Development Bank.

Crespi, G., J. Katzy, and J. Olivari. 2017. "Innovation, Natural Resource-based Activities, and Growth in Emerging Economies: The Formation and Role of Knowledge-intensive Service Firms." *Innovation and Development* 8(January): 79–101.

Díaz-Bonilla, E. 2015. *Macroeconomics, Agriculture, and Food Security* (1st edition). Washington, DC: International Food Policy Research Institute.

Dolan, C., and J. Humphrey. 2004. "Changing Governance Patterns in the Trade in Fresh Vegetables between Africa and the United Kingdom." *Environment and Planning* 36(3): 491–509.

Dosi, G., and R. Nelson. 2010. "Technical Change and Industrial Dynamics as an Evolutionary Process." In Handbook of Economics of Innovation, edited by B.H. Hall and N. Rosenberg. Available at https://www.sciencedirect.com/handbook/handbook-of-the-economics-of-innovation/vol/1/suppl/C.

Ebneth, O., and L. Theuvsen. 2005. "Internationalization and Financial Performance of Cooperatives: Empirical Evidence from the European Dairy Sector." In *Proceedings of the Annual World Food and Agribusiness Symposium and Forum*.

EPA (U.S. Environmental Protection Agency). 2021. "Importance of Methane." Available at https://www.epa.gov/gmi/importance-methane.

Falabella, C., J. Garro, J., M. Korb, M. Minaglia, and L. Tuninetti. 2018. "Evaluación de la huella de agua: Caso de estudio: quesos de pasta semidura." Instituto Nacional de Tecnología Industrial (INTI), Buenos Aires.

Fan, S. 2008. "Public Expenditures, Growth, and Poverty. Lessons from Developing Countries." International Food Policy Research Institute, Washington, DC.

FAO (Food and Agriculture Organization). 2003. "Environmental and Social Standards, Certification and Labelling for Cash Crops." FAO, Rome. Available at https://www.fao.org/3/y5136e/y5136e00.htm.

____. 2009. "How to Feed the World in 2050." High-Level Expert Forum. FAO, Rome. Available at https://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf.

____. 2010. "Water at a Glance: The Relationship between Water, Agriculture, Food Security and Poverty." FAO, Rome. Available at https://www.fao.org/3/ap505e/ap505e.pdf.

____. 2011. "The State of the World's Land and Water Resources for Food and Agriculture (SOLAW). Managing Systems at Risk." FAO, Rome. Available at https://www.fao.org/3/i1688e/i1688e00.htm.

____. 2013. "Food Wastage Footprint." FAO, Rome. Available at www.fao.org/publications.

____. 2014. "Impact of International Voluntary Standards on Smallholder Market Participation in Developing Countries – A Review of the Literature." FAO, Rome. Available at https://www.fao.org/3/i3682e/i3682e.pdf.

____. 2017a. "The Future of Food and Agriculture – Trends and Challenges." FAO, Rome.

____. 2017b. "Water for Sustainable Food and Agriculture." Report produced for the G20 Presidency of Germany. Available at https://www.fao.org/3/i7959e/i7959e.pdf.

____. 2019. "El estado mundial de la agricultura and la alimentación. Progresos en la lucha contra la pérdida and el desperdicio de alimentos." FAO, Rome. Available at http://www.fao.org/3/ca6030es/ca6030es.pdf.

____. 2020. "El estado mundial de la agricultura and la alimentación 2020: Superar los desafíos relacionados con el agua en la agricultura." FAO, Rome. https://doi.org/10.4060/cb1447es

____. 2021. "Agroecology Knowledge Hub." FAO, Rome. Available at https://www.fao.org/agroecology/home/en/.

FAO (Food and Agriculture Organization) and ITPS (Intergovernmental Technical Panel on Soils). 2015. "Status of the World's Soil Resources (SWSR): Main Report."

Farfán, V.F. 2010. "Café orgánico al sol and bajo sombrío. Una doble posibilidad para la zona cafetera de Colombia." *Avances Técnicos de Investigación* 399. Cenicafé.

____. 2014. "Agroforestería y Sistemas Agroforestales con Café. *Cenicafé*." Federació Nacional de Cafeteros de Colombia, Manizales, Caldas.

Fayos, T., H. Calderón, and J. Mir. 2011. "El éxito en la internacionalización de las cooperativas agroalimentarias españolas: Propuesta de un modelo de estudio desde la perspectiva del marketing internacional." *CIRIEC-España, Revista de Economía Pública, Social and Cooperativa* 72: 42–72.

Fernández-Arias, E., C. Sabel., E. Stein, and A. Trejos (eds.). 2016. *Two to Tango: Public-Private Collaboration for Productive Development Policies*. Washington, DC: Inter-American Development Bank.

Fernandez-Cornejo, J., and D. Spielman. 2002. "Concentration, Market Power, and Cost Efficiency in the Corn Seed Industry." Paper presented at the Annual Meeting of the American Agricultural Economics Association, Long Beach, CA.

Fernandez-Stark, K., P. Bamber, and G. Gereffi. 2011. "The Fruits and Vegetables Global Value Chain: *Economic Upgrading and Workforce Development*." Duke University CGGC, Durham, NC.

Ferrari, E., T. Chatzopoulos, I. Pérez Domínguez, P. Boulanger, K. Boysen-Urban, M. Himics, and R. M'barek. 2021. "Cumulative Economic Impact of Trade Agreement EU Agriculture." Publications Office of the European Union, Luxembourg.

Ferraro, C., H. Castello, S. Rojo, and J. Paz. 2021. "Las exportaciones de papa en Argentina: Estudio de caso a partir de la instalación de una empresa líder en el corazón de la producción de papa en el sudeste de la provincia de Buenos Aires." Inter-American Development Bank, Washington, DC. Unpublished.

Fromm, I., and J.A. Dubón. 2006. "Upgrading and the Value Chain Analysis: The Case of Small-scale Coffee Farmers in Honduras." Paper presented at the Conference on International Agricultural Research for Development. Available at https://www.researchgate.net/profile/Ingrid-Fromm/publication/242706970_Upgrading_and_the_Value_Chain_Analysis_The_Case_of_Small-scale_Coffee_Farmers_in_Honduras/links/541aa2760cf25ebee988af8b/Upgrading-and-the-Value-Chain-Analysis-The-Case-of-Small-scale-Coffee-Farmers-in-Honduras.pdf.

Fundación Aguacción. 2021. "Estrategias Privadas and Públicas para el Éxito en los Mercados Agroalimentarios Modernos. Estudio de Caso Chile."

Galperín, C. 2013. "El impacto de las medidas sanitarias and fitosanitarias and de los reglamentos técnicos sobre las exportaciones agrícolas: Una revisión de los estudios cuantitativos." Notas del Centro de Economía Internacional No. 32. Ministry of Foreign Affairs and Worship of the Argentine Republic, Buenos Aires.

Ghezzi, P., and E. Stein. 2021. "The Blueberry Boom in Peru." Inter-American Development Bank, Washington, DC.

———. 2021. "Los arándanos en el Perú." Inter-American Development Bank, Washington, DC. Unpublished.

Gil Pareja, S., R. Llorca Vivero, and J. Martínez Serrano. 2017. "Las agencias de promoción de exportaciones: Una visión panorámica." *Cuadernos de Información Económica* 258: 35–49.

Giller, K.E., R. Hijbeek, J.A. Andersson, and J. Sumberg. 2021. "Regenerative Agriculture: An Agronomic Perspective." *Sage Journals* 50(1): 13–25. https://doi.org/10.1177/0030727021998063.

Gillingham, K., and J.H. Stock. 2018. "The Cost of Reducing Greenhouse Gas Emissions." *Journal of Economic Perspectives* 32(4): 53–72.

Giovannucci, D., S.J. Scherr, D. Nierenberg, C. Hebebrand, J. Shapiro, J. Milder, and K. Wheeler. 2012. "Food and Agriculture: The Future of Sustainability." In *The Sustainable Development in the 21st Century (SD21) Report for Rio* 20. New York: United Nations.

Government of Argentina. 2019. "Plan de desarrollo exportador: Argentina Exporta." Office of the President of the Argentine Nation, Buenos Aires.

Government of Australia. 2021. "Improved Agricultural Export Legislation." Department of Agriculture, Water and Environment. Available at https://www.agriculture.gov.au/market-access-trade/improved-export-legislation.

González, A., J.C. Hallak, and G. Scattolo. 2021. "Requisitos técnicos en los mercados de exportación y respuestas empresariales: Los casos de arándanos y maquinaria agrícola en Argentina." Inter-American Development Bank, Washington, DC. Unpublished.

González, A., J.C. Hallak, G. Scattolo, and A. Tacsir. 2021. "Coordinación de los sistemas agroalimentarios en Argentina y capacidad de desarrollar la competitividad a medida." Inter-American Development Bank, Washington, DC.

González, R. 2020. "La meta con el aguacate hass colombiano es conquistar el mercado chino este año." *La República*. January 29. Available at https://www.agronegocios.co/agricultura/el-aguacate-hass-colombiano-busca-llegar-a-conquistar-el-mercado-chino-este-ano-2957422.

González Villalba, J.D., and N. Zelada Cardozo. 2019. "Guía técnica cultivo de yerba mate." FCA, UNA, San Lorenzo, Paraguay.

Green, T., R. Van den Brink, J. Talbert, and S. Sarode. 2021. "Regenerative Agriculture: What Every CCA Needs to Know." *Crops & Soils* 54(4): 37–43.

Gutiérrez, J.D. 2014. "Cooperativas de pequeños productores agrícolas en Colombia: ¿vehículos para el desarrollo rural?" *Desarrollo and Sociedad* 73: 219–71.

Hallak, J.C., and E. Tacsir. 2021. "Los sistemas de trazabilidad como herramientas de diferenciación para la inserción internacional de cadenas de valor agroalimentarias." Inter-American Development Bank, Washington, DC. Unpublished.

Hanf, J.H. 2014. "Processor Driven Integration of Small-scale Farmers into Value Chains in Eastern Europe and Central Asia." Food and Agriculture Organization, Rome. Available at http://www.fao.org/3/au847e/au847e.pdf.

Hanf, J., and T. Gagalyuk. 2017. "Integration of Small Farmers into Value Chains: Evidence from Eastern Europe and Central Asia." In *Agricultural Value Chain,* edited by G.

Egilmez. IntechOpen. Available at https://www.intechopen.com/books/agricultural-value-chain/integration-of-small-farmers-into-value-chains-evidence-from-eastern-europe-and-central-asia.

Harsh, M. 2007. "Managed Varieties – Are They in Our Future?" *PSU Fruits Times* 29(9).

Hassan, S.Z., and M.S. Sadiq. 2019. "Bringing More Value to Small Farmers: A Study of Potato Farmers in Pakistan." *Emerald Insight*. Available at https://www.researchgate.net/profile/Muhammad-Asif-25/publication/338880504_Bringing_more_value_to_small_farmers_a_study_of_potato_farmers_in_Pakistan/links/5e425a3d458515072d91b00b/Bringing-more-value-to-small-farmers-a-study-of-potato-farmers-in-Pakistan.pdf.

Hausmann, R., and D. Rodrik. 2006. "Doomed to Choose: Industrial Policy as Predicament." Harvard University, Cambridge, MA.

Hayakawa, K., H. Lee, and D. Park. 2011. "Do Export Promotion Agencies Increase Exports?" IDE Discussion Paper No. 313. Institute of Developing Economies.

Henson, S., and J. Humphrey. 2010. "Understanding the Complexities of Private Standards in Global Agri-food Chains as They Impact Developing Countries." *The Journal of Development Studies* 46(9): 1628–646.

Henson, S., and T. Reardon. 2005. "Private Agri-food Standards: Implications for Food Policy and the Agri-food System." *Food Policy* 30(3): 241–53.

Herrigel, G., and V. Wittke. 2014. "Varieties of Vertical Disintegration: The Global Trend Toward Heterogeneous Supply Relations and the Reproduction of Difference in US and German Manufacturing." Industry Studies Association Working Paper.

Heyder, M., C. Makus, and L. Theuvsen. 2011. "Internationalization and Firm Performance in Agribusiness: Empirical Evidence from European Cooperatives." *International Journal on Food System Dynamics* 2(1): 77–93.

Hidalgo Campero, J. 2021. "Caso de éxito: Corporación Agroindustrial Amazonas Castaña-Brazilnuts-Nuez Amazónica." Inter-American Development Bank, Washington, DC. Unpublished.

Huang, J., M. Piñeiro, V. Piñeiro, K. Anderson, N. Illescas, D. Laborde Debucquet, and L. Wellesley, L. 2018. "Global Food Security and Market Stability: The Role and Concerns of Large Net Food Importers and Exporters." T20 Argentina: Food Security and Sustainable Development Task Force Brief. International Food Policy Research Institute, Washington, DC.

Huchet-Bourdon, M., C. Le Mouël, and M. Peketi. 2016. "The Impact of Regional Trade Agreements on Agrifood Trade Flows: The Role of the Rule of Origin." Smart-Lereco Working Paper 16: 8.

Humphrey, J., and O. Memedovic. 2006. "Global Value Chains in the Agrifood Sector." United Nations Industrial Development Organization. Available at https://www.unido.org/sites/default/files/2009-05/Global_value_chains_in_the_agrifood_sector_0.pdf.

Hurley, T.M., X. Rao, and P.G. Pardey. 2014. "Re-examining the Reported Rates of Return to Food and Agricultural Research and Development." *American Journal of Agricultural Economics* 6(5): 1492–504. https://doi.org/10.1093/ajae/aaw080.

ICCO (International Cocoa Organization) 2015. "Review of Annex C of the International Cocoa Agreement 2010, Background Information (FFP/4/2)." ICCO Ad hoc Panel on Fine or Flavour Cocoa.

IDB (Inter-American Development Bank). 2014. "Repensando el Desarrollo Productivo. Políticas e Institucionales sólidas para la transformación económica." Development in the Americas Series. IDB, Washington, DC.

———. 2021. "Vision 2025. Reinvest in the Americas: A Decade of Opportunities." Inter-American Development Bank, Washington, DC. Available at https://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=EZSHARE-328957462-89.

IDB Invest. 2021. "Accelerating the Region's Recovery through Trade Finance." IDB Invest, Washington, DC.

Idígoras, G. 2015. "Propuesta para la creación de una unidad regional de análisis de riesgo para sanidad animal, protección vegetal e inocuidad de los alimentos del MERCOSUR ampliado (CAS)." Grupo de Países Productores del Sur.

Ilundain, M., J. Lema, and M. Sader. 2004. "Estimación del impacto de la fiebre aftosa en Uruguay (2001–2003). Efectos sobre la economía en su conjunto." Paper presented at the 1º Congreso Regional de Economistas Agrarios, 2.º Congreso Rioplatense de Economía Agraria. Unpublished.

IMF (International Monetary Fund). 2015. *Reaping the Benefits from Global Value Chains*. Washington, DC: IMF.

Jaureguiberry, F., and M. Tappata. 2021. "Exportaciones de cerezas en Argentina: El rol de la coordinación público privada." Inter-American Development Bank, Washington, DC. Unpublished.

Jordana, J., C. Volpe Martincus, and A. Gallo. 2010. "Export Promotion Organizations in Latin America and the Caribbean: An Institutional Portrait." IDB Working Paper No. 198. Inter-American Development Bank, Washington, DC.

Jouanjean, M. 2013. "Targeting Infrastructure Development to Foster Agricultural Trade and Market Integration in Developing Countries: An Analytical Review." Overseas Development Institute, London.

Katt, F., and O. Meixner. 2020. "A Systematic Review of Drivers Influencing Consumer Willingness to Pay for Organic Food." *Trends in Food Science & Technology* 100: 374–88.

Klepper, S. 1996. "Entry, Exit, Growth, and Innovation over the Product Life Cycle." *The American Economic Review* 86(3): 562–83.

Korhonen, J., A. Honkasalo, and J. Seppälä. 2018. "Circular Economy: The Concept and Its Limitations." *Ecological Economics* 143: 37–46.

Kuijpers, R., and J. Swinnen. 2017. "Value Chain Innovations for Technology Transfer in Developing and Emerging Economies: Conceptual Issues, Typology, and Policy Implications." *Food Policy* 83: 298–309.

Lederman, D., M. Olarreaga, and L. Payton. 2006. "Export Promotion Agencies: What Works and What Doesn't." Policy Research Working Paper No. 4044. World Bank, Washington, DC.

Legun, K.A. 2015. "Club Apples: A Biology of Markets Built on the Social Life of Variety." *Economy and Society* 44(2): 293–315.

Lemeilleur, S. 2013. "Smallholder Compliance with Private Standard Certification: The Case of GlobalGAP Adoption by Mango Producer." *International Food and Agribusiness Management Review* 16(4). Available at https://agritrop.cirad.fr/571781/1/document_571781.pdf.

Li, S., and Z. Kallas. 2021. "Meta-analysis of Consumers' Willingness to Pay for Sustainable Food Products." *Appetite* 163.

Li, Y., and J. Beghin. 2012. "A Meta-analysis of Estimates of the Impact of Technical Barriers to Trade." *Journal of Policy Modeling* 34: 497–511.

Lim, S. 2018. "Global Agricultural Value Chains and Structural Transformation." Department of Applied Economics. University of Minnesota.

Liu, P. 2007. "Voluntary Environmental and Social Labels. Innovations in Food Eco Labelling." Food and Agriculture Organization, Rome.

Maas F.M., G. Heijerman-Peppelman, M.J. Groot, F.W. Schoorl, and K. van der Linden. 2012. "Introducing New Apple Cultivars through a Coordinated Approach from Consumer till Breeder." *Acta Horticolturae* 940: 433–38.

Maertens, M., and J.F.M. Swinnen. 2009. "Food Standards, Trade and Development." *Review of Business and Economics* 54(3): 313–26.

Malerba, F. 2002. "Sectoral Systems of Innovation and Production." *Research Policy* 31(2): 247–64.

MAPA (Ministerio de Agricultura, Ganadería y Abastecimiento de Brasil). 2021. "Agregados agrícolas en el exterior." Available at https://www.gov.br/agricultura/pt-br/assuntos/relacoes-internacionais/adidos-agricolas.

Marais, Z.E., T.P. Baker, A.P. O'Grady, J.R. England, D. Tinch, and M.A. Hunt. 2019. "A Natural Capital Approach to Agroforestry Decision-making at the Farm Scale." *Forests* 10(11): 980.

Marí Vidal, S., N. Lajara-Camilleri, and R.J. Server Izquierdo. 2013. "La formación en las sociedades cooperativas como factor clave de competitividad en un contexto de concentración e internacionalización de los mercados." *Interciencia* 38(2): 112–20.

Marín, A. 2020. "GDM: Una empresa argentina que gana en el mercado global de semillas de soja." Inter-American Development Bank, Washington, DC.

Marín, A., L. Stubrin, E. Carreras, R. Palacín, and L. Mauro. 2021. "Caso de estudio Don Mario: Una empresa argentina que gana el mercado global de semillas de soja." Inter-American Development Bank, Washington, DC. Unpublished.

Marín, A., L. Stubrin, R. Palacín, and L. Mauro. 2021. "Caso de estudio Coopsol: un emprendimiento social con proyección mundial." Inter-American Development Bank, Washington, DC. Unpublished.

Mateo-Sagasta, J., and B. Jacob. 2011. "Agriculture and Water Quality Interactions: A Global Overview: Solaw Background Thematic Report - TR08." *Water* 45. Available at http://www.fao.org/3/a-bl092e.pdf.

Mateo-Sagasta, J., S.M. Zadeh, and H. Turra. 2017. "Water Pollution from Agriculture: A Global Review Executive Summary." Food and Agriculture Organization and International Water Management Institute. Available at http://www.fao.org/3/a-i7754e.pdf.

Mauro, L., L. Stubrin, and A. Marín. 2021. "Desde la industria farmo-química al sector de alimentos de alto valor: el caso Gihon Laboratorios Químicos." Inter-American Development Bank, Washington, DC. Unpublished.

Meier, C., B. Schlatter, J. Trávníček, and H. Willer. 2021. "The World of Organic Agriculture." FiBL and IFOAM-Organics International.

Mogues, T., B. Yu, S. Fan, and L. McBride. 2012. "The Impacts of Public Investment in and for Agriculture: Synthesis of the Existing Evidence." ESA Working Paper 12(07). Available at https://www.ifpri.org/publication/impacts-public-investment-and-agriculture-synthesis-existing-evidence.

Moïsé, E., and S. Sorescu. 2013. "Trade Facilitation Indicators: The Potential Impact of Trade Facilitation on Developing Countries Trade." OECD Trade Policy Paper No. 144. Organisation for Economic Co-operation and Development, Paris.

Moïsé, E., C. Delpeuch, S. Sorescu, N. Bottini, and A. Foch. 2013. "Estimating the Constraints to Agricultural Trade of Developing Countries." OECD Trade Policy Paper No. 142. Organisation for Economic Co-operation and Development, Paris. https://doi.org/10.1787/5k4c9kwfdx8r-en.

Molina, D., and M. Roa. 2014. "The Effect of Credit on the Export Performance of Colombian Exporters." IDB Working Paper No. 507. Inter-American Development Bank, Washington, DC.

Molina, D., C. Heuser, and M. Mosquita Moreira. 2016. "Infraestructura and desempeño de exportaciones en la Alianza del Pacífico." Inter-American Development Bank, Washington, DC.

Montalbano, P., and S. Nenci. 2020. "The Effects of Global Value Chain (GVC) Participation on the Economic Growth of the Agricultural and Food Sectors." Background Paper for "The State of Agricultural Commodity Markets (SOCO) 2020." Food and Agriculture Organization, Rome. https://doi.org/10.4060/cb0714en.

Montalbano, P., S. Nenci, and C. Pietrobelli. 2018. "Opening and Linking Up: Firms, GVCs, and Productivity in Latin America." *Small Business Economy* 50: 917–35.

Montoya, L.F.R., G.V. Deossa, and L.H. Giraldo. 2020. "Estrategias para el aprovechamiento de la pulpa de café en las fincas cafeteras del municipio de Andes." *Antioquia* 45.

Nájera, J. 2015. "Integración de pequeños agricultores en cadenas globales de valor: Desafíos and oportunidades dentro de la demanda global actual." *Tec Empresarial* 11(2). Available at https://www.scielo.sa.cr/scielo.php?script=sci_arttext&pid=S1659-33592017000200007.

Oakland, W.H. 1987. "Theory of Public Goods." In *Handbook of Public Economics* (Volume 2), edited by A.J. Auerbach and M. Feldstein. Elsevier.

Ochoa, P. 2020. "La agenda de facilitación de comercio and las VUCE en los países del MERCOSUR." Grupo de Países Productores del Sur (GPS).

OECD (Organisation for Economic Co-operation and Development). 2018. "Oslo Manual. Guidelines for Collecting, Reporting and Using Data on Innovation." OECD Publishing, Paris.

____. 2020. "Global Value Chains in Agriculture and Food: A Synthesis of OECD Analysis." Organization for Economic Co-operation and Development, Paris. https://doi.org/10.1787/6e3993fa-en

OECD (Organisation for Economic Co-operation and Development) and FAO (Food and Agriculture Organization). 2015. "Brazilian Agriculture: Prospects and Challenges." In *Agricultural Outlook 2015*. Available at https://www.oecd-ilibrary.org/docserver/agr_outlook-2015-5-en.pdf?expires=1630685142&id=id&accname=guest&checksum=8307AB2832A92521BD90600C65A3BD44.

Ogunleye, E. 2014. "Global Value Chain Development and Structural Transformation in Nigeria." Africa Economic Brief 5(2). African Development Bank Group.

Olmos, X. 2019. "Oficinas de promoción comercial en el exterior como instrumento para la diversificación exportadora: los casos de Chile, Colombia and el Perú." Project Document LC/TS.2019/57. Economic Commission for Latin America and the Caribbean, Santiago.

Opertti, F., and G. Sacristán. 2021. "Accelerating the Region's Recovery through Trade Finance." IICA Blog (November 25). Inter-American Institute for Cooperation on Agriculture. Available at https://www.idbinvest.org/es/blog/instituciones-financieras/financiar-el-comercio-exterior-para-acelerar-la-recuperacion-de-la.

Ortiz-Bobea, A., T.R. Ault, C.M. Carrillo, R.G. Chambers, and D.B. Lobell. 2021. "Anthropogenic Climate Change Has Slowed Global Agricultural Productivity Growth." *Nature Climate Change* 11(4): 306–12. https://doi.org/10.1038/s41558-021-01000-1.

Papendieck, S. 2021. "Requerimientos de 'deforestación cero' para productos agroindustriales en el acceso a mercado: Análisis de conformidad de las exportaciones del MERCOSUR." Grupo de Países Productores del Sur (GPS).

Papendieck, S., and P. Elverdin. 2021. "Harmonization of Sustainability Standards under the WTO Framework as the Core to Create an Intersection of Trade and Environment Mutually Supportative." In *The Road to the WTO Twelfth Ministerial Conference: A Latin American and Caribbean Perspective*, edited by V. Piñeiro and M. Piñeiro. Buenos Aires: WTO-IICA-GPS and Bolsa de Cereales de Buenos Aires.

Papendieck, S., and G. Idígoras. 2017. "The Link between Agricultural Trade, Climate Change and Food Security: Tariff Elimination for Environmentally Efficient Agricultural Goods (EEAG)." In *Agricultural Trade Interests and Challenges at the WTO Ministerial Conference in Buenos Aires: A Southern Cone Perspective,* edited by V. Piñeiro and M. Piñeiro. International Food Policy Research Institute (IFPRI); Inter-American Institute for Cooperation on Agriculture (IICA).

Pardey, P.G., C. Chan-Kang, S.P. Dehmer, and J.M. Beddow. 2016. "Agricultural R&D isonthemove." *Nature* 5377620: 301–03.

Pardey, P.G., J.M. Alston, and W. Ruttan. 2010. "The Economics of Technical Change in Agriculture." In Handbook of Economics of Innovation, edited by B.H. Hall and N. Rosenberg. Available at https://www.sciencedirect.com/handbook/handbook-of-the-economics-of-innovation/vol/1/suppl/C.

Parente-Laverde, A. M. 2020. "Value Chain and Economic Development: The Case of the Colombian Coffee Industry." *Organizations and Markets in Emerging Economies* 11: 173–88.

Paull, J., and B. Hennig. 2020. "A World Map of Biodynamic Agriculture." *Agricultural and Biological Sciences Journal* 6 (2): 114–19.

Pavitt, K. 1984. "Sectoral Patterns of Technical Change: Towards a Theory and Taxonomy." *Research Policy* 13(6).

Pérez, L., and M. Gómez. 2021. "Estrategias público-privadas para el establecimiento de un ciclo de exportación de aguacate exitoso: casos de Colombia and Perú." Inter-American Development Bank, Washington, DC. Unpublished.

Pérez-Caldentey, E., C. Vera, A. Díaz, and S. Vera. 2014. "El financiamiento del comercio internacional and el rol de la banca de desarrollo de América Latina and el Caribe." Serie Financiamiento para el Desarrollo No. 251. Economic Commission for Latin America and the Caribbean, Santiago. Available at https://repositorio.cepal.org/bitstream/handle/11362/37047/1/S1420297_es.pdf

Pingali, P. 2012. "Green Revolution: Impacts, Limits, and the Path Ahead." *PNAS* 109(31).

Piñeiro, M. 2020. "El sistema agroalimentario mundial: ¿Es posible construir una mejor gobernanza global?" Brief del Grupo de Países Productores del Sur. October.

Piñeiro, M., and P. Elverdin. 2019. "Tendencias globales que afectan lo rural. 2030 - Alimentación, agricultura and desarrollo rural en América Latina and el Caribe No. 4." Food and Agriculture Organization, Santiago.

Pons, J.C., and P. Sivardière. 2002. "Manual de capacitación: Certificación de calidad de los alimentos orientada a sellos de atributos de valor en países de América Latina." Food and Agriculture Organization, Rome.

Procolombia. 2018. "Avocado in Colombia." Available at https://www.slideshare.net/grupoterravocado/hass-avocado-indistry-in-colombia-procolombia-2018.

Ponzio, C., R. Gangatharan, and D. Neri. 2013. "Organic and Biodynamic Agriculture: A Review in Relation to Sustainability." *International Journal of Plant & Soil Science:* 95–110.

Prunello, J. 2014. "El rol de las organizaciones de promoción comercial en la internacionalización de las Pymes." *Revista de la Bolsa de Comercio de Rosario* 1521 (January).

Qian, L., A. Sarkar, H. Wang, and X. Wang. 2021. "Evaluating the Impacts of Smallholder Farmer's Participation in Modern Agricultural Value Chain Tactics for Facilitating Poverty Alleviation. A Case Study of Kiwifruit Industry in Shaanxi, China." *Agriculture* 11: 462. https:// doi.org/10.3390/agriculture11050462

Quilloy, K. P. 2015. "Empowering Small Farmers through Cooperative: The Success Story of Subasta Integrated Farmers Multi-Purpose Cooperative." *International Review for Management and Business Research* 4(1): 361–75. Available at https://www.icoped.com/uploads/8/0/9/0/80907692/irmbr_quilloy.pdf

Radi, C., and P. Ramírez. 2006. "El abc para la comercialización directa de cocoa especial and con certificación." GTZ, Corpe, MAG, Udenor, Amaznor.

Rao E.J.O., and M. Qaim. 2011. "Supermarkets, Farm Household Income, and Poverty: Insights from Kenya." *World Development* 39(5): 784–96.

Rao E.J.O., M. Qaim, and B. Brummer. 2012. "Farmer Participation in Supermarket Channels, Production Technology, and Efficiency: The Case of Vegetables in Kenya." *American Journal of Agricultural Economics* 94(4): 891–912.

Rapsomanikis, G. 2015. "The Economic Lives of Smallholder Farmers. An Analysis Based on Household Data from Nine Countries." Food and Agriculture Organization, Rome. Available at https://www.fao.org/3/i5251e/i5251e.pdf.

Reardon, T., C.B. Barrett, J.A. Berdegué, and J.F.M. Swinnen. 2009. "Agrifood Industry Transformation and Small Farmers in Developing Countries." *World Development* 37(11): 1717–727. https://doi.org/10.1016/j.worlddev.2008.08.023.

Reardon, T., and L. Flores. 2006. "'Customized Competitiveness' Strategies for Horticultural Exporters – Central America Focus with Lessons from and for Other Regions." *Food Policy* 31(6): 483–503.

Redrado, M., and H. Lacunza. 2004. "Una nueva inserción comercial para América Latina." Disclosure Document IECI-02, INTALITD, Buenos Aires. Available at https://publications.iadb.org/publications/spanish/document/Una-nueva-inserci%C3%B3n-comercial-para-Am%C3%A9rica-Latina.pdf.

Reganold, J.P., and J.M. Wachter. 2016. "Organic Agriculture in the Twenty-first Century." *Nature and Plants* 2. https://doi.org/10.1038/NPLANTS.2015.221.

Rehman, F.U., and A.A. Noman. 2021. "Does Infrastructure Promote Exports and Foreign Direct Investment in Selected Southeast Asian Economies? An Application of Global Infrastructure Index." *Journal of Economic Studies* 48(7): 1346–370. https://doi.org/10.1108/JES-03-2020-0123.

Rehman, F.U., A.A. Noman, and Y. Ding. 2020. "Does Infrastructure Increase Exports and Reduce Trade Deficit? Evidence from Selected South Asian Countries Using a New Global Infrastructure Index." *Journal of Economic Structures* 9(1): 10. https://doi.org/10.1186/s40008-020-0183-x.

Ritchie, H., and M. Roser. 2020. "$CO_2$ and Greenhouse Gas Emissions." OurWorldInData.org. Available at https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions.

Rius, A. 2015. "Mandatory Livestock Traceability as a Catalyst for Knowledge Intensive Services in Uruguay." IDB Discussion Paper 376. Inter-American Development Bank, Washington, DC.

Robertson, A., and J. Eather. 2020. "Market Access Improvements: A Case Study of Stone Fruit Exports to China." *Agricultural Commodities* 10(1): 60–67. Available at https://search.informit.org/doi/abs/10.3316/informit.058563447290975

Rodale Institute. 2014. "Regenerative Organic Agriculture and Climate Change. A Down-to-Earth Solution to Global Warming." Rodale Institute, Kutztown.

Rodrik, D. 2015. "Premature Deindustrialization." John F. Kennedy School of Government, Harvard University, Cambridge, MA.

Rosa-Schleich, J., J. Loos, O. Mußhoff, and T. Tscharntke. 2019. "Ecological-Economic Trade-Offs of Diversified Farming Systems – A Review." *Ecological Economics* 160 (June): 251–63. https://doi.org/10.1016/j.ecolecon.2019.03.002.

Rosati, A., R. Borek, and S. Canali. 2021. "Agroforestry and Organic Agriculture." *Agroforestry Systems* 95(5): 805–21.

Sabel C., and P. Ghezzi. 2021. "The Quality Hurdle: Towards a Development Model That Is No Longer Industry-Centric." Columbia University. Available at http://www2.law.columbia.edu/sabel/papers/QualityHurdle_May-10-2021.pdf.

Sabel, C.F., and J. Zeitlin. 2012. *Experimentalist Governance*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199560530.013.0012.

SAGARPA (Secretaria de Agricultura, Ganaderia, Desarrollo Rural, Pesca y Alimentacion). 2018. Available at: http://www.agricultura.gob.mx/catalogos/sagarpa-2018.

Salazar, L., A. Maffioli, J. Aramburu, and M. Agurto. 2016. "Estimando los impactos de un programa de erradicación de la mosca de la fruta en Perú. Un enfoque de regresión discontinua geográfica." Inter-American Development Bank, Washington, DC.

Salvatici L., and S. Nenci. 2017. "New Features, Forgotten Costs and Counterfactual Gains of the International Trading System." *European Review of Agricultural Economics* 44(4): 592–633.

Sánchez, E. 2020. "Programa Nacional Frutales: Superficie ocupada por plantaciones frutales en el país and cambios en su estructura productiva." INTA Ediciones.

Schenkelaars P., H. de Vriend, and N. Kalaitzandonakes. 2011. "Drivers of Consolidation in the Seed Industry and Its Consequences for Innovation." Comission of Genetic Modification, Bilthoven.

Senasa. 2018. "El rol del SENASA en la apertura de mercados internacionales." Available at http://www.senasa.gob.ar/senasa-comunica/noticias/el-rol-del-senasa-en-la-apertura-de-mercados-internacionales.

Skiba, U., and R.M. Rees. 2014. "Nitrous Oxide, Climate Change and Agriculture." *CAB Reviews* 9(010): 1–7.

Smith, P., H. Clark, H. Dong, E. A. Elsiddig, H. Haberl, R. Harper and F. Tubiello. 2014. "Agriculture, Forestry and Other Land Use (AFOLU)." In *Climate Change 2014: Mitigation of Climate Change*. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Soriano, B., and A. Garrido. 2015. "The Role of Private Sector in Development: The Relation between Public-Private Investment in Infrastructure and Agricultural Exports in Developing Countries." *Economía Agraria and Recursos Naturales* 15(2): 93–117.

Stubrin, L., A. Marín, E. Carreras, and R. Palacín. 2021. "La cadena de valor de la fruta de pepita en Argentina: Casos de éxito exportador en mercados con crecientes oportunidades de diferenciación." Inter-American Development Bank, Washington, DC. Unpublished.

Stubrin, L., and E. Stein. 2021. "Competitividad, desarrollo productivo and mejora burocrática: El caso de la Secretaría de Simplificación Productiva de Argentina." IDB Technical Note No. 2117. Inter-American Development Bank, Washington, DC.

Swinnen, J. 2014. "Global Agricultural Value Chains, Standards, and Development." Robert Schuman Centre for Advanced Studies Research Paper No. RSCAS 2014/30.

Trần, T.T.T., T.N. Nguyễn, P.T. Nguyễn and T. Bùi. 2020. "Impact of Bank Credit on Exports to Association of South East Asian Nations Countries: Empirical Study of Vietnam." *Asia & the Pacific Policy Studies* 7(1): 27–42. https://doi.org/10.1002/app5.290.

Trigo, E. and P. Elverdin. 2019. "Los sistemas de investigación and transferencia de tecnología agropecuaria de América Latina and el Caribe en el marco de los nuevos escenarios de ciencia and tecnología." Alimentación, agricultura and desarrollo rural en América Latina and el Caribe No. 19. Food and Agriculture Organization, Santiago.

Tully, S.M., and R.S. Winer. 2014. "The Role of the Beneficiary in Willingness to Pay for Socially Responsible Products: A Meta-Analysis." *Journal of Retailing* 90(2): 255–74. https://doi.org/10.1016/j.jretai.2014.03.004.

Turinek, M., S. Grobelnik-Mlakar, M. Bavec, and F. Bavec. 2009. "Biodynamic Agriculture Research Progress and Priorities." *Renewable Agriculture and Food Systems* 24(2): 146–54. https://doi.org/10.1017/S174217050900252X.

UN (United Nations). 2017. *Trade Facilitation and Paperless Trade Implementation: Global Report 2017.* Geneva: UN.

____. 2019. "World Population Prospects 2019." Revision 1. Population Division, Department of Economic and Social Affairs. Available at https://population.un.org/wpp/.

UN (United Nations) and High Level Task Force 2015 on Food and Nutrition. 2015. "The Zero Hunger Challenge – Advisory Note for Action: All Food Systems are Sustainable." UN, Geneva. Available at https://www.un.org/en/issues/food/taskforce/wg3.shtml.

UNEP (United Nations Environment Programme). 2016. "A Snapshot of the World's Water Quality: Towards a Global Assessment." UNEP, Nairobi.

USDA (U. S. Department of Agriculture) and Food Loss and Waste Liaison. 2021. "Why Should We Care about Food Waste?" USDA, Washington, DC. Available at https://www.usda.gov/foodlossandwaste/why.

USDA (U. S. Department of Agriculture). 2021a. Foreign Market Development Program (FMD). USDA, Washington, DC. Available at https://www.fas.usda.gov/programs/foreign-market-development-program-fmd.

____. 2021b. Quality Samples Program (QSP). USDA, Washington, DC. Available at https://www.fas.usda.gov/programs/quality-samples-program-qsp.

____. 2021c. "Technical Assistance for Specialty Crops (TASC)." Available at https://www.fas.usda.gov/programs/technical-assistance-specialty-crops-tasc.

Valdivia, G., N. Vera Villanueva, and F. Valdivia Bondarenko. 2021. "Estrategias empleadas por pequeños productores de quinua real para llegar al mercado agroalimentario global." Inter-American Development Bank, Washington, DC. Unpublished.

Villa Alves, F., R. Giolo de Almeida, and V. Laura (eds.). 2015. "Carne carbono neutro: um novo conceito para carne sustentável produzida nos trópicos." EMBRAPA Gado de Corte, Campo Grande, MS.

Volpe, C. 2010. "Odyssey in International Markets: An Assessment of the Effectiveness of Export Promotion in Latin America and the Caribbean." Special Report on Integration and Trade. Inter-American Development Bank, Washington, DC.

____. 2017. "Cómo salir del laberinto fronterizo: Una evaluación de las iniciativas de facilitación de comercio en América Latina and el Caribe." Informe Especial sobre Integración and Comercio. Inter-American Development Bank, Washington, DC.

Von Hesse, M. 1994. "Políticas públicas and competitividad de las exportaciones agrícolas." *Revista de la CEPAL* 53 (August).

Vos, R., and L. Bellù. 2019. "Global Trends and Challenges to Food and Agriculture into the 21st Century." In *Sustainable Food and Agriculture,* edited by C. Campanhola and S. Pandey. Rome: Elsevier and Food and Agricutlrue Organization. https://doi.org/10.1016/B978-0-12-812134-4.00002-9.

Wang, H., X. Wang, A. Sarkar, and L. Qian. 2021. "Evaluating the Impacts of Smallholder Farmer's Participation in Modern Agricultural Value Chain Tactics for Facilitating Poverty Alleviation—A Case Study of Kiwifruit Industry in Shaanxi, China." *Agriculture* 11(5): 462. https://doi.org/10.3390/agriculture11050462.

Willer, H., and L. Kilcher. 2011. *The World of Organic Agriculture: Statistics and Emerging Trends*. Geneva: Research Institute of Organic Agriculture and Organics International.

Willer, H., and J. Lernoud. 2021. *The World of Organic Agriculture: Statistics and Emerging Trends.* Geneva: Research Institute of Organic Agriculture and Organics International.

WTO (World Trade Organization). 2016. *Trade Finance and SMEs: Bridging the Gaps in Provision*. Geneva: WTO.

———. 2021. "Regional Trade Agreements Database." Available at http://rtais.wto.org/UI/PublicMaintainRTAHome.aspx.

WTO (World Trade Organization), UNCTAD (United Nations Conference on Trade and Development), and ITC (International Trade Centre). 2021. *World Tariff Profiles 2021*. Geneva: WTO.

Zelicovich, J. 2020. "Anatomía de las instituciones de la política comercial externa: Estudio de casos." IDB Technical Note No. 1851. Inter-American Development Bank, Washington, DC.