Chapter 21

Fresh Cherry Industry in Chile

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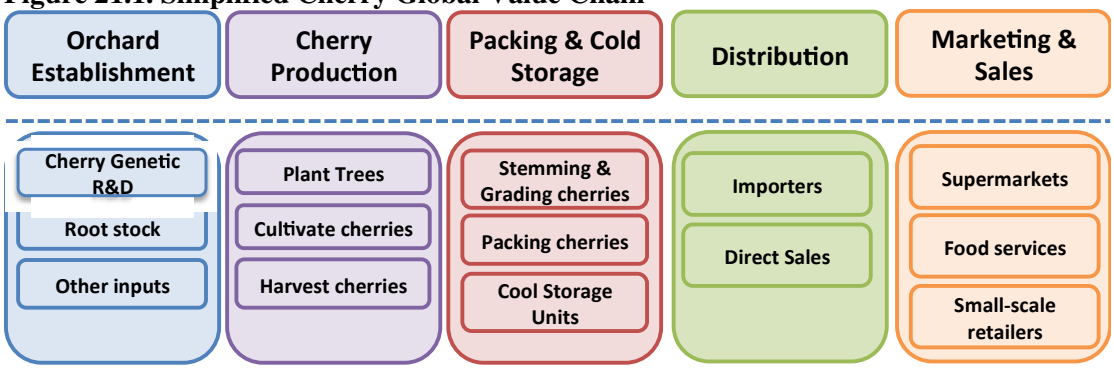
21.1. Industry Overview

The growth of global value chains in the fresh fruit sector over the past three decades has resulted in its increased industrialization, with sophisticated packing plants and highly efficient logistics operations becoming key tenants of competitiveness. The recent evolution of the cherry sector illustrates these changing dynamics. Although a highly perishable product with a considerable quality premium, distant inter-regional trade of fresh cherries has grown significantly over the past fifteen years thanks to the incorporation of new handling and packaging technologies and services.

In 2013, global trade in fresh cherries reached US$1,5 billion, up from US$0.5 billion in 2003 (UN Comtrade, 2015).[2] The Asia Pacific region plays a central role in the global industry, accounting for approximately half of both demand and supply.[3] The two largest cherry exporters are the United States and Chile, accounting for 29% and 27% of world exports respectively.[4] China is the single largest market, accounting for one third of all fresh cherry imports. The Asian markets demand not only high volumes, but also high quality fruit, despite an estimated 30-45 days for container shipment. This places increased emphasis on the need for effective production, packaging and logistics solutions as well as efficient distribution and sales channels. Figure 21.1 illustrates a simplified cherry global value chain.

Figure 21.1. Simplified Cherry Global Value Chain



Source: Authors

Chile is one of the few producing economies with primarily export-driven cherry production, with less than one in four cherries being sold in the domestic market (Fresh Fruit Portal, 2013). Chilean cherry export growth has been driven by the sector's ability to rapidly scale up volumes and produce high quality fruit. The sector began to expand in 2000 in response to opportunities arising from increased demand from China (FreshPlaza, 2015); by 2014, exports had reached 100 thousand tonnes, and the value per kilogram of Chilean cherries was almost twice the global average.[5] Exports are projected to

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[2] All UN Comtrade statistics are based on calculations using 2013 import data, using product code HS-080929.

[3] In 2013, APEC member economies accounted for 63% of all imports and 67% of all exports.

[4] Turkey is the world's third largest cherry exporter, with an 11% market share. The majority of its exports are destined to intra-regional trade in the European Union.

[5] The global average price per kilogram in 2013 and 2014 was US$4.37 and US$4.65 respectively. Chile earned US$6.03 and US$7.27 during these years. New Zealand captured the highest value with US$11.53/kg in 2014 (UN Comtrade, 2015).

increase by a further 50 thousand tonnes by 2018 as the result of aggressive expansion of producer orchards (FreshPlaza, 2015). With the economy's orchard expansion outpacing that of rival, US, this would make Chile the world's largest cherry exporter.

21.2. Background information on the firm[6]

The firm represented in this case is one of Chile's top five fresh fruit exporters. In addition to cherries, the company exports a diverse range of fruits, including apples, avocados, blueberries and grapes to over 50 different markets in the Americas, Asia, Europe and the Middle-East and North Africa. Although its core business is its export operations dominated by large number of packing plants in Chile and Peru, the firm also cultivates fresh fruit through production owned by its business partners, in addition to running large contract grower operations. This model allows the company to guarantee its supply.

With over thirty years of experience, the privately owned Chilean firm has operated under an export-oriented strategy since its inception. It began producing cherries for export in 2008, and had expanded to almost 10 different varieties by 2015. Together with blueberries, cherries are one of the highest value fruits exported by the company and returns can be as much as four times that of the production of other staple exports, such as apples. Two thirds of the firm's cherry exports are destined to the Chinese market, followed by North America and the United Kingdom.

All of the firm's cherry exports are destined for the fresh cherry market due to its high quality. While cherries can be processed – including frozen, canned, and preserved such as the popular maraschino cherry used in cocktails around the world, the firm does not carry out these activities and its products are directed exclusively to the fresh cherry market. Fresh cherries can be sold for 70-100% more than cherries destined for processing and even lower quality fruit, which is sold on the domestic market, nets higher prices than that offered by processing firms.

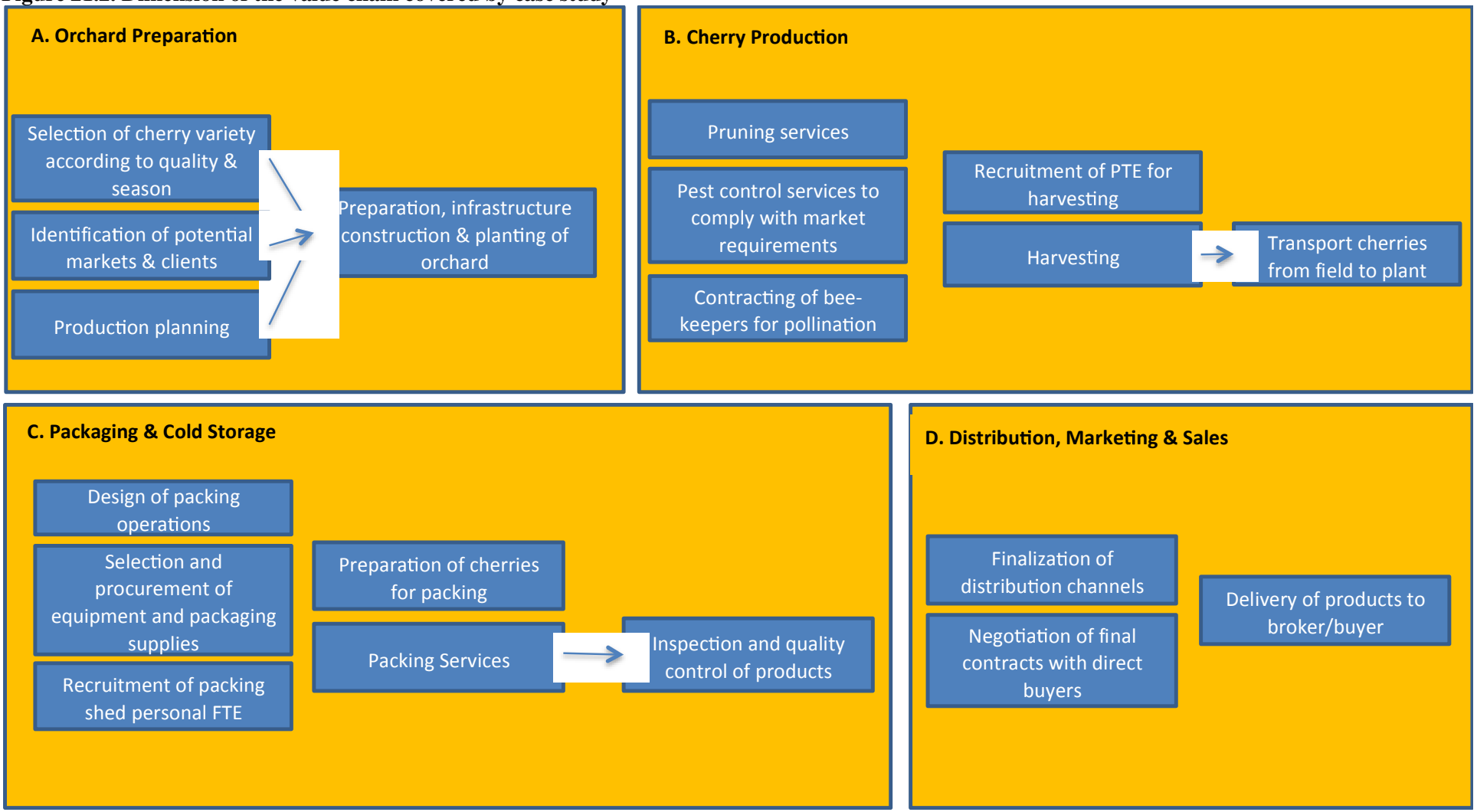
21.3. Description of the Value Chain

This case study will focus on the firm's Chilean operations, which accounts for the majority of the firm's exports and all cherry exports. The product of focus for this study is fresh cherries, including both sweet and sour varieties. These products are grown over a 700 km stretch, from Santiago in Central Chile to Osorno in the South.

For the purposes of this study, the value chain is considered to begin with research and development in both genetics and field performance of different varieties, this is followed by orchard establishment, cherry production, packaging, distribution and marketing.

[6] All information about the firm in this case study is from its corporate website as well as from the interview.

Figure 21.2. Dimension of the value chain covered by case study



Source: Authors

R&D and Pre-Orchard Establishment

The first stage in the cherry global value chain is the development and selection of cherry variety. The firm works with several different varieties including Bing, one of the most highly demanded cherry types, and is continuously experimenting with new alternatives to improve production. The development and selection of the right variety of cherry for production underlies two key aspects of competitiveness in international cherry trade – fruit quality and seasonality. **Fruit quality** in key markets is determined by size, color, taste and the absence of blemishes. Higher quality fruit nets higher prices. Prices, however, are also determined by when the fruit enters the market, that is, its **seasonality**. While consumers are often unaware of the differences between the varieties beyond sweet and sour, different cherry varieties perform differently according to the specific climatic and geological conditions in which they are grown. Thus, significant research and testing must be undertaken prior to the plantation of a commercial orchard to ensure quality production and that harvest can be planned to optimize installed packing plant capacity and meet peaks in market demand.

At this stage, the firm provides extensive information on new varieties, their performance characteristics and the firm's projected demand to its outgrowers who then independently determine whether or not to produce these varieties. Once the cherry varieties are selected, the land and rootstock must be prepared and planted and irrigation and roofing infrastructure installed. Due to the impact of rain on the final quality of cherries – which can lead to losses of 30% of the crop, roofing of the cherry trees has become essential. Newly planted orchards then take some four to five years to reach maturity and their average productive lifespan is 30-35 years.

Cherry Production

Production has four key annual steps required for orchard optimization: pruning, pest control, pollination and harvesting. Other ongoing operations include irrigation and fertilization. Pruning must be undertaken once a year to ensure maximum commercial harvesting heights. Pest control is essential to ensure fruit quality and minimize the spread of disease. Pollination of cherry blooms is actively managed through the presence of beehives in the orchards which can increase production by over 50%. Finally, the cherries are harvested by hand to protect against damage before being transported to the packing plant. While hand-picking the cherries makes this a particularly labor intensive activity, mechanized harvesting has not yet evolved sufficiently to protect the fruit from damage which undermines its arrival quality in long-distance shipping.

Packing, Cold Chain Management and Logistics

During the packing stage, fruit is first hydro-cooled and fumigated to slow ripening and kill any spores upon entry from the field. It is then cleaned, stems are checked and the fruit is graded before being packaged for exports. While in early days of exporting, these operations were done by hand, today, the firm's packing operations have been mechanized. Mechanization of washing and checking of stems, combined with electronic grading has significantly improved the firm's productivity. The shift from manual to mechanized packing plant operations can increase volumes by a factor of 5. This is essential given the increased volume of fruit being produced each year. This equipment represents a particularly high barrier to entry, as it is expensive, requires economies of scale in production and is highly specific to cherries, meaning that it is only used for a few months of the year during the harvest season.

The cherries are first packaged into own-brand bags and placed into 5kg cardboard boxes which are then loaded into refrigerated containers or trucks for transport to the port. Unlike other fruit such as apples and grapes, cherries cannot be kept in cold storage. Normally, cherries must be consumed between 7 to 10 days following harvest, limiting firm exports to regional markets;[7] however, the specialized 'modified atmosphere' packaging used by the firm slows ripening considerably and allows for the fruit to maintain its quality during long-distance shipping. This increases the fruit's shelf life to up to 60 days, and when combined with effective cold chain management, this essentially allows exporters to reach any global market.

Prior to shipping, however, the fruit must be certified to ensure that it meets the sanitary and phytosanitary requirements of the different markets. These requirements are particularly strict in the United States and Europe. As a result of this, over the past decades, the packing plants have become pristine operating environments, akin to clean manufacturing factories in other industries.

Distribution, Marketing and Sales

Cherries are sent by road from the packing plants to one of a number of ports in Chile; early season cherries to China, for example, are shipped by air and can net prices as high as US$20 per kilogram; while mid-season volumes are shipped by sea. The majority of the fruit is shipped in refrigerated containers, which has drastically facilitated the export of fruit, by allowing mixed containers of different fruit to be sent to different markets. As a fruit exporter with multiple different fresh products, the firm is thus able to bundle sales of a variety of fruits for different clients, providing it with a definite competitive advantage over single product exporters. Given the high demand for cherries, mixing cherries exports provides the firm with leverage for the sale of commodity products such as Red Globe grapes.

The firm utilizes a range of different distribution and marketing channels depending on the market. There are three primary models: In the first model, the firm manages **direct sales** to supermarkets, this is common for very big buyers such as Wal-mart; in the second model, the firm ships to **independent importers** or brokers who arrange commercial agreements with other sales points, from wholesale operations to small greengrocers. This is a common distribution method in China. Under the importer model, the importer charges an 8% fee over the sales value to place fruit in the retail market.[8] In the third model, the firm **owns the importer in the destination** economy, either exclusively or as part of a joint venture with other fruit exporters. This model is more common in the EU. As the product is largely a high value commodity, minimal branding or marketing is undertaken to promote the sale of the fruit.

Logistics and distribution plays a fundamental role in ensuring that the firm's fruit earns high prices and meets client needs; a glut of fruit on the market will depress prices, while there are certain high demand dates for which the firm must ensure correspondingly large volumes are shipped – such as that for the Chinese New Year in early February. As mentioned earlier, this requires integrated planning from orchard locations, through production processes such as pruning to harvesting schedules, but is fundamentally dependent on logistics operations and the speed with which importers or brokers can place the product in the market. Any hold ups in the system, such as customs delays or problems with a broker, can upset this balance and result in millions of dollars of losses.

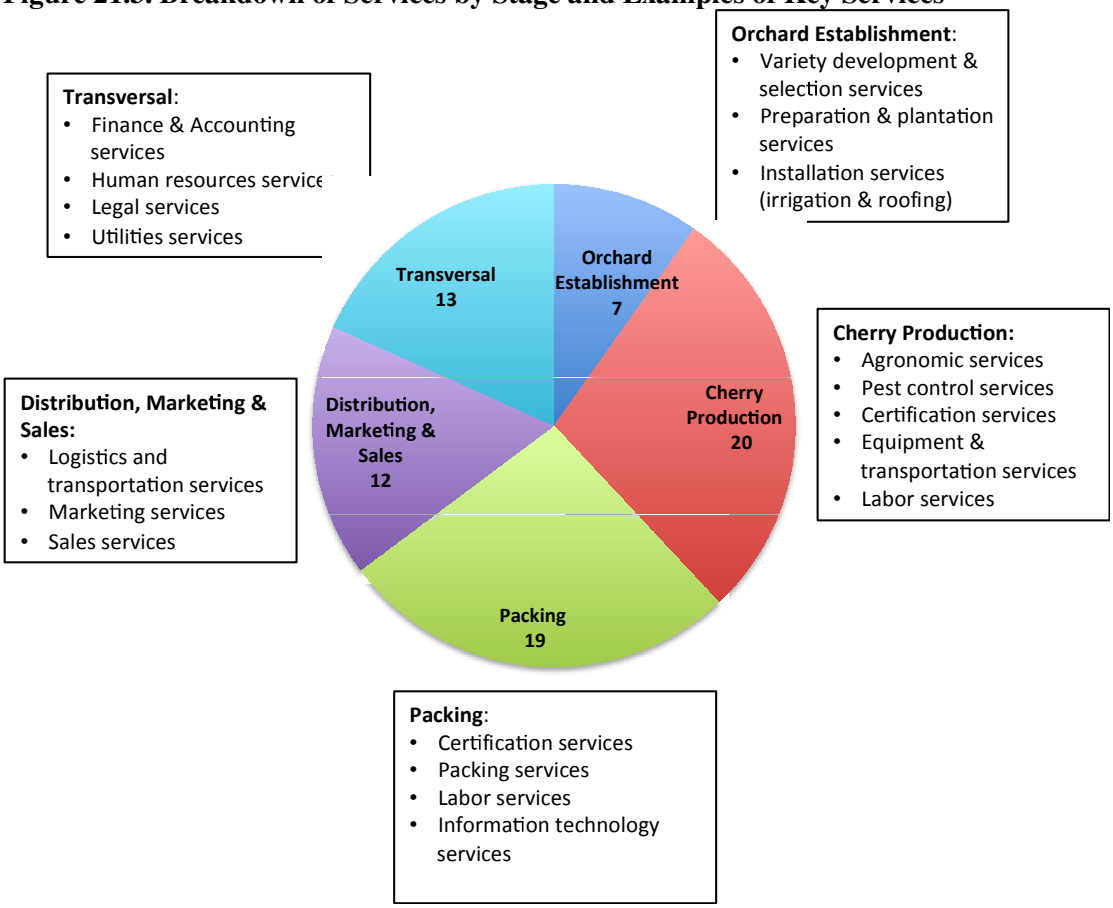
[7] Even shipping from Chile to the United States takes approximately 14 days.
[8] Discounting arrival expenses.

21.4. Services along the Value Chain

Services identification and value contribution

The cherry global value chain has a very high incidence of services. A total of 71 services, which have been further disaggregated into 88 separate services (see Figure 21.3) are identified in this value chain and they are categorized according to the various stages within the chain: i) orchard establishment services, ii) services during cherry production, iii) packing services, iv) distribution and marketing services, and v) transversal services.

Figure 21.3. Breakdown of Services by Stage and Examples of Key Services



Source: Authors based on firm interview

These services are discussed below according to the respective stage of the value chain.

Orchard Establishment Services

The primary services required in the establishment of a new orchard include variety testing and selection, the plantation of the orchard and the construction of the related infrastructure such as roofing and irrigation. Of these, only variety selection is carried out in-house, performed together with affiliated cherry production by the company's owners. The firm's technical department sources and experiments with different varieties in nurseries hosted by these producers to identify combinations that optimize production. Variety development itself is mostly carried out by specialized companies in California, U.S. and the producers pay royalties according to areas planted and yields. The firm negotiates these royalties on behalf of both their in-house production and their outgrowers.

Cherry Production Services

During cherry production, the firm provides technical assistance, and production and harvest supervision to its outgrowers. There are 50 agronomists on staff in charge of these activities,[9] while additional external technical assistance is hired when highly specialized knowledge is needed. The firm also provides financial services to its outgrowers. With years of experience with outgrower operations, it has strong in-house knowledge of outgrowers' potential to deliver quality production, and thus their capacity to repay loans. This allows the firm to provide more competitive lending rates to producers.

Other services hired by producers include consulting services regarding pesticide application and standards compliance; beehive rental for pollination; post-harvest quality analysis; information technology for precision agriculture; sub-contracting of labor and related services such as medical and catering during labor-intensive periods of pruning and harvesting; security services; weather advisories; transport services and renting machinery for harvest amongst others. These services are all outsourced to third party providers.

Packing Services

In the packing stage of the value chain, key services required include packaging selection, certification (public & private), quality and residue testing, information technology, equipment maintenance and cleaning, human resources services such as recruiting, training, transportation, medical provision, and catering. The firm outsources the majority of these operations to specialized service providers such as laboratories for quality testing and the United States Department of Agriculture (USDA) for approval for exports to the US.[10] However, it also partially outsources others and maintains in-house capacity to support day-to-day operations. For example, training is provided in-house where possible, but when new certifications are required for new buyers, external trainers are contracted. Regular equipment maintenance and cleaning is undertaken by an internal maintenance department; however, specialized repairs are outsourced.

While the firm owns two dedicated packing plants for cherries, they also rent a third plant, as well as cold storage facilities during the peak of the season. Interestingly, outsourcing of packing of cherries is also becoming more frequent. Indeed, the firm uses these services to manage peak periods when their in-house packing plants do not have enough capacity. In these cases, the contracted packing plant operates as a turn-key facility – that is, they must have all certifications and quality control in place. The exporter provides the cherries, packaging and specifications.

The Chilean sanitary and phytosanitary agency, SAG (*Servicio Agrícola y Granadero),* must certify all exported produce to ensure it meets regulatory requirements for its different markets. The USDA also has operations in the packing plant and provides certification for produce destined for the US market.

Distribution, Marketing & Sales Services

Due to the seasonality of the products, the firm does not have an internal transportation fleet, as this would lie idle for part of the year. Transportation options are widely available in the Chilean market. While the shipping industry in Chile is quite competitive due to the economy's high export volumes, economies of scale are important to manage costs, as these are approximately the same as production costs. Thus, the firm has established a company together with other leading exporters in the industry to negotiate shipping rates. This affiliated operation has developed sophisticated software which allows it to aggregate export volumes across firms and thus to determine the optimum arrangements for shipping companies, routes, and methods for fresh produce based on the exported product and destination market. This service is also

[9] These agronomists work with producers of all fruits, not only cherries.

[10] Indeed, the USDA rents a space within the firm's packing plants to carry out its certification for export.

sold to other exporters in Chile. With their ability to negotiate lower prices at different stages of the logistics operations, combined with online customs clearance procedures, the firm does not use bundled logistics services as these are more expensive.

The principal services in the marketing and sales segments of the value chain are logo and packaging design and market research, combined with commercial operations needed to identify new clients and managing these relationships. The firm outsources market research services, while all commercial operations are carried out in-house. Market research and marketing in Chile's fruit export sector is almost exclusively carried out by the Association of Fruit Exporters (ASOEX) and ProChile, Chile's export promotion agency. This is the result of limited differentiation of the final product.

Transversal Services

In addition to services provision in each segment of the value chain, there are a number of transversal services that support the firm's day-to-day operations. These services include finance and accounting, human resource management and are primarily managed in-house. The most important service that is outsourced is the provision of the SAP information systems used for managing production, logistics and inventories. Legal services for negotiating contracts are also outsourced.

Outsourcing, Bundling and Other Aspects of Services Supply

Among the 88 individual services identified in this value chain, our analysis estimates 12 services are supplied in-house, 32 are partially outsourced, while 44 are fully outsourced (see Table 21.1). This is illustrative of the aggressive outsourcing strategy for services followed in the sector.

Table 21.1. Breakdown of Services Provision, by Value Chain Stage

Stage of Value Chain	In-House	Partially Outsourced	Fully Outsourced
Orchard Establishment	2	0	5
Production	1	11	9
Packing	0	14	8
Distribution, Marketing & Sales	2	2	9
Transversal	7	5	13
Total	**12**	**32**	**44**

Note: Services performed by affiliated companies are included as 'in-house' services in this analysis.
Source: Authors based on interviews

Generally, the firm's reasons for outsourcing are driven by its overall strategy to focus on its core competencies and maintain its fixed operations as efficient and knowledge intensive as possible, operating in the highest value segments within the Chilean context. This is essential given relatively low margins, high costs of equipment and a short production season.[11] The sophistication and maturity of the fruit export sector in Chile means that local knowledge and services are widely available at competitive prices either independently or through affiliated firms, thus facilitating a high degree of services outsourcing and allowing the firm and its peers to focus on their core competencies. Furthermore, given the maturity of the fruit export sector, service providers have become increasingly specialized, and there has been a tendency away from bundled service packages. This is highlighted in the firm drawing on a limited number of bundled service operations.

[11] The cost of Installation of one equipped packing plant can be as high as US$20 million.

Those services provided in-house are focused principally on the firm's core competencies: sourcing fruit at the right time and right quality, packing and placing the products in their key markets, as well as transversal services. Partially outsourced services are generally those that have a day-to-day aspect in addition to specialized services needs, as well as those with in-house supervision or control of quality and specifications, with external services suppliers for the bulk of the work. The firm has a total of 400 full time employees. 120 of the full time staff are in administrative, commercial, and management (15) positions or product specialists (50) providing technical assistance in production operations. The remaining 280 are in operations, including machine and cold room operators. The firm has an estimated 2,000 seasonal employees on staff during peak periods. Seasonal employees primarily work on the packing lines in the pack house and many of these are sub-contracted.[12]

As noted in Table 21.1, individual decisions to outsource are largely based on (1) efficiencies and economies of scale, such as transport services (2) access to specialized equipment & skills, (3) collective provision of services through industry association and public institutions, (4) independent audits and government regulations (5) network economies, such as recruitment services and; 6) lack of feasibility in supplying services in-house, such as utilities services.

21.5. Policies Affecting the Value Chain

An important component of this study is the analysis of how policies, both government and private, impact the value chain discussed here, and hopefully, identify areas of improvements (see Appendix A). This firm faces few policy challenges, for example, in trade policy (customs and logistics) and even in labor policies. This is due to the fact that Chile's policy environment is well-oriented to fruit exports, thanks to over thirty years of experience in the export sector. Furthermore, as one of Chile's largest fruit exporters, the firm is well positioned to both influence and comply with regulations in the economy.

Export-oriented policies

Chile's fresh fruit exports have benefited to a great degree by the consistent export-oriented trade policies that have been implemented over the past few decades. By 2013, Chile had 22 free trade agreements with 60 economies, providing access to 60% of the world's consumers (Murray, 2013). ProChile and DIRECOM (*la Dirección General de Relaciones Económicas Internacionale*s), together with the National Agriculture and Livestock Agency (SAG) have actively worked to open markets for the economy's produce. ProChile and DIRECOM have been vital in terms of leading negotiations in reduction of quotas and tariffs. SAG is particularly proactive in ensuring compliance with SPS standards around the world. Indeed Chile's domestic standards are considered to be world-class which facilitates access to most global markets.[13] Measures implemented and closely monitored by SAG guard against the entry of plant disease at all borders, and they work actively with all producers and exporters to ensure disease and pest control in the fields and packing plants. This helps both to reduce use of pesticides and ensures import destinations of the disease-free nature of Chilean fruit. As a result of these efforts all major markets are open for all of Chile's fruit – including cherries and blueberries.

[12] Many of these workers also work with the firm in the packing plants for other products during other periods of the year.

[13] In addition, SAG collaborated with the United States Department of Agriculture to allow Chilean exporters to participate in the APHIS-USAID Pre-Clearance Program which clears Chilean produce for import into the United States before it even leaves the pack-house (SAG, 2015).

Institutionalization

Strong levels of institutionalization have proven very helpful to ongoing sector growth. The Association of Fruit Exporters (ASOEX) is a particularly strong organization. Representing 96% of all fruit exports, the organization provides a range of services from developing inputs for free trade agreement negotiations and managing public good issues such as research in packing techniques, disease, labor issues, certification and SPS problems, to carrying out a range of marketing services such as market research and promotion of Chilean produce in key international shows. Members pay a quota proportional to their exports. The organization works closely with both public and private sector actors to resolve issues affecting the industry. The organization has also been proactive in ensuring Chilean producers can easily meet private standards in key export markets. For example, the organization was instrumental in the creation of ChileGAP. ChileGAP is considered equivalent to the private GlobalGAP certification required by many large buyers in the EU and US markets.[14] Allowing producers to receive certification under the ChileGAP regulations, rather than requiring audits by GlobalGAP made certification significantly more affordable for even small producers.

Efficient logistics: competitive transportation, modern ports, and streamlined customs operations

While transportation costs from Chile are invariably high, given the distance from major markets, logistics costs are lower than in many other competitor economies. High import and export volumes and a liberalized transportation sector have fostered competition amongst logistics providers, which have helped to reduce costs. The modernization of the Chilean ports following their privatization, which began in the late 1990s, has significantly contributed to the economy's capacity to rapidly export large quantities of perishable products. There are a large number of airports and ports (8-10) in Chile today that are designed to handle these products, from Coquimbo in the North to Chile Chico in the South. This means that no fruit has to travel more than 250km by land before reaching the port. This helps reduce transportation cost, potential delays and maintain the quality of the fruit. Online processing with the implementation of the single-window system has improved the efficiency of customs clearance, reducing unnecessary delays at the ports. However, strikes amongst customs officials remain a key challenge which affects not only cherries but the export of Chile's wide variety of fresh products from fruit to mussels and salmon. These have occurred on a more regular basis in recent years. These strikes upset the streamlined operations, and can result in losses of millions of dollars in perishable produce (Fresh Fruit Portal, 2013).

Human capital development & labor regulations[15]

Efforts in terms of human capital development and labor regulation have been key in facilitating growth. Training efforts have been focused on driving productivity, led on one hand by tax incentives through the National Training and Employment Agency (SENCE), and on the other by the ChileValora program – a joint initiative between the Ministries of Economy, Education,

[14] ChileGAP was validated in 2008 by GlobalGAP. It was the first national standards to be accepted as equivalent to the demanding private standard.

[15] For a discussion of how workforce development initiatives have contributed to the upgrading of the fruit industry in Chile, see Fernandez-Stark, K et al. (2010). Workforce Development in the Fruit and Vegetable Global Value Chain. In G. Gereffi, K. Fernandez-Stark & P. Psilos (Eds.), *Skills for Upgrading: Workforce Development and Global Value Chains in Developing Countries*. Durham: Center on Globalization Governance & Competitiveness and RTI International.

Labor and Social Security and the private sector. SENCE provisions incentivize firms to individually and collectively develop training programs specially to meet the needs of the industry. The ChileValora program is a competencies-based certification system launched at the end of the 1990s that certifies every job profile required for the industry, from equipment operation to packing of fruit for export (Fernandez-Stark et al., 2011). In addition to increased productivity, flexible labor regulation, which permits subcontracting of labor, has allowed the industry to maintain its competitiveness by relying on temporary contracts to meet peak periods of demand during the year. The introduction of childcare facilities also supports the participation of women in the packing plants.

R&D and variety development

As the industry has demonstrated success in cherry production, policies have also been put in place to improve productivity and constantly upgrade packing technologies to ensure freshness. Public-private partnerships such as that between Chile's Agricultural Research Institute (INIA, *Instituto de Investigacion Agropecuaria*) and ASOEX co-finance this research. Several competitive grant funds are available to carry out research for the fruit export sector, many of which are financed through the Fondo de Inversion para la Competitividad (InnovaChile). The Universities play a central role in applied research through the provision of services to the industry. Despite advances in terms of adjusting varieties to the Chilean context, additional efforts are still required in supporting research in the development of new varieties. Although INIA has made strides in developing new grape varieties, no work is yet being undertaken to develop new cherry varieties.

Moving forward

This case study presents a cherry producer-exporter's perspective on the importance of services in its operations. Policies clearly impact the firm's access to and use of services, as well as its ability to provide them. To date, strong efforts by the Chilean government, combined with significant collaboration by industry actors, from concentrated, economy-wide efforts in promoting Chilean fruit abroad, to trade facilitation and logistics improvements, have supported the growth of the sector. Continued collaboration between the government and private sector and research and educational institutions will further support the sector's consolidation.

In particular, this collaboration over policies affecting services provision is required with respect to labor regulation, innovation and modernization of government and trade processes. First, labor flexibility have been important to the sector's competitiveness and minimizing overhead; however, this needs to be assessed against the context of job and social security, together with retention strategies to increase productivity. Second, innovation in the adaptation of foreign varieties to the Chilean context and, in the long term, development of new varieties in Chile will help to position the economy not only as a producer of cherries, but as an exporter of knowledge-intensive research services. This requires continued support for local R&D. Finally, continued streamlining of government protocols regarding licensing and export and import procedures can help support increased volumes of exports, as well as expedite payments through the value chain to the different actors from producers to their wide range of service providers.

Appendix A

Table A.1. Pre-Agro/Orchard Establishment Phase

	Service	Central Product Classification (CPC) Ver.2 Code	Supplied in-house	Outsourced to affiliated companies and reasons	Outsourced to third-party suppliers/ government and reasons	Bundled
1	Variety Development	81140 - Research and experimental development services in agricultural sciences	No	No	Yes; comparative lack of expertise	
2	Variety Selection	81140 - Research and experimental development services in agricultural sciences	Yes; in-field testing	Yes; in-field testing	No	n/a
3	Identification and Purchase of Appropriate Property for Orchards	72240 - Real estate appraisal services on a fee or contract basis	No	No	Yes; efficiencies	n/a
4	Negotiation and payment of royalties for closed varieties	85999 - Other support services n.e.c.	Yes; core strategy	No	No	n/a
5	Land Preparation and plantation of rootstock	86119 - Other support services to crop production	No	No	Yes; efficiencies	n/a
6	Construction of orchard infrastructure (roofing, etc)	86119 - Other support services to crop production	No	No	Yes; efficiencies	n/a
7	Installation of irrigation equipment	54234 - General construction services of irrigation and flood control waterworks	No	No	Yes; efficiencies & specialized skills	n/a

Source: Compiled by Authors based on firm interview

Table A.2. Cherry Production

	Service	Central Product Classification (CPC) Ver.2 Code	Supplied in-house	Outsourced to affiliated companies and reasons	Outsourced to third-party suppliers/ government and reasons	Bundled
8	Production Management	83115 - Operations management consulting services	Yes	No	Yes; access to specialized knowledge	No
9	Certification of Operations for Private Standards	83115 - Operations management consulting services	Yes; for recertification	No	Yes; for new certifications	No
10	Certification for Public Sanitary and Phytosanitary Standards	91131 - Public administrative services related to agriculture, forestry, fishing and hunting	No	No	Yes; government services	No
11	Disease and plague control	86119 - Other support services to crop production	Yes; application	No	Yes; efficiencies, specialized knowledge	n/a
12	Pruning of cherry trees	86119 - Other support services to crop production	Yes; supervisory team & trainers	No	Yes; efficiencies labor-intensive for short periods	Bundled with labor sub-contracting
13	Pollination of cherry blooms	86119 - Other support services to crop production	No	No	Yes; efficiencies – economies of scope	n/a
14	Equipment rental for harvesting	86119 - Other support services to crop production	No	No	Yes; efficiencies	Bundled with repair and maintenance

15	Harvesting services	86119 - Other support services to crop production	Yes; supervisory team & trainers	No	Yes; efficiencies	Bundled with labor sub-contracting
16	Land transport of cherries from orchard to packing plant	65119 - Other road transport services of freight	No	No	Yes; efficiencies – economies of scale	
17	Repair and maintenance of equipment	87156 - Maintenance and repair services of commercial and industrial machinery	Yes; for minimal fleet	No	Yes; for specific maitenance	Bundled with equipment rental
18	Recruitment of temporary/ seasonal workers	8512 – Labour supply services	Yes	No	Yes; network efficiencies	
19	Transportation services for workers to and from orchards	64114 - Local special-purpose scheduled road transport services of passengers	No	No	Yes; economies of scale	Bundled with recruitment
20	Training of temporary/seasonal workers	92919 - Other education and training services, n.e.c.	Yes	No	Yes; specialized skills	n/a
21	Catering services for workers	63393 - Other contract food services	No	No	Yes	
22	Medical services	93121 - General medical services	No	No	Yes	
23	Social insurance for seasonal workers	91320 -Administrative services related to government employee pension schemes; old-age disability or survivors' benefit schemes, other than for government employees 91330 - Administrative services related to unemployment compensation benefit schemes	Yes; for internal personnel (required by law)	No	Yes,	Bundled with recruitment of workers
24	Post-Harvest Quality Control for all production	83441 - Composition and purity testing and analysis services	No	No	Yes; efficiency, specialized skills	

25	Weather analytical services for all growers	83430 - Weather forecasting and meteorological services	No	No	Yes	n/a
26	Agronomic extension services for outgrowers	83115 - Operations management consulting services	Yes; firm provides this service to their outgrowers	No	Yes; specialized skills	n/a
27	Financing for the production of cherries by outgrowers	7113 – Credit granting services	Yes; specialized knowledge	No	No	

Source: Compiled by Authors based on firm interview

Table A.3. Packing

	Service	Central Product Classification (CPC) Ver.2 Code	Supplied in-house	Outsourced to affiliated companies and reasons	Outsourced to third-party suppliers/ government and reasons	Bundled
28	Production management	83115 - Operations management consulting services	Yes	No	Yes; specialized skills	n/a
29	Architectural Services: Design and construction of packing plants	83213 - Architectural services for non-residential building projects	No	No	Yes; efficiency, specialized skills	Bundled with engineering services for plant construction
30	Engineering Services: Design and construction of packing plants	83310 - Engineering advisory services	No	No	Yes; efficiency specialized skills	Bundled with architectural services for plant construction
31	Certification of Operations for Private Standards	83115 - Operations management consulting services	Yes; for recertification	No	Yes; efficiency specialized skills	n/a
32	Certification for Public Sanitary and Phytosanitary Standards	91122 - Public administrative services related to health care	No	No	Yes; government services	n/a
33	Quality assurance and compliance with standards	83441 - Composition and purity testing and analysis services	No	No	Yes; efficiency, economies of scale	n/a
34		Class of 8313 - Information technology (IT) consulting and support services	Yes; in-house department	No	Yes; efficiency – specialized	

	Software systems for inventory management and packing operations	Class of 8314 - Information technology (IT) design and development services Class of 8316 - IT infrastructure and network management services	for day to day operations		skills, economies of scale	
35	Testing and selection of appropriate packaging materials	83442 - Testing and analysis services of physical properties	Yes	No	Yes; efficiency, speci alized skills	n/a
36	Rental of additional packing facilities	72112 - Rental or leasing services involving own or leased non-residential property	No	No	Yes; efficiency - extra capacity in peak periods	n/a
37	Packing Services	85400 - Packaging services	Yes	No	Yes; efficiency -extra capacity in peak periods	Bundled with cold storage services
38	Temporary cold storage prior to export	67210 - Refrigerated storage services	Yes	No	Yes; efficiency -extra capacity in peak periods	Bundled with packaging services
39	Repair and maintenance of equipment	87156 - Maintenance and repair services of commercial and industrial machinery	Yes	No	Yes	n/a
40	Specialized cleaning services for machines and equipment	85340 - Specialized cleaning services	Yes	No	Yes; specialized services	n/a
41	Pest Control	86119 - Other support services to crop production	Yes; for daily operations	No	Yes; efficiency & specialized skills	n/a
42	Government inspections on fire prevention, health hazards, environmental protection and other aspects.	91290 - Public administrative services related to other public order and safety affairs	No	No	Yes; government services	n/a

43	Recruitment of temporary/seasonal workers	8512 – Labour supply services	Yes; permanent workers recruited in-house	No	Yes; efficiency and network efficiencies	Bundled with social insurance for workers
44	Social insurance for workers	91320 -Administrative services related to government employee pension schemes; old-age disability or survivors' benefit schemes, other than for government employees 91330 - Administrative services related to unemployment compensation benefit schemes	Yes; for internal personnel (required by law)	No	Yes; subcontractors contribute individually	Bundled with labor subcontracting
45	Catering services for workers	63393 - Other contract food services	No	No	Yes; efficiency	n/a
46	Medical services	93121 - General medical services	No	No	Yes; efficiency	n/a

Source: Compiled by Authors based on firm interview

Table A.4. Distribution, Marketing and Sales

	Service	Central Product Classification (CPC) Ver.2 Code	Supplied in-house	Outsourced to affiliated companies and reasons	Outsourced to third-party suppliers/ government and reasons	Bundled
47	Consulting services for optimization of logistics providers	83116 - Supply chain and other management consulting services	No	Yes; economies of scale	No	n/a
48	Customs-related services	85999 – Other support services n.e.c.	Yes	No	No	n//a
49	Land transport of goods (from packing plant to domestic port)	65111 - Road transport services of freight by refrigerator vehicles	No	No	Yes; efficiency – economies of scale	Bundled international shipping
50	Cargo handling services	67110 – Container handling services	No	No	Yes; efficiency – economies of scale	Bundled internationalshipping
51	International shipping, by sea and air	65213 – Coastal and transoceanic water transport services of intermodal containers by container ships 65211 - Coastal and transoceanic water transport services of freight by refrigerator vessels 65319 - Air transport services of other freight	No	No	Yes; efficiency – economies of scale	Bundled cargo handling services
52	Freight insurance	71333 – Freight insurance services	No	No	Yes; not possible to supply in-house	n/a
53	Reception, customs-services and handling at destination	67110 – Container handling services; 85999 – Other support services n.e.c. Customs-related services	No	No	Yes; efficiency – economies of scale	n/a
54	Storage and warehousing services for cherries at destination	67210 - Refrigerated storage services	No	No	Yes; efficiency	n/a

55	Importer (Concessioned fruit)	61221 - Wholesale trade services on a fee or contract basis, of fruit and vegetables	No	Yes; efficiency, certain markets	Yes; lack of expertise, market specific	n/a
56	Design of logo and design of packaging	83919 – Other specialty design services	No	No	Yes; efficiency, specialized skills	n/a
57	Market Research	83700 - Market research and public opinion polling services	Yes	No	Yes; collective action	n/a
58	Sales services	61221 - Wholesale trade services on a fee or contract basis, of fruit and vegetables	Yes; core strategy	No	No	n/a

Source: Compiled by Authors based on firm interview

Table A.5. Transversal Services

	Service	Central Product Classification (CPC) Ver.2 Code	Supplied in-house	Outsourced to affiliated companies and reasons	Outsourced to third-party suppliers/ government and reasons	Bundled
59	Company registration and licensing services (obtaining permit to operate)	91138 – Public administrative services related to general economic, commercial and labour affairs	No	No	Yes, government services	n/a
60	Headquarter services	83118 – Head office services	Yes	No	No	n/a
61	Management services	83111 – Strategic management consulting services	Yes	No	No	n/a
62	Finance & Accounting	Group of 822 - Accounting, auditing and bookkeeping services	Yes	No	Yes; independent audit required by law	n/a
63	Insurance services (commercial life and accident/health insurance, property insurance for the factory compound, product quality insurance, management liability insurance)	7131 – Life insurance and pension services	No	No	Yes, not possible to supply in-house	n/a
		7132 – Accident and health insurance services	No	No	Yes, not possible to supply in-house	n/a
		71334 – Other property insurance services	No	No	Yes, not possible to supply in-house	n/a
		71335 – General liability insurance services	No	No	Yes, not possible to supply in-house	n/a
64	Corporate communications, marketing and public relationship	83121 - Public relations services	Yes	No	No	n/a
65	Legal services, including contract negotiations with foreign buyers	82120 - Legal advisory and representation services concerning other fields of law	No	No	Yes; efficiency, specialized skills	n/a

		82130 - Legal documentation and certification services				
66	Human resources management (Permanent staff)	Class of 8511 - Personnel search and referral services	Yes	No	No	
		92919 - Other education and training services, n.e.c.	Yes	No	Yes; specialized skills	n/a
67	Social insurance for staffs	91320 – Administrative services related to government employee pension schemes; old-age disability or survivors' benefit schemes, other than for government employees	Yes	No	No	n/a
		91330 – Administrative services related to unemployment compensation benefit schemes	Yes	No	No	n/a
68	Information technology services	Class of 8313 - Information technology (IT) consulting and support services	Yes; internal IT department supports day to day operations	No	Yes; efficiency, specialized skills	n/a
		Class of 8314 - Information technology (IT) design and development services				
		Class of 8316 - IT infrastructure and network management services				
69	Utilities: Electricity, gas, water and telecommunications services supply and waste removal	Class of 8631 - Support services to electricity transmission and distribution	No	No	Yes; not possible to supply in-house	n/a
		86320 - Gas distribution services through mains (on a fee or contract basis)	No	No	Yes; not possible to supply in-house	n/a
		86330 - Water distribution services through mains (on a fee or contract basis)	No	No	Yes; not possible to supply in-house	n/a
		94239 - General waste collection services, other	No	No	Yes; not possible to supply in-house	n/a
		Group: 841 - Telephony and other telecommunications services	No	No	Yes; not possible to supply in-house	n/a

70	Security Services	85230 - Security systems services	No	No	Yes; specialized skills	n/a
		85250 - Guard services	No	No	Yes; efficiency	n/a
71	Cleaning Services	85330 - General cleaning services	Yes	No	No	n/a

Source: Compiled by Authors based on firm interview

Table A.6. Policies affecting services in the value chain

Government and private policies/services	Authority(ies) in charge	Details	How the policy affects services in the value chain
Incentives for R&D (Tax incentives and Competitive Grant Funds)	CORFO (Economic Development Agency), CONICYT (National Commission for Scientific and Technological Research)	CORFO offers a series of grant and incentive benefits for the research and development in the fruit sector. These instruments are designed to foster collaboration between domestic and international universities, public research institutions and the private sector.	It provides inputs into improved production, harvesting and post-harvesting techniques, resulting in better quality fruit with higher post-harvest performance.
Competitive Grant Funds for Exports in Agroforestry	PROCHILE (Export Promotion Agency)	The program provides market research and undertakes promotional activities to support the growth of cherry exports abroad. In addition, the program provides funding for commercial missions abroad, office rentals abroad for promotion, participation in international trade fairs, short-term training abroad amongst others.	It provides exporters with detailed information regarding potential export markets as well as promoting cherries abroad in key international events. In addition, it offers financing for other marketing and sales services in the value chain.
Online Certification for Agricultural and Forestry Exports	Servicio Agricola y Granadero	Certification that exported products meet the phytosanitary requirements of the destination market. This certification can be obtained online.	It facilitates entry of cherries into destination markets.
SAG/USDA-APHIS/ASOEX Pre-Clearance Program	SAG, United States Department of Agriculture and ASOEX	This public-private model provides jointly managed inspection sites in Chile for pre-clearance primarily for fresh fruit destined to the U.S. market. The joint inspection program has been in place since 1982, and has numerous sites across Chile including all major ports.	It streamlines import procedures at U.S. ports allowing Chilean fruit to quickly enter the US market.
Modernization of Customs Services and Single-Window System	Servicio Nacional de Aduanas (National Customs Office)	The online single-window system requires exporters to submit all export related documentation for approval in one place. It is open 24 hours a day, 7 days a week provides immediate processing of documents that do not require further evaluation. This system was launched in a pilot phase in 2013; fresh cherries were included in the first phase.	Its enables governments to electronically process information, documents and fees both faster and more accurately. In doing so, it increases the speed of customs handling and processing reducing the time perishable produce is in transit for international markets.

Tax Credit for Education and Training (SENCE)	Servicio Nacional de Capacitación y Empleo (National Training and Employment Agency)	This incentive allows firms to deduct the cost of training workers in specific workplace competencies, subject to a cap of 1% of total compensation costs. To qualify for this credit, employers must pay social security costs for participating employees. Courses must be approved by SENCE to receive this benefit and can vary from short term courses (< 8 hours) to longer courses with academic equivalence (>200 hours).	It facilitates training for employees in the sector, directly contributing to productivity.
National Labor Skills Certification System (NLSCS)	Joint initiative between the Ministries of Economy, Education, Labor and Social Security	Skills and competencies for every job in the sector were profiled and compiled with the help of the private sector. These results were shared with technical training institutions to ensure that educational programs met industry needs. In addition, practical examinations were made available for workers already in the industry to certify their competencies regardless of how these were acquired.	It facilitates sector-wide competency improvements for labor and increases labor mobility contributing to productivity and quality improvments and standards compliance.
Flexible Labor Regulations for the Fruit Export Sector	Direccion de Trabajo (Ministry of Labor)	The law allows for short-term contracts for temporary workers in the fruit sector, as well as permitting variations in working hours.	It facilitates the provision of labor in peak periods (pruning, harvesting, packing) in the value chain at competitive prices.

Source: Authors

References

Fernandez-Stark, K. , P. Bamber and G. Gereffi (2011). Workforce Development in the Fruit and Vegetable Global Value Chain. In G. Gereffi, K. Fernandez-Stark & P. Psilos (Eds.), *Skills for Upgrading: Workforce Development and Global Value Chains in Developing Countries*. Durham: Center on Globalization Governance & Competitiveness and RTI International.

Fresh Fruit Portal (2013). Cherries of the World 2014. Retrieved June, 2015, from http://www.freshfruitportal.com/wp-content/uploads/2013/12/cherries_of_the_world_2014.pdf.

FreshPlaza (2015). Chile: More than 100,000 tones of cherries exported. *Fresh Plaza*. April 2 Retrieved June 2015, from http://www.freshplaza.com/article/134803/Chile-More-than-100,000-tons-of-cherries-exported).

Murray, N. (2013). Free to Trade. *Food News*. June from http://www.direcon.gob.cl/wp-content/uploads/2013/12/Oct5_DG-Food-News_Chilealimentos_Anuga.pdf.

SAG (2015). Exportaciones: Productos Vegetables a Estados Unidos. Retrieved July, 2015, from http://www.sag.cl/ambitos-de-accion/productos-vegetales-estados-unidos.

Shipman, M. (2015). Optical Sorters Take Over California Cherry Industry. *The Packer*. April 16 Retrieved July 2015, from http://www.thepacker.com/shipping-profiles/california-cherries/optical-sorters-take-over-californias-cherry-industry

UN Comtrade (2015). United Nations Statistics Division Trade Statistics. United Nations: New York.