Royal Quinoa reigning the world-
from food of the poor to the world's superfood

An insight into quinoa trade's impact on people, planet and profit in the Bolivian Southern Altiplano, based on value chain analysis and relationship assessment between quinoa producers and exporting companies

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Abstract

As a part of the thesis project, a value chain analysis was conducted in order to provide insight into the features of the various current sales channels. At the same time, the (differing) perceptions held by quinoa producers, associations and exporting companies were studied in order to grasp the nature and benefits of these sales channels. Finally, a glance at the quinoa trade's impact on people, the planet and profits is presented so as to aid in understanding the significance of the positive and negative effects of trade promotion. In summarizing and evaluating the findings of this research, recommendations are given as to how to develop strategies that can encourage a sustainable balance between satisfying superfood adorers' demand and creating trade benefits for the Andean producers.

The tremendous boom in the Bolivian quinoa sector that began in the early 2000s and continues to this day has brought an explosion in exports and higher market prices. From 2003-2013 the amount of exported quinoa has grown nine fold and its value has increased by a factor of 26. Being initiated by national producer organisations and Alternative Trade Organisations (ATOs) from the West, private companies entered the scene in the 1990s and are gaining in importance: in 2013, they were responsible for more than 70% of Bolivia's quinoa exports. Hence the sector has been and is currently being developed with Western collaboration, e.g., with aid from CBI, a Dutch market development organisation which advises companies on their exporting activities.

The development of the sector is accompanied by new purchasing programs, developed and established by associations and exporting companies, that guarantee quality, traceability and a steady supply to international clients. In addition, the programs include provisioning of farming inputs, such as fertilizers, tools and machinery, field assistance and group certification. At the moment, not all farmers are targeted by these programs. Instead, other market channels may prevail; ones in which the informal market in Challapata and middlemen play a crucial role, especially in dynamic and often unpredictable price policies. In certain periods of the year, the price offered in Challapata is higher than the one companies pay the producers per quintal (1 quintal = 50 kg) and "opportunistic" farmers may prefer to sell their produce outside of arranged agreements.

The issue of such side-selling is a substantial challenge for export companies and international traders, since it drives them to reach their quotas by seeking other supply channels that do not always afford traceability, organic origin and price stability. The farmers' challenges mainly revolve around production-related issues, such as harvest losses due to droughts, infestations of pests and decreasing soil fertility.

The farmers' increasing vulnerability to environmental factors can be linked to the intensification of production systems that has been introduced in order to meet production targets stipulated by international markets, but is less sustainable than the traditional production systems (which take the fragile ecosystem of the Andes into account). The impacts of trade and trade promotion are diverse, having had positive as well as negative effects on farmers' livelihoods, their diets, natural ecosystems, prices and the dynamics of the trade itself. An affirmative argument for trade promotion is the general expansion of the sector, having created international demand and standards that provide a stable market with high prices for producers and hence a general improvement of livelihoods in quinoa-producing villages.

Aside from farmers associations and consumers, companies and international collaborators are becoming markedly more influential. Recognizing their responsibilities and potential, the insight outlined here can be useful in developing strategies to maintain and especially make the trade of Bolivian quinoa more sustainable.

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Abbreviations

ANAPQUI = Asociacion Nacional de Productores de Quinua (National Quinoa Producer Association)

AS = Altiplano Sur

ATO = Alternative Trade Organizations

BS = Bolivianos (1 Euro=9.03 Bs)

CABOLQUI = Cámara Boliviana de Exportadores de Quinoa y Productos Órganicos

CBI= Centre for the Promotion of Imports from developing countries

CECAOT= Central of Farming Cooperatives "Operation Land"

COMPASUR = Programa Complejo Productivo Altiplano Sur

CPTS = Centre for the Promotion of Sustainable Technologies

FAO = Food and Agriculture Organization

FAUTAPO = Fundacion AUTAPO

GAP = Good Agricultural Practices

HA = Hectare

ICS = Internal Control System

MT = Metric Tons

QQ = Quintal (50 kg)

QR = Quinua Real

VHL= Van Hall Larenstein, University of Applied Sciences

Chapter 1. Introduction

1.1 Topic

The following report, which is part of a thesis project deals with the topic of Bolivian quinoa. Recognized by many institutions and consumers as "superfood", quinoa has gained popularity in recent years. In the International Year of the Quinoa, which was launched in February of this year by UN officials and representatives of Andean countries, the topic is receiving much attention. On the one hand, quinoa is promoted by the Food and Agriculture Organization FAO because of its nutritional value and its potential in food security and poverty eradication. For the same nutritional properties, it is known and praised by health fetishists and vegetarians. On the other hand, quinoa has gone through a period of harsh criticism, especially pronounced by Western media (such as the Time in 2012) blamed to deteriorate soils in the fragile ecosystem of the Bolivian highlands and set food security of the Andean population at risk.

1.2 Context

Core of this report is an applied research which is conducted in the context of a final thesis project for the study program International Development Management, major Fair Trade Management, at Van Hall Larenstein, Applied University of Science in Wageningen, the Netherlands. The external commissioner of the thesis is Freek Jan Koekoek, director of MERCADERO marketing company and consultant and quinoa "expert" of the CBI, Centre for the Promotion of Imports from developing countries. CBI's goal is to increase exports from developing countries to EU/EFTA markets with the final goal of poverty alleviation. Some of the Bolivian quinoa processing and exporting companies are part of CBI's intensive Export Coaching Program for Natural Ingredients which started in 2010 and will continue until 2015. Other Bolivian quinoa processors and exporters have participated in two similar programs in the past decade. CBI's export coaching programs involve intensive consulting and coaching of companies, in order to help the company develop its 'export capacity'. One important point of attention of this coaching is the purchasing system of the companies.

In Bolivia, the research was supported by two key institutions in the quinoa chain, CABOLQUI and FAUTAPO.

CABOLQUI is the main association of quinoa exporters in Bolivia, who together represent 70% of the country's quinoa exports. CABOLQUI is thus an important platform of communication with the sector and a source of information. CABOLQUI's interest in the research is to show the exporting companies' role in international trade and get a confirmation about the positive impacts companies have in producing villages from the farmers' perspective. In March 2013, CABOLQUI has organized an international symposium, joining chain participants to discuss issues at stake. CABOLQUI enabled the researcher to participate in that conference which has been a key event, providing an excellent introduction into the topic.

FAUTAPO is a foundation that has been investing heavily (FAUTAPO investing work, money coming from external funds) in the quinoa supply chain since 2005. The foundation has been supported by the Dutch development cooperation. The interest of the foundation in this thesis is to demonstrate better the impact of its work to the outside world.

1.3 Objective/Justification

The interest of conducting this research for MERCADERO and CBI is twofold:

First, the results of the research should help to improve the coaching and advisory service of the commissioner offered to SMEs (small and middle sized enterprises) in developing countries.

Second, it is important to get more insight into the impact of trade and trade promotion on social and economic development. Such insights are important to improve the trade promotion projects on the one hand, but also to increase the public awareness of the effects of trade and thus, possibly, to justify further public support of this. CBI is financed largely by public money, as an instrument of the development cooperation of the Netherlands, and so are many other trade promotion institutions. As was mentioned before, FAUTAPO has also been largely financed with public money, in particular Official Development Aid form the Kingdom of the Netherlands.

It will be assessed in how far the commercialization of quinoa has affected the livelihoods of farmers, which steps have led to the (un-)successfulness of the quinoa commerce and what the bottlenecks in the firm-farmer-relation are. The insight that the research presents is of the commissioner's interest to optimize his consulting activities.

1.4 Way of working

The underlying idea of the degree's thesis project is an applied research, a combination of research and practice. The report will go beyond describing and analysing the results, recommending steps to take to improve the studied case. The recommendations will be discussed with some of the important chain actors in a 'consult' (term used by VHL, meaning a discussion round) which is part of the thesis project. A third part is the publication of an article or column for an inexpert audience. The three parts compose the final grade and will be finished by the beginning of July.

The project was settled and started in the end of February 2013 on the Biofach trade fair in Nuremberg on which the researcher could already be introduced to some of the chain actors. Until mid-march, literature was studied and the questionnaires prepared, to leave to Bolivia the 19th of March. Before starting the field work, an international quinoa conference, organized by CABOLQUI was visited, which gave a first impression of the actual situation in the quinoa sector; looking from the international/importer's point of view. The field work was conducted in the sub-sequent 3 weeks, interviewing export firms, farmers and certification bodies. Apart from the interviews with farmers, the interviews were conducted in La Paz and were organized independently. The trips to the Southern Altiplano as well as many documents used in the literature review were facilitated by FAUTAPO. In May and June, this report was written.

1.5 Structure of the report

The report is built up in a way, that the (in-expert) reader is introduced into the topic quinoa and its features and challenges. After the introduction chapter, which presents the topic, the context and the justification of the thesis, the first part of the second chapter is dedicated to quinoa in general and its development during the last 40 years. The second part of that chapter focuses on Bolivian quinoa, the development of the sector and the different production systems in place. Chapter 3 presents the content of the thesis; the research problem, objective and questions. In the consequent chapter, the methodology chapter, it is explained, in which theoretical framework the research questions are answered and which methods have been used to achieve answering them. In the 5th chapter, results are presented. The researcher will answer the single sub-questions about the value chain's features, the status of companies' and farmers' business relation and finally the trade's impact on producer's livelihoods. Chapter 6 is dedicated to the discussion of the results and conclusions are given in chapter 7. In the last chapter, the researcher will give recommendations about activities that concern the commissioner's role in the quinoa chain.

Chapter 2. Background Information/Literature Review

Latin American geographer Alexander von Humboldt wrote in the beginning of the 19th century that quinoa was to ancient Andean societies what "wine was to the Greeks, wheat to the Romans, cotton to the AraBs." Therefore, it is also often called "grano de los Inca" or "grano de oro" ("Inca-grain" or "golden grain"). In its history, quinoa has gone through the stage of being a staple food for Andean inhabitants, a period in which it had the reputation of being the 'food of the poor' and has developed into being one of the most expensive gluten-free carbohydrate products, being a 'food of the wealthy'. (quinoa: 4.85$/kg in comparison to white rice: 1$/kg or noodles: 1.20$/kg; Source: New York Times, 2011)

2.1 Quinoa

Figure 2. Quinoa producer in Uyuni, March 2013

2.1.1 Quinoa's importance today

Quinoa is called the golden grain not only due to its appearance but also due to its many positive properties. In the FAO's report "Quinoa: An ancient crop to contribute to world food security" the following are mentioned as outstanding intrinsic characteristics: First of all, quinoa has a broad genetic variability which allows for developing superior varieties in the future. Next to that, it has a strong adaptability to extreme climate and soil conditions. Further, its nutritional properties are outstanding since it is a rich source of proteins, phosphorus, calcium and iron and contains all important amino acids. Quinoa also is relatively low in production costs and lastly can be used in many diverse methods.

An important feature is the absence of gluten of most quinoa varieties.

	Royal Quinoa	Rice	Barley	Wheat
Proteins (g)	13.8	7.2	10.6	11.5
Fat (g)	5	2.2	2.1	2
Carbohydrates (g)	59.7	74.6	57.7	59.4
Minerals (g)	3.4	1.2	2.2	1.8
Calcium (g)	85	39	26	41
Magnesium (mg)	204	119	57	90
Iron (g)	4.2	2	2	3.3

Table 2. Nutritional properties of quinoa, ANAPQUI 2012

2.1.2 History

Ancient history

The origin of quinoa can be traced back to the Andean region, namely the area around the Titicaca lake in the Bolivian and Peruvian Altiplano between Cuzco and Potosí. It has always played an important role in indigenous societies throughout the Andean region. Quinoa is said to be produced for more than 7000 years and that the Andean inhabitants recognized its nutritional properties and its medicinal value long before the arrival of the Spanish conquistadors (FAO, 2011).

In Chile (Arica) as well as in Peru (Ancon), archaeological evidence has been found that proof the consumption of quinoa in ancient Andean. According to findings in northern Chile, archaeologists believe quinoa was in use prior to 3000 B.C. Further evidence from the Ayacucho area places the domestication of quinoa before 5000 B.C. (Erdos, J. 1999)

Erdos recognizes the fundamental role that quinoa played in the Inca civilization. "It is believed that the Incas considered quinoa to be a sacred plant: Religious festivals included an offering of quinoa in a fountain of gold to the sun god, Inti; a special gold implement was used to make the first furrow of each year's planting; and, in Cuzco, ancient Incans worshipped entombed quinoa seeds as the progenitors of the city."

With the arrival of the Spanish during the 15th and 16th century, many things changed. Farmers were sent into the gold mines of Peru and Bolivia, and non-native crops were introduced for Spanish consumption and hence changing traditional agricultural patterns and diets. During that period, quinoa use was associated only with native populations, leading to a negative perception of as belonging to the lower class (Erdos, J. 1999)

Modern history

Further, Erdos (1999) states that "by the beginning of the 20th century, quinoa had lost its status as the Mother Grain. Foreign crops, such as barley, had been introduced and surpassed quinoa in importance. Further decline occurred in Peru in the 1940s when the government began to import large amounts of wheat. Between 1941 and 1974, quinoa cultivation in Peru plummeted from 45.000 ha to 13.000 acres. Compounded with the growing acculturation of indigenous populations and the stigma of indigenous identification attached to its consumption, quinoa lost its grandeur and became just another subsistence crop for poorer rural families."

Until the 1970s, the traditional farming system prevailed, in which peasant producers kept most of their quinoa for auto-consumption, selling a small part on rural markets and reserving some seeds for the next season. It was also used for trading it with other products from other communities. Another way of selling quinoa is on the weekly market of Challapata, on which quinoa producers from all over the region are selling their quinoa nowadays. Some 40 years ago, wholesalers purchased small quantities of marginalized farmers who did not have any means to reach Challapata, and distributed it. Since farmers did not have any other paths to commercialize their quinoa, their bargaining power was small and the price paid to producers was equivalent to one third the price of imported wheat (Ayaviri et al. 1999).

For some years, quinoa has had the reputation of being food of the poor and the Indians and prices have been as low as 0.72 $ /qq (personal communication with German Aroni, 2013) in 1980. Studies conducted by the FAO, the American Academy of Science and the NASA in the 1980s classifying quinoa as a complete food, recognizing its potential to contribute to food safety and its adoption by the NASA (Caceres et al., 2008) as a food for astronauts had positive effects on quinoa's image. Local public research institutions began to collect and systematize traditional knowledge and promote quinoa's multiple properties outside of Bolivia. Soon, it was adopted by international, mainly French companies and becoming an exotic alternative for vegetarian consumers and fitted well into the new trend of consumer concerns about health, preservation of the environment and social issues (Caceres 2005).

2.1.3 Bolivian government in 2013

The increasing popularity of Bolivian quinoa has many reasons, some are market-based, others are rather political. Since quinoa has the status of being one of the Andes' solutions to world food security (Evo Morales, 2013), it is very much promoted by Bolivian politics within and outside of the country. Evo Morales, Bolivia's current president has been elected by the FAO as "quinoa ambassador", representing Bolivian quinoa producers at the launch of the International Year of the Quinoa 2013 in New York. Within that event of the International Year of the Quinoa, many activities are organized within Bolivia by the government, such as the "caravana de la quinua", a 3-day-tour through all production areas of the country in which producers, media companies and government representatives joined . The route is not only travelled; it is planned to develop a touristic route; stimulating the country's tourism activities and at the same time promoting quinoa. Bolivia does not promote quinoa only outside of the country but guarantees that it is consumed by Bolivians. There is a package given to all pregnant women and women that are nursing for one year which includes chocolate, milk and quinoa (private communication with Abigail Balidivieso, 2013). Another way of promoting quinoa's national consumption is via the (public) school breakfasts that include quinoa products (presentation Mr. Calzadilla, Ambassador of Bolivia to the Netherlands, 28.5.2013). In May 2013, the Chamber of Deputies decided to build the International Centre of Quinoa in Bolivia. The

centre's activities should focus on research, but also on the support of the quinoa chain in general and consulting activities.

2.1.4 Expanding international trade relations

As described in the paper "Fair Trade and quinoa from the southern Bolivian Altiplano" by Cáceres, et al. (2008), the change of the Bolivian quinoa sector from quinoa as an auto-consumption and barter product to an internationally recognized "superfood" has started in the 1970s with the emergence of small producer organisations, OECAs. They have been formed in order to find new markets without the intermediaries that often were the only sales possibility to farmers. At the same time, Alternative Trade Organization (ATOs) gathered strength in Northern countries and soon, a network between small producers from the global South and consumers in the North was being established. CECAOT, Bolivian's first national cooperative was created in these years, joining 14 community-based cooperatives and organizing the first national meeting of quinoa producers in Oruro on which production issues, industrialization and marketing were discussed.

In 1983, a first contract of exporting 200 tons to the USA was signed between CECAOT and the Quinoa Corporation, a company from the USA. In the same year, ANAPQUI, the national association of quinoa producers was founded with 150 members and soon was linked to the German ATO GEPA. GEPA played a big role in centralizing demand from European ATOs and thereby reducing costs for importers. In that period, the construction of quinoa processing plants has been made possible with funding from the UN. In 1989, first contracts between GEPA and ANAPQUI have been signed and soon, GEPA was stimulating the association to set up criteria for ecological and social quality to enable and increase in exports to European countries. In this period, a new stage of quinoa trade and export-oriented agriculture has started which was based on long-term-relations, fair prices, funding for agricultural activities and social initiatives.

A new phase was commenced in the 1990s with converting to organic cultivation. In 1992, PROQUINAT, the program for natural quinoa was launched by ANAPQUI with the aim to develop new production systems to achieve organic quality for Royal Quinoa. This program, which is still running in 2013, introduced organic production methods and certification standards. Further, it promoted the introduction of equipment and machinery. Within the period of organic conversion, the Association of Bolivian Ecological Producers was formed, being responsible for the development of norms for organic production in Bolivia, based on EU regulations. It was soon realized, that external certification included high costs. With that reason, a local certifier, Bolicert was created.

Until the mid-1990s, peasant organisations had the monopoly in quinoa exports with a market share of 88% in 1998 of ANAPQUI and CECAOT only (ANAPQUI 57%, CECAOT 21%). But the increasing demand and the prices soon translated into the entrance of newly emerging private companies that made ANAPQUI lose its position. This is the next phase of quinoa commercialization that is present until today with the companies having a market share of 53.7% (in 2003, probably much higher in 2013). This new phase initiated a new model of firm-farmer relationship, shifting from the associative model, developed by ANAPQUI and CECAOT towards a more business-oriented model. The entrance of companies also meant higher expectations of quality from the client's side; a requirement that companies could fulfil more easily than peasant organisations. The companies' experience in business, the fulfilment of quality criteria and delivery was contributing to their successful emergence.

(All information above: Caceres et al., 2008)

The Graph below shows the destination countries of quinoa exports in 2012, with USA being the biggest importer of Bolivian quinoa with 64 %, followed by France (10%), Canada (7%), the Netherlands (6%) and others.

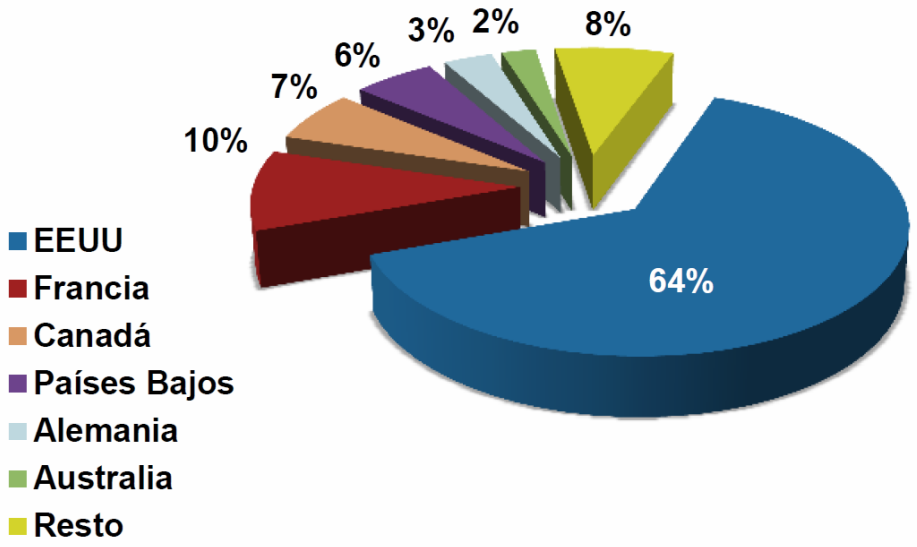


Figure 3. Destination countries of quinoa exports, IBCE 2013

2.1.5 Situation in 2013: positive and negative media attention

Despite all positive aspects of quinoa and the positive effects of its commercialization like increased livelihoods for producers, there has been a discussion about "dark sides of the superfood" (TIME, 2012). Such supposed negative side effects of the quinoa boom have been passionately discussed in the Western media during the last 3 years, especially by the Guardian with its article named 'the unpalatable truth about quinoa'. One of the loudest criticisms is that the increasing demand of developing countries has raised quinoa prices that much that "poor Bolivians can no longer afford their staple grain" (The Guardian, 16 January 2013). Due to the high prices, quinoa is less consumed by locals since they prefer to sell it on the one hand but can also not afford it anymore. The high export prices motivate Bolivians to become producers and many city dwellers come back to the Altiplano to cultivate a piece of land. Since land was traditionally used as a communal herding or cultivation ground, land disputes are raising. In 2012, TIME reports that "hundreds of farmers fought over what was once abandoned land" and that "dozens were injured and four even kidnapped". Next to the land disputes, the quinoa boom is also criticized to cause land and environmental issues. Since the farming systems are shifting from the traditional one of using 10% of the land for quinoa cultivation and leave the rest to the llamas to an increasing cultivation of quinoa in mechanized monocultures, current quinoa production is "provoking a soil crisis since the cameloid's guano is undisputed the best fertilizer for maintaining and restoring quinoa fields" (TIME, 2012). Due to the lack of natural fertilizer, the organic status of quinoa is at risk. The Guardian puts quinoa on level with crops such as Brazilian soya or Peruvian asparagus calling it "yet another troubling example of a damaging north-south-exchange". The case of quinoa seems to be ironic, causing all the issues and on the other hand being celebrated as a hero product, being organic, Fairtrade, wholegrain and gluten-free (The Guardian 2013).

2.2 Quinoa in Bolivia

2.2.1 Development of the Bolivian quinoa sector

These days, Bolivia is one of the world's most important quinoa producers and exporters, accounting to 40% of quinoa produced in the Andean region (after Peru with 57% and before Ecuador with little more than 1%) and with export values of US$ 43 million in 2009. This is before Peru with US$ 552.000 (FAO, 2011; dates from 2009). Production of quinoa in Bolivia has grown from 15000 tons (38000 ha) in 2008 to 27000 tons (50000 ha) in 2009 (PROINPA, 2010). According to information of the Ministry for Productive Development (Viceministerio de Desarrollo Productivo), the cultivated area has been 96.544 ha in 2012 and is estimated to expand to 104.365 ha in 2013, equivalent to 58.040 tons. International traders' expectations are similar: from 50000 to 60000 tonnes. Between 2010 and 2012, Bolivian quinoa exports grew with 42 %, having exported 26.000 tons in 2012 (IBCE, 2013).

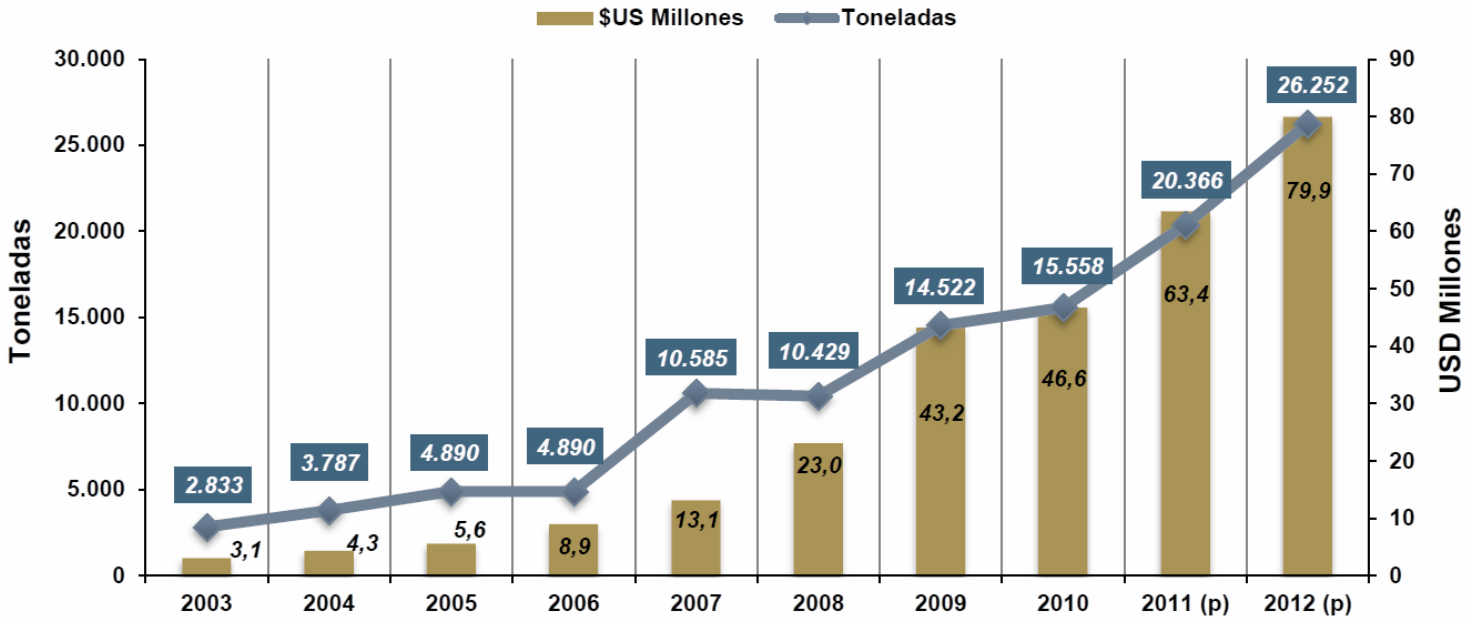


Figure 4. Quinoa Exports From 2003-2012, IBCE, 2013

In the Graph above, published in February 2013 by the IBCE, the Bolivian Institute for Foreign Commerce, it can be seen that export volumes have increased times 10 and the quinoa's export value times 26 in the last ten years. The Table below shows the price development since 2001 until 2008. In May 2013, the Challapata price for white Royal Quinoa is 850 Bs/qq; black quinoa was sold for 1500 Bs/qq.

Year and month	**Price, Bs/qq**
2001, September	140
2002, September	160
2003, October	170
2004, August	255
2005, July	245
2006, October	255
2007, October	275
2008	315 (jan), 330 (march), 420 (may), 450 (june), 670 (july), 700 (sept)

2.2.2 Quinoa in the Bolivian Altiplano

The Bolivian Altiplano is separated in the Northern Altiplano which ranges from the Titicaca lake in Peru until la Paz, the Central Altiplano which ranges from la Paz to the city and region Oruro and finally the Southern Altiplano/Altiplano Sur covering the regions Oruro and Potosi and ranging until Chile.

Figure 5. Bolivia and location Altiplano

The Royal Quinoa is grown in the Southern and Central Altiplano. The field research focused mainly on the Southern Altiplano since 83% of exported quinoa originated from Oruro in 2012 (IBCE, 2013).

The Southern Altiplano is characterized by the presence of salt lakes, among them the famous Salar de Uyuni with an area of 10582 square kilometers. Other characteristics of this area are its altitude (with an average of 3750 m above sea level), its harsh climate conditions and its indigenous inhabitants (Aymara and Quechua). Most of the exported quinoa originates from that region since the properties of the quinoa grown around the salt lakes are mostly requested by international clients. The circumstances given in the Southern Altiplano make the variety grown in that region, the Quinua Real or Royal Quinoa, unique. It is characterized by its high content of saponine and its size with a diameter is more than 2 mm and so bigger than the grains of other quinoa varieties. Within the variety of Quinua Real, much diversity (ecotypes) can be found in terms of plant characteristics, size and

colour. In PROINPA's document "Catálogo Etnobotánico de la Quinua Real de Bolivia" (2012), 51 of these ecotypes are explicitly described. At the moment, there are 55 varieties of quinoa grown, not only in the Altiplano but also in the Yungas and the valleys of the country. The ecotypes which are mostly required by the international market are restricted to four of them and are all of the Quinua Real variety: Real Blanca, Toledo, Phisanqalla (which is known as red quinoa) and Ch'iara (which is the black quinoa). However, in the European market at least the so-called quinua dulce (sweet quinoa) from near the Titikaka lake is also widely marketed.

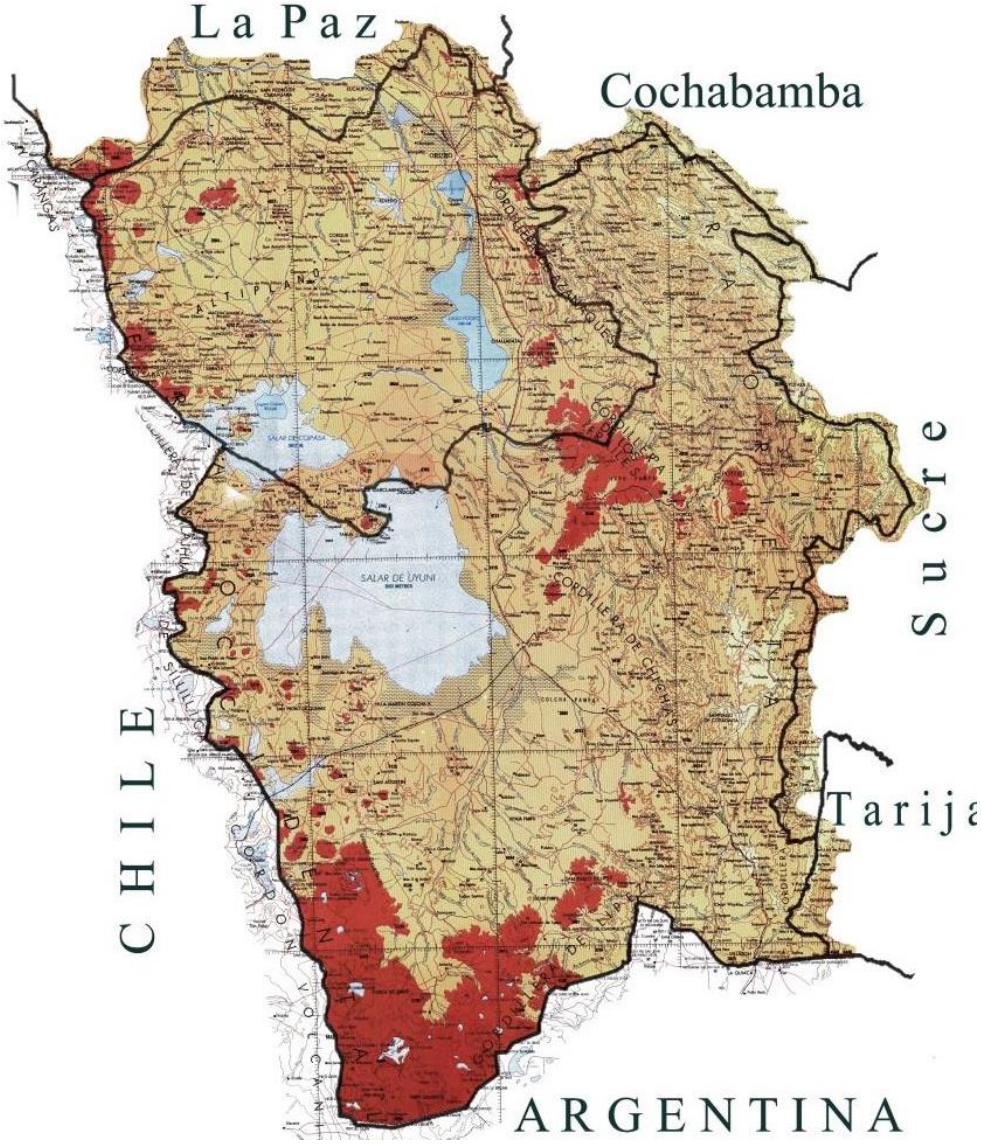


Figure 6. Bolivian Altiplano, FAUTAPO

Figure 7. Area of the "Intersalar" in between the Uyuni and the Coipasa salt lake and Salinas as the centre of production for Quinua Royal

2.2.3 Farming Systems

"A farming system is a decision making unit comprising the farm household, cropping and livestock system that transform land, capital and labour into useful products that can be consumed or sold" (http://www.agriinfo.in/?page=topic&superid=1&topicid=643). This paragraph deals with the agricultural part of the farming system, namely the production system present in the quinoa production in the Southern Altiplano, neglecting the other elements of a farming system.

Quinoa (Chenopodium quinoa wild.) is a species of the goosefoot family (Chenopodiaceae) and is often called a pseudo-grain for its similarity with grains. The part which is used for consumption is the plant's seed. Quinoa is an annual plant and has the potential to grow in very adverse soil and climatic conditions since it can grow from sea level up to an altitude of 4000 m above sea level, resist temperatures from -4 to 38°C and can still have acceptable yields with a rainfall of 100 to 200 mm. The climatic conditions in the Andean Altiplano are very extreme with an arid climate, low temperatures and regular periods night frosts and intense solar radiation. The soils are alluvial and sometimes poorly drained.

The conditions in the Southern Altiplano in which the Quinua Real is grown are the following:

The **altitude** of plots varies from 3610 to 4500 m a.s.l., whereas the majority (80%) is grown between 3600-3800 m a.s.l. (source: FAUTAPO Atlas, 2011)

The **soils** are characterized by the composition of volcanic material and the low presence of organic matter and a pH of 7.1-8. They are sandy, loose, slightly saline and susceptible to wind erosion

Precipitation in the area is 165 mm/year with the majority of the area having less than 150 mm/year and the area of the Intersalar (north east of Salar de Uyuni) having 350-370 mm/year

The average days of days of **frost**/year are 183 days. Departments in the south east of the Salar (San Augustin and Uyuni)and Tahua bordering the salt flat in the north, having a very high risk (34%) of frosts are threatened more than other regions with only 10%.

During the vegetative cycle of quinoa, temperatures range from 12.2°C in November to -6.1 °C in April ; average maximum temperature in the area: 16°C, minimum temperature: -6,4°C

Figure 8. Typical landscape in the Altiplano, llama and thola, San Augustin, 2013

Old versus new farming system

In the traditional farming system, peasant producers kept most of their quinoa for auto-consumption, selling a small part on rural markets, reserving some seeds for the next season or for bartering with other communities. In the traditional cultivation, the farmer's activities only implied sowing and harvesting. Little crop maintenance (and no agrochemicals) was necessary since there was almost no infestation with pests. In order to avoid a 100% crop loss, the farmer would plant different varieties at different times of the year in one plot. The main principle of agriculture was soil conservation, including practices such as terracing, leaving land fallow for 4-6 years, and only working with manual tools. In the traditional land owner system in Aymara communities, a piece of land would belong to the person that would clear it (by hand). With the intensification and mechanization of quinoa production, many of those techniques have changed, since machinery is used for soil preparation, sometimes sowing and harvesting and post-harvesting and utilization of agro-chemicals. According to Carimentrand & Ballet (2010), the size of cultivated plots depends on its location; whether it is located on a hill or in the plains, where use of machinery and hence large scale cultivation is easier. In

the earlier introduced Atlas (FAUTAPO, 2011), the following development of surface under cultivation of Royal Quinoa per family is described:

2006: 6 ha - 12 ha
2007: 2.6 ha - 14 ha
2008: 1.7 ha – 6.6 ha
2009: 5.6 ha – 8.8 ha
2010: 4.9 ha – 10.83 ha

During the field work, plot size per farmer varied from less than 0.5 ha up to 50 ha.
A similar variation in yield (kg/ha) is at stake, due to different cultivation techniques.

Production cycle of Quinua Real

The original farming system prevailed until the 1970s and the whole production of quinoa from soil preparation until post-harvest practices was done by hand. In the Southern Altiplano, quinoa cultivation was restricted to the slopes bordering the two salt lakes Uyuni and Coipasa. At the slopes, there is less incidence of night frost and more rainfall; hence better growing conditions. Towards the north, quinoa was part of a diverse crop rotation system together with potato, corn and wheat; whereas in the south, it is often the only crop grown and apart from llama raising the only source of income. In the harsh conditions of the Southern Altiplano no other crops can grow.

The mechanization of agriculture as well as the increased international demand for quinoa has led to the relocation of production zones from the hills to the plains (pampa) on which tractors can be used more easily (FAO, 2011). According to FAO, the mechanical system (95%) is virtually replacing the manual one (5%). In the "Atlas Productivo de la Quinua Real", published by FAUTAPO (2011) it is shown that in year 2011 85% of all quinoa production in the Southern Altiplano is cultivated on the plains, 7% on the slopes and 8% on the steep hills. The density of tractors per municipality varies from 4 tractors in San Augustín to 300 tractors in the municipality of Salinas de Garci Mendoza. This number is related to the cultivated area which is about 2.500 ha in San Augustín and 44.200 ha in Salinas. The density of tractors/ha therefore ranges from 0.002 to 0.007 tractors/ha. It is said that around 80% of all soil preparation is done with tractors, meaning that communities, in which tractors are rare, producers rent them from other communities. There seems to be strong interest among farmers to increase mechanization, and this is perfectly understandable if one takes into account the general scarcity of labour in the area (personal observations during field visits).

The Table below gives a summary of the economic costs and returns of different farming systems, comparing the manual, semi-mechanized and fully mechanized systems. The calculations take fixed costs such as land and tools as well as variable costs, seeding, maintenance, harvesting and inputs into account. Certification costs are not included. Some activities, especially land preparation, harvesting and post-harvesting need much labour force; therefore a completely mechanized system is more profitable.

	Production costs	Value of production	Margin
Manual	5119 Bs/ha	8125 Bs/ha	3006 Bs/ha
Semi-mechanized	6443 Bs/ha	8125 Bs/ha	3482 Bs/ha
Mechanized	3627 Bs/ha	8125 Bs/ha	4498 Bs/ha

Turnover is calculated when yielding 12.5 qq/ha (575 kg/ha) and selling quinoa for 650 Bs/qq.

The yield per hectare can vary between 500 and 1000 kg and depends on presence of pests, soil fertility, GAP and precipitation.

Soil preparation (in January/February/March)

Soil preparation is done in a mechanized system or manually
When done manually, the traditional system uses a tool called Taquiza to remove the surface soil.
In the mechanized system, a motorized plough like a disc harrow is used.

At the same time, soil fertility is to be maintained. A combination of three elements supports soil fertility: the incorporation of manure into the soil, hedges (barreras vivas) around the plots in order to prevent wind erosion and leaving the land to rest fallow for (minimum) one year. Variations in fallow land periods vary according to the use of manure (only one year obligatory) to no use of manure or fertilizer (minimum 2 years obligatory).

Seed selection

There are research institutions such as PROINPA, FAUTAPO or the PROQUINAT team, that have been and are developing superior seeds but most farmers select their seeds from the previous harvest. When selecting the seeds, those institutions recommend to choose seeds of only one ecotype, size and colour as well as certified seeds.

Sowing (August until beginning of September)

As in the soil preparation, sowing can be done in a mechanized system or manually; most often, the latter is the case. In the traditional system, a hole is dug until humid soil is reached. The seeds (30-50) are put into this hole and are covered with first moist and then dry soil. The distance of these holes from each other is 1 to 1.20m. When the planting is done with a tractor, it dugs lines into the soil and deposits the seeds with a distance of 0.80 to 1 m.

Crop maintenance/pest and disease management

During the growing period of quinoa, the farmer has to make sure that the crop is growing healthy. That means weeding the crop and controlling pests and diseases.

The most important pests are the quinoa moths/polilla (Eurysacca melanocampta Meyrick) and the ticona complex/ pilpinto (Capitarsia turbata) which is a nocturnal butterfly but also rodents and birds can cause crop losses when the crop is not protected from them consuming it. With the introduction of certified organic quinoa, organic pest controls, with a combination of mechanical, cultural and biological control have been developed and are implemented by farmers during the crop cycle. In order to prevent attacks from rodents (mostly mice and hares), traditional methods are being used. The most destructive disease in quinoa is the downy mildew (Peronospora farinosa). It is especially present in cultivation zones outside and therefore lower than the Altiplano.

Harvest/Post-harvest/Primary processing (April-June)

Harvesting time ranges from April until June, depending on different factors such as ecotype, soil type, humidity and temperature and is one of the most labour-intensive periods in the crop's life-cycle. Harvesting quinoa can be done with three different methods: traditional uprooting in which the whole plant is pulled out of the ground; harvesting with a sickle which enables the roots to stay in the

soil as organic matter; and semi-mechanical harvesting which is done with a mechanical mower and has the advantage of being done much faster.

The post-harvest methods with which the final grain is obtained involves drying, threshing, venting and storage of the quinoa grain. Drying is done by stacking the cut quinoa plants on different piles and letting them dry for about 3 weeks. Threshing as well as venting the quinoa in order to separate the grain from the panicle can be done in the traditional or mechanized way. Comparing the traditional with the mechanical threshing, a huge difference is seen. When threshing the quinoa with a stick, sifting and winnowing it in the traditional way, the farmer can process 1.5 qq/day whereas a threshing machine can process up to 10 qq/hour. In the process of venting or winnowing, 4 qq/day are obtained when doing it manually and up to 8 qq/hour with a machine.

Storage

Finally, the quinoa is filled in sacks made of woven llama wool or polypropylene and stored on pallets.

In the Southern Altiplano, 43% of the total production is organic, 26% is in conversion and 31% are in transition, hence on the way of being organic as well (Atlas FAUTAPO, 2011).

(Most information above is taken from: Guía de técnicas de producción ecológica en el cultivo de la Quinua Real, FAUTAPO)

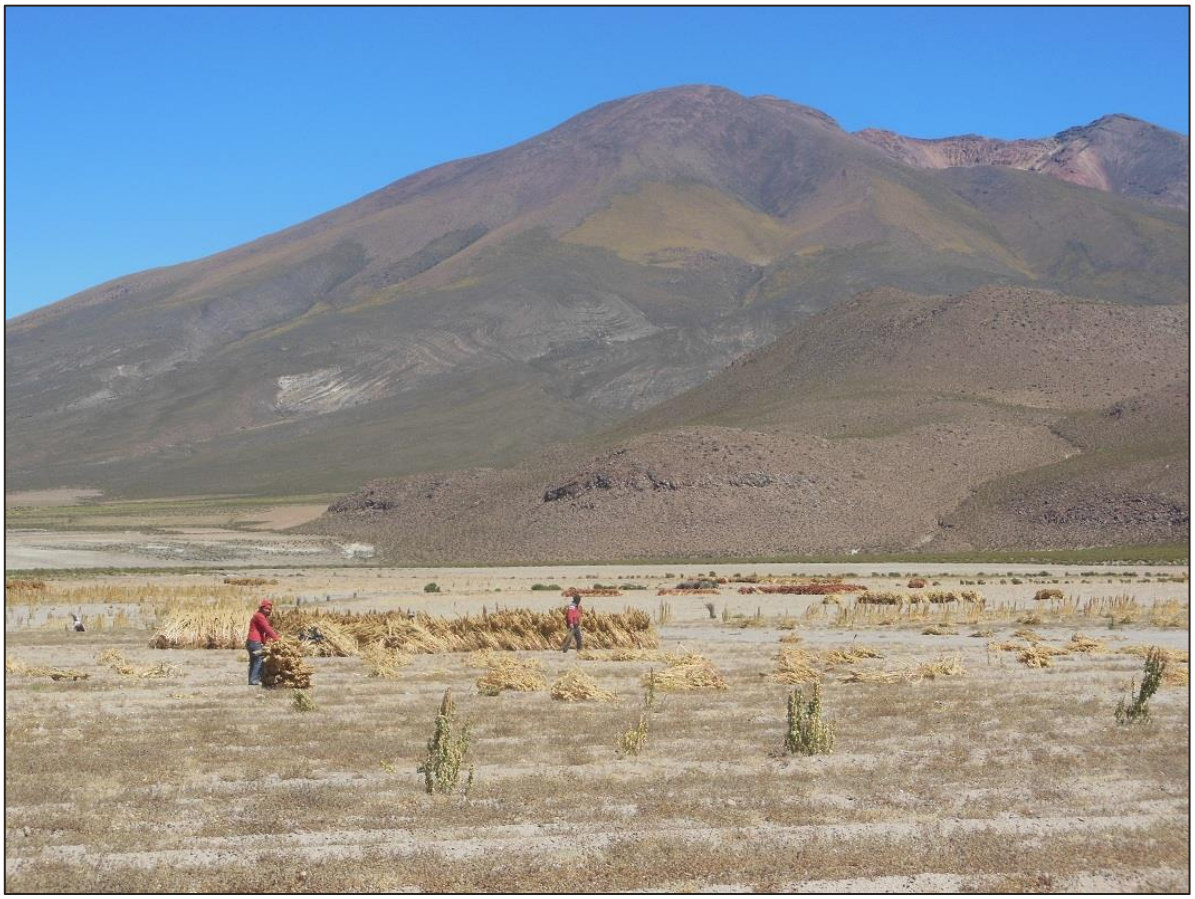


Figure 9. Harvesting in San Augustin, April 2013

Chapter 3. The thesis

3.1 Research Problem

Lack of insight into how trade and trade promotion affect chain actors, especially firms and farmers and their relation to each other. Little knowledge is at stake concerning the trade's impact on farmers' livelihoods.

3.2 Research Objective

To provide insight into quinoa trade's impact on people, planet and profit in the Bolivian Southern Altiplano based on a value chain analysis and a relationship assessment between two of the quinoa chain's main actors in Bolivia, namely the quinoa farmers and the exporting firms.

3.3 Research Question(s)

1. What are the features of Bolivia's organic quinoa value chain?

2. What is the status of business relations between producers and exporters in Bolivia's organic quinoa value chain?

3. To what extent does the quinoa commercialization affect the livelihood of quinoa producers? To what extent do organic producer groups and exporters contribute to an improved market position of quinoa growers?

3.4 Sub-questions

What are the features of Bolivia's organic quinoa value chain?
Who are the actors, operators and facilitators in the quinoa chain in 2013?
Which historical features have shaped the organic quinoa value chain of today?
Which are the challenges the quinoa chain is facing in terms of sustainability?
Which are the channels for quinoa in the research area?

What is the status of business relations between producers and exporters in Bolivia's organic quinoa value chain?
Which functions do the producer groups have? Which functions do the exporting companies have?
Which challenges do the firms and producer groups face in the value chain?

To what extent does the quinoa commercialization affect the livelihood of quinoa producers? To what extent do organic producer groups and exporters contribute to an improved market position of quinoa growers?
What role do producer groups and exporters have in the upgrading of the quinoa trade?
Has the commercialization of quinoa improved the livelihoods of farmers in the research area?

The sub research questions will be answered with different methods. The research will consist of literature review, qualitative interviews to understand the different cases of farmers and companies as well as the quinoa chain's compounds and finally a tool to assess business relationships, the 22Tango method will be used for conducting the research. The concept of the 22 Tango tool will be explained in Chapter 4.2.1 and the according questionnaire will be found in annex 2.1.

Chapter 4. Methodology

4.1 Theoretical Framework

The methodology for this research is based on the theoretical framework(s) of a value chain analysis. Various documents about value chains, supply chains, commodity chains, etc. are available. The following definitions have been picked and combined for this research's conceptualisation.

In Kaplinsky's definition, "a value chain describes the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use".

In the FAO's definition from 2005, "a 'value chain' in agriculture identifies the set of actors and activities that bring a basic agricultural product from production in the field to final consumption, where at each stage value is added to the product. A value chain can be a vertical linking or a network between various independent business organizations and can involve processing, packaging, storage, transport and distribution." It is also differentiated between traditional agricultural value chains, that are "generally governed through spot market transactions involving a large number of small retailers and producers" and modern value chains that are "characterized by vertical coordination, consolidation of the supply base, agro-industrial processing and use of standards throughout the chain."

A third approach by Hellin and Meijer introduces the market map framework, referring to the analogy of mapping of a value chain with the painting of a house, adding more colour and detail to the bigger picture by applying several layers. "A comprehensive mapping", including the layers of value chain actors, the enabling environment and the service providers, "describes the interacting and competing channels and the variety of final markets".

In "the governance of global value chains" by Gereffi et al., the governance in value chains is taken into consideration since global trade nowadays is not only an "international trade of goods and services but a system of governance that link actors across borders with different arrangements such as sourcing and contracting." (Gereffi et al., 2001). Five basic types of value chain governance are distinguished, namely the markets, the modular value chains, the relational value chains, captive value chains and hierarchy. The nature of Bolivian's value chain governance (s) are delineated in the results and conclusion Chapters.

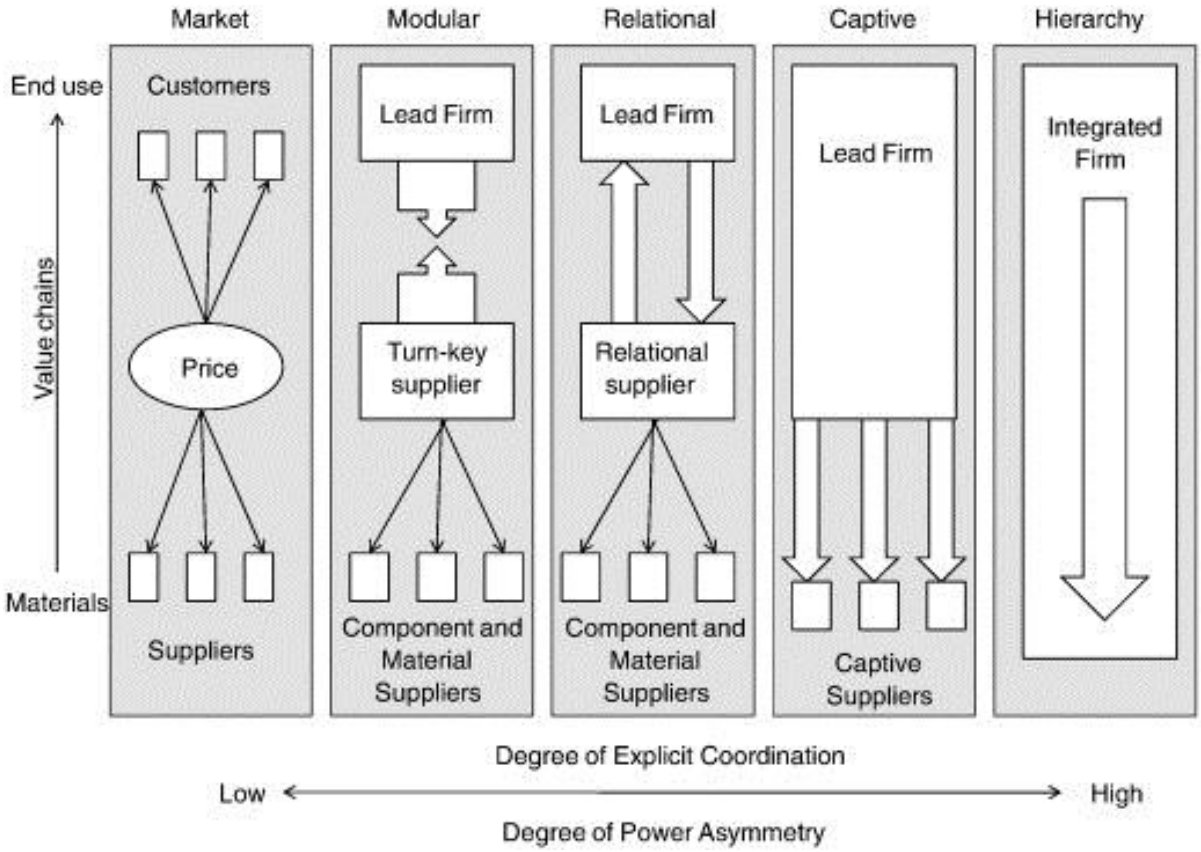


Figure 10. Governance structures, Greffin 2005

Hence, a value chain analysis is used to describe the actors and activities that are at stake to bring a product from "farm to fork". The main focus of this research though will be on the interlinkages between actors and services on all levels until the moment of export, taking the shift from traditional to modern value chain into consideration.

4.2 Methods

The following activities are done to answer the research questions with their sub-questions.

RQ 1. What are the features of Bolivia's organic quinoa value chain?	
Who are the actors, operators and facilitators in the quinoa chain in 2013?	Literature, Observations, Quinoa Conference
Which historical events have shaped the organic quinoa value chain of today?	Literature
Which are the challenges the quinoa chain is facing in terms of sustainability?	Literature, Quinoa Conference
Which are the trade channels for quinoa in the research area (Southern Altiplano)?	Interviews, Observations
RQ 2. What is the status of business relations between producers and exporters in Bolivia's organic quinoa value chain?	
Which functions do the exporting firms have in terms of firm-farmer relationship? Which functions do the producer groups have in terms of firm-farmer relationship?	Interviews
Which challenges do the firms and producer groups face in the value chain?	Interviews, Questionnaires
RQ 3. In how far does the quinoa commercialization affect the livelihood of quinoa producers? In how far do organic producer groups and exporters contribute to an improved market position of quinoa growers?	
3.1 What role do producer groups and exporters have in the upgrading of the quinoa trade?	Interviews, Observations
3.2 Has the commercialization of quinoa improved the livelihoods of farmers in the research area?	Literature, Observations

RQ1: Questions concerning the value chain will mostly be answered by studying literature. In recent years, the topic quinoa has been of great interest to scientists since the ancient crop has experienced a drastic market boom since the 1990s. Visiting the quinoa conference in La Paz will substantially contribute to an understanding of the situation in 2013. The conference will be held to celebrate the past's success of quinoa as well as to discuss sustainability issues which the production is facing.

RQ2: The second part of the research assesses the business relation between farmers and exporters. To do this, the 22 Tango method is used, which uses a set of statements as a base. The outcome of the relationship assessment can be used for followed-up activities by chain actors that work on the improvement of the relationship, taking the identified challenge areas as a basis.

RQ3: With answering research question 3, it will be revealed in how far the commercialization of quinoa has contributed to an improved livelihood of farmers of the Altiplano. Since a livelihood analysis is mostly very comprehensive, this question will be answered in form of storytelling, combining information gathered during interviews, observation but mainly literature review.

4.2.1 Two-to-Tango method-Questionnaires

Background information

The 22Tango method is a tool developed by Ted Schrader within the context of the Agri-Pro-Focus partnership to improve firm-farm relationships. The tool is used to assess and analyse those relationships in a participatory way as well as identifying follow-up activities to improve the relationship at hand. Its basic concept is based on business relations between firms and farmers that have different interests and perceptions of each other due to or resulting in limited communication. The lack of communication can provoke misunderstandings, wrong perceptions and mistrust between the parties which finally can affect the business relation. Since both parties are dependent on each other it is important to engage in stable and transparent relationships.

The tool works with the perceptions that farmers have of the firms and vice versa. Those perceptions might have been created over years and can be true or not; fact is that perceptions shape their behaviour since individuals respond to each other in terms of their perceptions. Seven challenge areas with according statements (and compiled in questionnaires) have been developed in workshops, covering the context of firm-farmer relation; crops, markets and standards, the actors, risks, the agreement, farmers' defaults and firm's defaults. The self-assessment results derived from the questionnaires should facilitate communication between farmer and firm. The application of the tool is not an objective in itself. The tool can be applied by facilitators knowledgeable about the business case and/or (staff of) the firm and farmers' organization concerned. In any case, there should be very clear prospects that the results of the exercise will be taken up for further action.

The finally designed questionnaires are conducted with both firms and farmers in order to evaluate their perceptions on all topics. The respondents have 4 categories to choose from ranging from "totally agree" to "don't agree at all". The results are directly put into an excel file and can be translated into graphs immediately, making it easy to visualize and compare the perceptions at hand. Quick debriefing is possible and very much appreciated. The interviewed stakeholders will be joined in a focus group discussion in order to discuss the outcomes of the farmers' (e.g.) overall perceptions and it will be further discussed why certain answers have been given. The same happens with the other party.

In order to conclude, it can be said that the tool allows a better understanding of two parties from each other and triggers communication. The tool is only helpful though when it is executed with all its steps. First of all, it is important to understand the business case one is dealing with so that statements can be adapted to the situation and their results will give a better insight into the business relation. Secondly, it is very crucial to share and discuss the self-assessment results, rather than only collect data and produce graphs. The results that are given show the (subjective) perception of firm and farmer. It does not explain why scores are high or low. Therefore, the interpretation has to be done by the actors involved. Lastly, it has to be decided how to follow up on the results and their interpretation.

(Source: ORGANIZED FARMERS AS PARTNERS IN AGRIBUSINESS, Firm-farmer partnerships and contracting part 1-4, Agri-Profocus, March 2012)

Implementation of the tool

In case of this thesis, some of the suggested steps could not been followed exactly. The essential barrier was that the researcher was not familiar with the business case on beforehand and relied on literature and comments of people knowing the case of Bolivian quinoa. With this input, the questionnaires have been adapted as much as possible and covered the challenge areas of the business case quite well. Another difficulty was that the existing relationships in the quinoa chain are not as simple as a direct firm-farmer relationship but rather muddy, involving more stakeholders that are fluctuating per season. Farmers have official business relations with companies but sell also on the black market in Challapata, are part of an association or sell to an unknown middleman. At the same time, companies have a variety of different supply methods for their quinoa. Comparing all those different types of relationships would be of great interest but the number of interviewees is rather limited. Due to network sampling, some of the relationship types, especially the one of farmers being affiliated with companies are missing. The sample that was taken looks as follows:

Total: 56 questionnaires, of which
34 farmers, 24 members of farmers associations, 10 individual farmers
19 companies (owners and employees)
3 middlemen

4.2.2 Interviews

Additionally to the questionnaires which are part of the 22Tango method and are to be found in annex 2.1, qualitative interviews have been conducted with firms, farmers as well as 3 out of the 4 certification bodies in Bolivia in order to better understand the farming systems, provisioning system, traceability and challenges, chain actors are facing. As for the companies, the provided information has been used to design a table that allows comparing the different 9 companies interviewed. The interviews can be found in the annex 1.1 and 1.2.

4.2.3 Literature

Apart from the field work which includes the conduction of questionnaires and interviews, literature has been studied before, during and after the field work. The literature reviewed is a combination of different material. Before leaving to Bolivia, the Internet (Google Scholar) and the library of Wageningen University have been searched for relevant literature relating to the topic "Bolivian quinoa" after 2000. Google Scholar provides 5.020 results for "Quinoa Bolivia", with most documents relating to physiological and nutritional properties of the plant and its cultivation. In order to prepare for the field work, 4 of those documents, literature about the 22Tango method plus the "Atlas Productivo de la Quinua Real" (FAUTAPO, 2011) have been studied thoroughly. In Bolivia, the researcher was provided with material from FAUTAPO, PROINPA and Pablo Laguna, giving insight mainly into production aspects and the sociological side of the quinoa trade (respectively). During the research process, literature referring to value chain theory has been searched for, as well as covering the topic of trade impact and livelihood development. In that latter topic, a contact with Enrico Avitabile could be established during the quinoa conference which has proven to be useful since he is going to publish a PhD thesis about food sovereignty and food security. Since CABOLQUI did not provide any requested material relating to trade, numbers about cultivation, exports and values of quinoa are derived from FAOSTAT and IBCE.

4.2.4 Additional methods

Next to the three elements of literature review, interviews and questionnaires, an international congress about quinoa organized by CABOLQUI in la Paz has been visited. This congress gave the opportunity to get to know stakeholders involved working rather downstream in the supply chain, exporting firms, chambers of commerce and importing firms. Other people representing media, research centres and financing institutions have been present as well.

An attempt has been made to collect more data for the results of the 22Tango method. CABOLQUI offered to distribute the questionnaire among its members' farmers and FAUTAPO proposed to send selected statements to farmers, that are registered in a certain database that distributes (and receives) information via a SMS service. The two institutions made themselves responsible for the implementation of the methods but despite reminders from the researcher's side, no feedback has been received yet.

4.3 Data collection

Primary data collection has been done during a period of three weeks in the area (Bolivian Altiplano, in the regions of la Paz, Oruro and Potosi). Interviews and questionnaires have been conducted with representatives of quinoa companies, associated and individual farmers and with directors of certification bodies (no questionnaires in this case). In total, 56 questionnaires have been collected, among which 19 with representatives of 9 quinoa companies, 34 with farmers of which 24 are members of 15 different associations and 10 being individual farmers. In the first week of the stay in Bolivia, representatives of quinoa companies could be met at the International Conference of Quinoa. Being introduced to each other during the 4 days, there were no difficulties with arranging dates for interviews and visits to the factories (mostly in La Paz).

All interviews (including some of the questionnaires) have been recorded with a mobile phone which makes it possible to transcribe the conversation.

Secondary data collection for the research has mainly been done in Wageningen. Quinoa is a well-studied and discussed topic, especially in 2013 and some of the research questions could better be answered with literature review than with the limited time of 5 weeks of primary data collection in Bolivia.

Figure 11. Interviews in Challapata, April 2013

4.4 Data processing

There are two types of information that were obtained from the field work: qualitative data from the interviews and quantitative data from the questionnaires. The information collected during the interviews is used to understand farming systems, sales channels and price mechanisms as well as understanding individual perceptions. Further, a table comparing the companies' profiles was built with the interviews' results. The data collected with the questionnaires has been entered in an excel spread sheet which includes certain formulas to calculate the percentage of agreement with the provided statements and topics per group and subgroup and the level of agreement. Information gathered during literature study is incorporated into the background information and into the answers of the sub-questions, found in the results Chapter.

4.5 Timeline

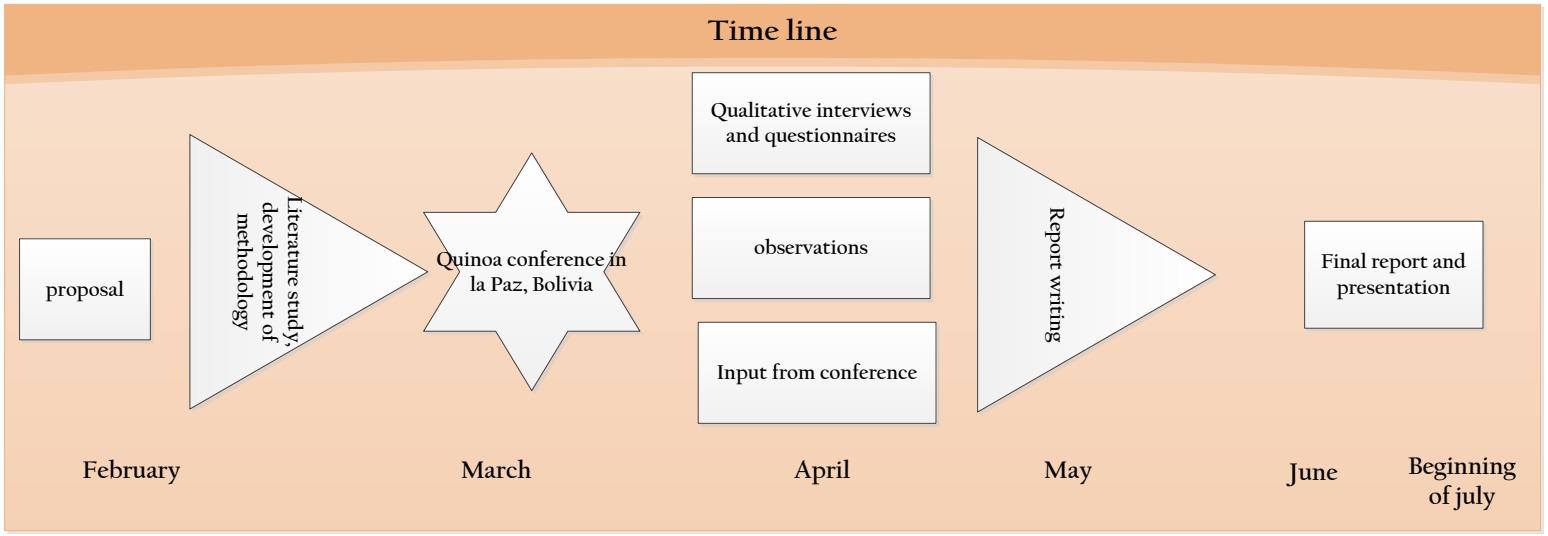


Figure 12. time line in which the study has taken place

Chapter 5. Results

The result Chapter is structured according to the sequence of the research questions that were introduced in Chapter 3. The title of the subchapter indicates the topic of the research question and the according sub-questions are presented below, each indicating the research methods, that have been used to answer them. An overall conclusion of the three research questions will be given in Chapter 7.

5.1 Features of Bolivia's organic quinoa value chain

5.1.1 Who are the actors, operators and facilitators in the quinoa chain in 2013?

The results for the stakeholder mapping are a combination of literature, observations and information shared at the quinoa conference

5.1.1.1 Farmers and farmer organisations

Farmers

In the study "Situación Actual al 2008 de la Quinua Real en el Altiplano Sur de Bolivia" which was executed by FAUTAPO, it is estimated that 14.000 families in the Southern Altiplano (departments Oruro and Potosi) are involved in quinoa production. A similar number is mentioned by CABOLQUI, which speak of more than 14.000 farmers (March 2013). According to Bolivian media (*http://www.infoquinua.bo/?opc=noticia&id=317*) , there are 6.000 permanent producers in 10 different communities of the Southern Altiplano. PROINPA speaks of 70.000 quinoa producers in total. It surely has to be differentiated between farmers producing for auto consumption only, the ones that produce for the national market and farmers involved in international trade.

CECAOT

CECAOT is a producer cooperative with 300 members in 13 regional cooperatives and has been the first organization of quinoa growing peasants which had emerged from earlier programs of Belgian missionaries promoting agricultural mechanization.

ANAPQUI

ANAPQUI (Asociación Nacional de Productores de Quinoa) is the national association of quinoa producers, based in Challapata. It was founded in 1983 with the aim to cut out middlemen in the quinoa chain and find guaranteed markets for the producers. Supported by ITC (International Technical Corporation Program), the Central Union of Peasant Workers (CSUTBC) and financed through bilateral collaboration program of the UN and the European Community, the association could be upgraded to a processing and exporting association. At the moment, it has 2.000 members with an area of 35.000 ha in the surroundings of Challapata and the area of the Intersalar, the zone between the Uyuni and Coipasa saltlake. It is working with 8 regional associations which are based in the production zones and the main location is in Challapata in the south of Oruro where ANAPQUI collects, processes and stores quinoa. ANAPQUI seems to be a highly recognized producers association in Bolivia, providing an often imitated example in many of its operating areas such as price setting mechanisms, producers program or its own regulations for organic production. The program PROQUINAT (Programa Quinoa Natural) has been developed by the association in 1992 and is responsible for extension service and the ICS. ANAPQUI is functioning as a producers association but is processing and exporting quinoa at the same time as the companies presented above do. ANAPQUI is organic certified and has been one of Bolivia's pioneers in Fairtrade.

5.1.1.2 Middlemen

Middlemen have been the traditional buyers of quinoa, being the ones having contacts to farmers and means of transport (personal communication with Martha Cordero). Nowadays, middlemen have negative as well as positive connotations; sometimes being a stable link between farmers and companies and sometimes ruining business and prices for both farmers and companies (both opinions mentioned during the quinoa conference in march 2013). Many of the middlemen present in the Bolivian sales channels are difficult to categorize since they avoided being interviewed. A study done by PRORURAL illustrates the following: community collectors who are going to the fields with their vehicles, collecting quinoa and then selling it in Challapata to bigger middlemen, Challapata middlemen who are distinguished into three different types: small ones that buy and sell 100 qq/week, medium ones that often work in a union, buying and selling one truck/week and wholesalers that buy and sell 4 trucks/week, having their own warehouses and equipment to clean quinoa. Further, there are other buyers that can be Peruvians and small, national enterprises.

5.1.1.3 The final processing and exporting companies

In total, there are about 62 processing plants in Bolivia, of which 16% are traditional, 27% semi-industrial and 57% industrial plants (35 in total), which are the ones this research focuses on since they are exporting the quinoa. All of them have a different philosophy, different processing capacities, different supplier programs and in some cases are situated in a different location. The paragraphs below are an example of how 2 of those companies present themselves on their weBsites. In Chapter 5.2.1, a table with information about product range, processing capacity, price mechanisms and other relevant information of all (9) interviewed companies will be provided.

ANDEAN VALLEY S.A.

Andean Valley S.A. is a private company dedicated to the processing, developing and exporting of Andean products, with organic Royal Quinoa as its main product, processed into grains, flours, pre-cooked food and flakes. The company's self-stated philosophy is "to offer the consumer health, nutrition and quality of life with our new products", supporting sustainable development for quinoa producers and production areas in Bolivia.

Andean Valley has developed a suppliers program, "Farmers Program Andean Valley", including 450 families in 18 communities in the southern highlands of Bolivia.

Through the program, the producers get: technical support for organic farming, from two field agronomists together with Danish Organic Agricultural technicians; organic supplies for pests controls (organic certificates pesticides, pheromones, light traps), organic fertilizer (soil amendments), tools for cultural cultivation practices and finally a fair price. In some cases, roads have been built to access high altitude production areas.

IRUPANA ANDEAN ORGANIC FOOD S.A.

Irupana is a company specialized in the production of organic Andean cereals with Royal Quinoa being its most important product(white, red and black). Irupana's mission is to contribute to national food security and to recover Bolivia's potential of the production of organic agricultural products. In their vision it is stated that "there is a way to achieve sustainable development with social justice among human beings, in harmony with Mother Earth and with the adequate profitability to make the company a self-sustaining model." The products they sell are available in food stores in Bolivia, and Irupana has a range of grain products for export.

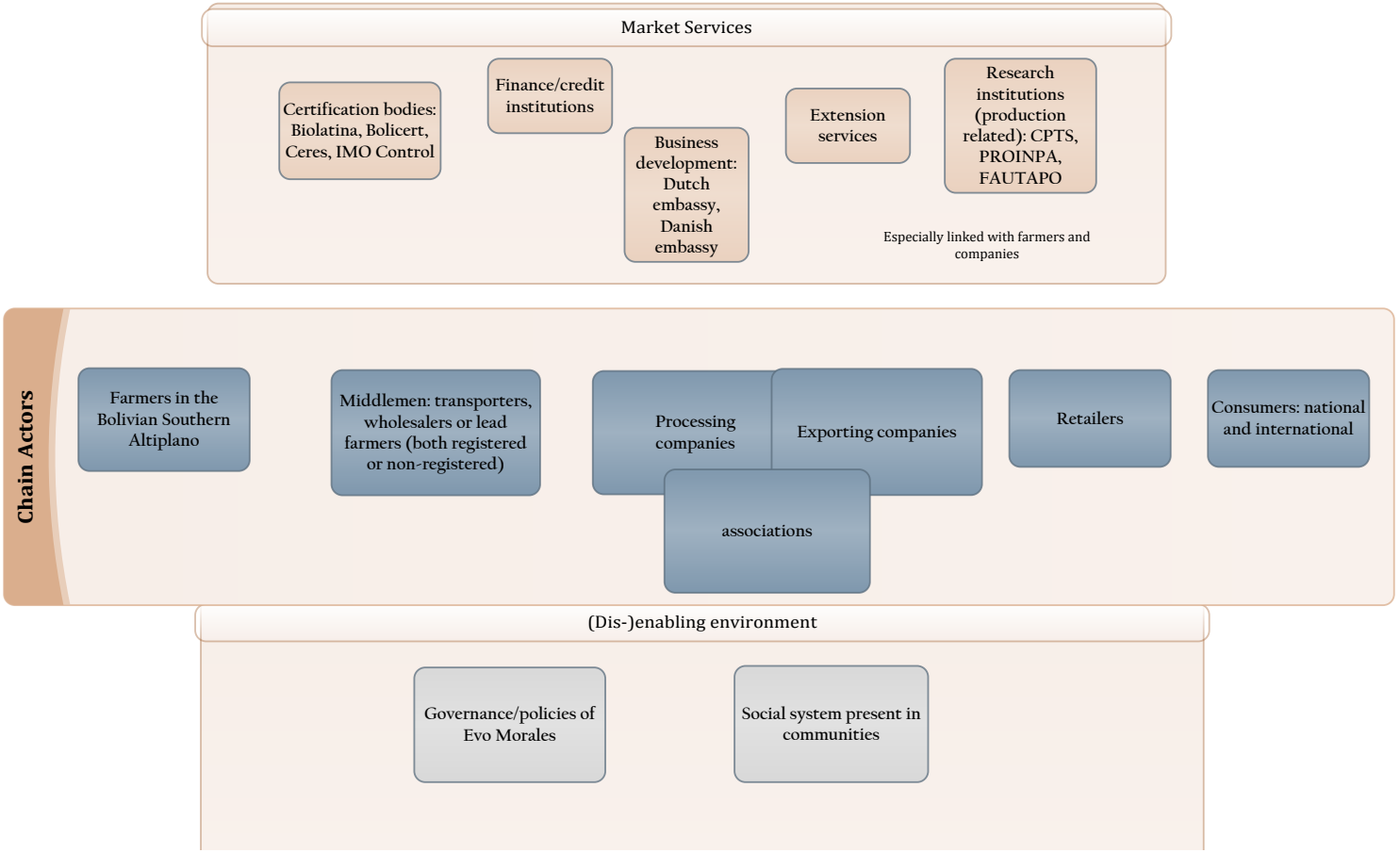


Figure 13. Chain actors in the quinoa chain

The Graph above gives a rough indication of who the actors in the Bolivian quinoa value chain are. A more detailed description of who they are follows below, an explanation about how they are interacting with each other follows in Chapter 5.1.4.

5.1.1.4 Market Services

CBI/MERCADERO

CBI-Centre for the Promotion of Imports from developing countries offers coaching programs and other market services to increase exports from developing countries to EU/EFTA markets. With several modules, they engage all key actors in the value chain with the purpose of strengthening the competitive capacity of producers and exporters; and improving the infrastructure in developing countries by supporting Business Support Organisations (BSOs) and government authorities. Success stories (that they mention on their weBsite) are the projects "Bringing Benin's community-based tourism to Europe" or "From "product push" to "market pull" for the metal sector in Bosnia-Herzegovina". MERCADERO is connected to CBI's activities through the consulting activities Freek Jan Koekoek is doing for companies that are involved in the CBI's projects.

CABOLQUI

CABOLQUI is the Cámara Boliviana de Exportadores de Quinoa y Productos Órganicos (Bolivian chamber of exporters or quinoa and organic products). CABOLQUI is a non-profit organization that is promoting organic production, social and environmental responsibility and the development of small farmers in order to contribute to the development of all active participants in the quinoa chain and other organic products (http://www.cabolqui.org/).

It seems that quinoa is CABOLQUI's main activity, especially in year 2013, which is the International Year of the Quinoa and which was celebrated in Bolivia in march 2013 with CABOLQUI being the host of about 150 international guests. CABOLQUI's quinoa branch is composed of ten companies that are operating as exporting and processing companies in Bolivia. At the moment, they are representing 70% of the nation's quinoa grain export and 25% of the existing companies in the country. The companies working with CABOLQUI work alongside their associated suppliers, offering differentiated pricing and enabling strong relationships. These relationships have become long-term strategic alliances and have led to the development of different programs for suppliers . The impacts these programs are aiming at are at the economic (enhanced production, generated employment, local development), the social (improved quality of life of suppliers and companies' employees) and the environmental level (promoting values of respect). (http://www.cabolqui.org/)

The companies associated within CABOLQUI are:

Andean Valley, Quinoafoods, CITY, SINDAN, SIMSA, Irupana, Jatariy, QUINOABOL, Conrural XXI, Latco International. For the thesis, 6 of these companies have been interviewed.

Fundación FAUTAPO

The "foundation FAUTAPO- education for development" started with a project in 1998. Within this project- which was initiated by the Dutch embassy and the Bolivian ministry for higher education, science and technology, FAUTAPO should develop educational material for the curricula of several educational institutions, such as the Universidad Autónoma Tomás Frías de Potosí. FAUTAPO started its operations as a foundation in 2005, when the project was completed and the decision was made to continue with the already established basis of that foundation. Its first program was dedicated to quinoa and started in 2005: el Programa COMPASUR (El Programa Complejo Productivo Altiplano Sur) which aimed at developing the Quinoa Real as being the main economic activity in the area in the first phase and developing livestock activities, rural turism and quinoa as potential and interacting activities in the second phase which is going to end in the end of this year.

Apart from private and public institutions, the project COMPASUR has mainly been supported institutionally and financially by the Dutch embassy. Within the project, FAUTAPO is working with other national and international research institutions such as PROINPA and farmer associations like ANAPQUI.

FAUTAPO's general work is determined by their mission to "promote the social and productive development at local, regional and national levels, as well as the institutional strengthening of actors and their educational and productive networks". Their activities are composed of supporting producers with technical and professional training, contributing to increased productivity levels in companies, leading and coordinating comprehensive training processes in Bolivia and supporting knowledge management and hence broadening opportunities for the Bolivian society. They are operating at local, regional and national levels and work across those levels by strengthening the institutional power of chain actors to improve their networks. (source: FAUTAPO weBsite, 2013)

PROINPA

PROINPA is a research centre based in Cochabamba whose activities are contributing to agricultural development and are financed by the Bolivian and European governments. PROINPA has done many studies in the field of quinoa and has created a seed bank, protecting the various existing varieties, developed a line of organic fertilizer and pesticides (BIOTOP) and developed farming systems in which natural ecosystems can be protected.

CADEPQUI-OR

CADEPQUI (Cámara Departamental de Productores de Quinua de Oruro) is the chamber of quinoa producers in the region of Oruro.

FAO

The role FAO is playing is the one of a communicator and promoter in the quinoa sector since it has called 2013 the International Year of the Quinoa. The year 2013 is dedicated to quinoa and "aims at getting the world's attention on quinoa´s biodiversity and nutritional value and which role it plays in food security, nutrition, and poverty eradication. Further, it can contribute to achieving the internationally agreed development goals." (FAO website 2013)

In Bolivia, FAO is planning to develop an International Centre of Quinoa in which market intelligence is collected and exchanged, new technologies and varities researched and distributed such as in the International Rice Research Institute e.g.

Donor organizations

Many of the quinoa projects have been financed and supported by international institutions and governments, in recent years mainly by the Dutch and the Danish embassy which are closely collaborating with FAUTAPO and CPTS respectively. Other financial support is given by the bank for development and production, Banco de Desarollo Productivo offering low-interest credits amongst others. USAID has played a substantial role in the 1990s in setting up processing units in the quinoa production areas but is less involved in 2013 (see Chapter about quinoa).

CPTS

CPTS is the centre for the promotion of sustainable technologies and is active in the field of investigation, development of "clean" technology and technical guides since 1994. In quinoa, CPTS has been developing machinery to facilitate land preparation, seeding, harvesting and post-harvesting. The machinery is being tested in a pilot project in the community Ayamaya and was presented during the international CABOLQUI event.

5.1.1.5 Certification Bodies

In Bolivia, there are four certification bodies that are involved in the certification of organic agricultural products. All of the certification bodies certify production as well as processing operations according to European, United States', Canadian and Japanese organic standards and in some cases according to private standards such as Soil Association or Bio Suisse. Companies present in Bolivian quinoa are presented below.

Established in 1996, BOLICERT is the only Bolivian certification body in the country and the only one working with additional standards of IFOAM. BOLICERT is working in quinoa since its beginning when it was created together with the association ANAPQUI as being an independent, national certification body for certifying quinoa in Bolivia.
BIOLATINA, which is a Latin-American certification body with its head office in Lima, Peru, is working since 1998 in Bolivian quinoa. BIOLATINA is working also with 3 private certificates.
CERES, with its head office in Happurg, Germany, is working in Bolivia since 2008 with 5 inspectors.
The three bodies mentioned above are all based in La Paz, whereas IMO Control is based in Cochabamba. IMO Control is the Swiss Institute for Market-ecology and is a department of the non-profit Swiss Bio-Foundation and is working in inspection, certification and quality control.

Companies and farmers choose one of the certification bodies for a complex of reasons, which may include certification/inspection costs, implementation of requirements or delivery of (transaction) certificates or inspection/auditing scheme, as well as reputation. The standards for organic quinoa according to which the certification bodies inspect production and processing sites are the same for all, although some inspect more strictly than others (JacoBsen, 2011 and personal communication with Pedro Claver, 2013). Other differences between them are in costs. The certification bodies have recognized the importance of collaborating and are working on an agreement to match those differences and work together on the challenges present in certification and transparency (personal communication with Carmen Murillo Quiroga, 2013).

Certification process

The organic standards allow for individual and group certification. In many settings involving small farmers, group certification is the norm, since the alternative is very costly. This is also the case in Bolivia (personal communication with Pierre Frachon). Most of the times, the organic certificate is owned by companies or a producer group. That means that they have to guarantee traceability and organic production in their quinoa supply. In this case, companies working with fixed producer groups, have an Internal Control System (ICS) with field technicians that supervise the producer (groups). In this case, the certification body makes a yearly audit, checks the documents of the ICS and inspects a sample of the producers. The percentage of inspected farmers among all registered producers that is required varies with the certification bodies and is 100% in case of Bolicert and up to 30% with Biolatina (personal communication with Micaela Cabrera Bayer, 2013).

Another case is that single producers apply for and then own the certificate. In a calculation done by JATARIY and FLO cert. (information from personal communication with Pierre Frachon, 2013), it was concluded that the process of certification is worthwhile for one quinoa producer with an area bigger than 25 ha In this way, farmers do not depend on one company, they are free in selling their quinoa wherever they will receive the best price for their produce. In case of a single certified producer, 100% of the area is inspected.

It is also possible, under the group certification modality, that the farmer mentioned above is sub-contracting other farmers, mostly with his proper ICS. Some companies are working with that system of sub-contracting as well in order to save inspection costs.

Detalle	Costo (USD)
Día de inspección parcela	169,00
Día inspección procesamiento	170,00
Informe de inspección (por informe)	169,00
Honorario viaje (total)	169,00
Traducciones a otro idioma	169,00
Certificado anual	405,00
Hospedaje, transporte	(únicamente costo real)
TOTAL	1251,00 + costos de hospedaje y transporte

Table 2. Certification Costs Bolicert, 2008

5.1.2 Which historical features have shaped the organic quinoa value chain of today?

With information derived from literature, the recent history of the expanding quinoa sector in Bolivia can be categorized in different phases:

Until the 1970s: quinoa was consumed domestically and received little attention; it had a rather negative reputation in the western-orientated part of society and was considered food for the indigenous and criollo ethnic groups

1970s to 1983: establishment of small producer groups/ cooperatives in Bolivia; at the same time alternative trade organisations (ATO's) emerge in Western countries

1983-1990: first contracts established between producer organisations, ATO's and private companies; building of processing plants to fulfil international quality requirements

1990s: period of organic conversion starts; programmes for production of organic quinoa are developed, new production systems, including the use of machinery are introduced to the Altiplano

Late 1990s: increased participation of private companies, less importance of producer organisations, purchasing model shifting from associate relation to firm-farmer relations

2003: international quinoa boom starts; export numbers and quinoa prices on the local market are increasing rapidly

Starting 2010: first criticism on sustainability of quinoa production in Bolivia is pronounced by international media

2013: recognition of quinoa's importance at international level: FAO nominates 2013 the International Year of Quinoa

5.1.3 Which are the challenges the quinoa chain is facing in terms of sustainability?

Information in the following paragraphs are derived from several newspaper articles and information picked up at the quinoa conference

In Bolivia, quinoa has been produced for thousands of years, being part of an organic and closed production system which was integrated into the fragile ecosystem of the Bolivian Andes. The harvest

of the quinoa system provided staple alimentation for Bolivian's inhabitants and at the same time provided its own organic fertilizer for the plant by using llama manure. Many of these issues are claimed to be non-existing anymore and the quinoa-boom is criticized to do more bad than good. Articles have been written about soil deterioration or social problems within quinoa producing communities. The detonating growth of the international demand for quinoa and hence the expansion of quinoa cultivation in Bolivia is surely leading to certain issues that have been mentioned by Western reviews. This research approaches the question from different angles, trying to give a holistic picture. The concept of sustainability from which the question is being answered, keeps the trade aspect in mind, meaning that sustainability within the quinoa chain would mean the possibility of a continuous and successful trade for both farmers, farmer associations as well as processing and exporting companies and other actors at the end of the value chain.

Loss of traditional production system threatens Bolivian's ecosystem
Summarizing and combining the information gathered during the literature review, interviews and observations, one gets aware that the international trade explosion in recent years and Bolivian's response with expanding cultivation of the crop sets itself at risk to continue as successfully. With the rapidly expanding cultivation of quinoa, traditional cultivation practices, which are the guarantee for sustainable production of quinoa tend to be neglected. Farmers are shifting their production towards intensive cultivation systems which means that more space is used for only the quinoa plant and less space is given to the raise of animals (mostly llamas) which are providers of natural fertilizer and another source of income. In traditional systems, land lays fallow for 4 to 8 years; nowadays, 1 to 2 years are the maximum (JacoBsen, 2011). Due to the demand for the Royal Quinoa (Quinua Real) which is characterized by its big grains, little other varieties are grown. Within Royal Quinoa, there are about 50 ecotypes, but local varieties are less and less cultivated since there is little demand for them.

Local cultivation trying to keep up with international demand
At the same time, the small-holder farmer who is threshing his quinoa plant with the use of some simple tools under the bright sun of the Bolivian Altiplano is one of the images that is used in advertising and promoting quinoa in foreign countries. In many cases, small-scale farming is still present but if not specifically preserved, traditional knowledge and farming systems tend to be forgotten when international demands need to be satisfied quickly, as examples of other crops show.

Unpredictable prices
Many voices have been raised about the unsustainability of the quinoa price which is known to be fluctuating very much. Not only farmers do complain about the extremely growing or shrinking price; especially international traders have difficulties making business with the current price setting mechanisms (discussed on the quinoa conference in march 2013). The dynamics of the price setting, which is found to happen mainly on the fair in Challapata are difficult to grasp but it seems that farmers as well as companies and especially importers do not have an influence on the price. Prices are set according to the season's harvest, international demand and local offer but still are very difficult to predict. The "unsustainability" of the quinoa price lies in the complexity of making business or contracts with a fixed price between different parties.

Traceability
Lastly, the (organic) quinoa chain is facing difficulties in terms of traceability. As it is presented in Chapter 5.1., there are various channels for the quinoa to reach the processing companies and hence the final importer in foreign countries. In case of the companies' suppliers program, the quinoa producer can be identified thanks to the ICS but in case of companies working with suppliers who

work with subcontracted farmers or buy from middlemen directly, the quinoa's origin is blurry. Most of the times, companies do an analysis to check for chemical residues from the non-traceable quinoa but according to personal information from a certifier, there have been many cases of containers being rejected in European ports, which means a big loss for companies. Another issue, which should not find too much attention here is double certification. Since certified quinoa earns more money, farmers find ways of selling their quinoa to different companies, being certified twice. That means, that double the amount of quinoa of one plot is sold to the organic market, leading to the question of its origin.

5.1.4 Which are the channels for quinoa in the research area?

The information about the channels is derived from qualitative interviews in which companies and associations state their supplier and distribution system

5.1.4.1 General overview

5.1.4.2 Associative model: 4 qualitative interviews with board members of associations, 19 questionnaires with farmers

5.1.4.3 Informal market model: questionnaires with 11 farmers, 3 middlemen

5.1.4.4 Firm-farmer model: 9 qualitative interviews, 9 questionnaires with firms

5.1.4.1 Overview

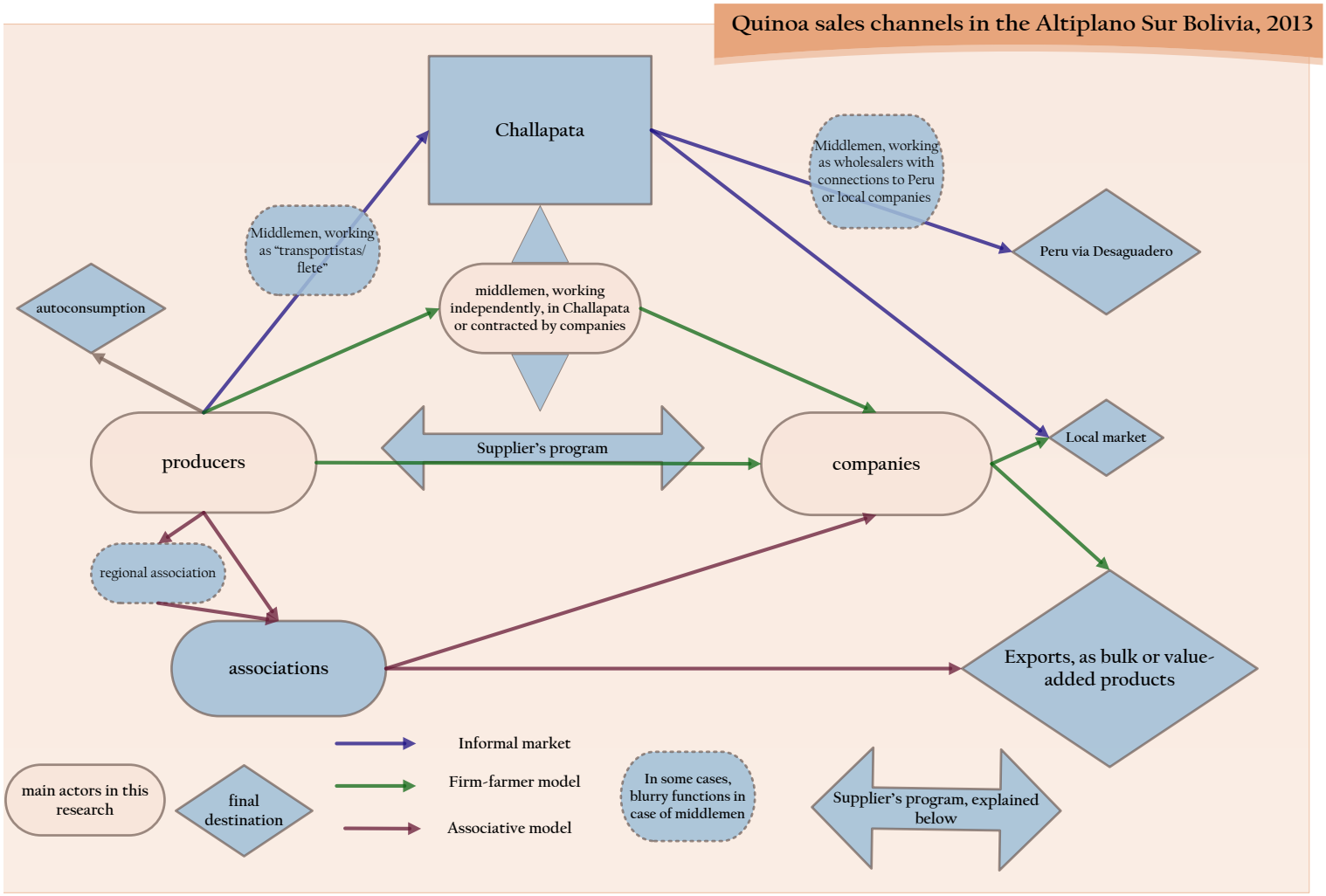


Figure 14. Quinoa sales channels in 2013

The Graph above gives an image of how the quinoa value chain in Bolivia is organised in 2013, putting its main stress on quinoa flow on farm and company level. It pictures the actors that are directly involved in the quinoa trade from the field level until the (final) destination of the quinoa which is within Bolivia, Peru and in foreign countries. There are various ways of how farmers are selling their produce and various ways of how companies purchase the raw or semi-processed grain. Three main channels are presented within the Figures 14 to 22 and are presented separately below. All three channels were researched and interviewed during the research in Bolivia and its participants have been interviewed or filled out the questionnaires.

The companies' suppliers programs ("programa de proveedores"):

In order to guarantee their quinoa supply, most companies have set up a grogram for the quinoa producers. The program can include group certification (paid by the company, field technicians (responsible for the ICS), transport, support with farming tools, etc.). With successful programs, a direct relationship can be established between firm and farmer, stable prices, quality and traceability guaranteed.

Value chain governance

According to the typology of value chain governance of Gereffi et al.,(2005) which is introduced in the methodology Chapter, the types of value chain governance that can be found in the quinoa chain in Bolivia match with the **market model** and the **relational value chain model**. The features of the market model are that actors can easily switch to new partners- without facing high costs, and that market linkages can be transitory as well as repeated on the long term. This governance applies especially to the informal market channel via Challapata but also in trade relations that emerge spontaneously, such as an associated farmer who decides to sell his produce to a middleman, offering a higher price than the association, or a company, replenishing its supplies by buying from sporadic middlemen. The character of relational value chains, which implies mutual dependency between buyers and sellers plays an important role in the Bolivian quinoa trade. The objective of both parties is to trade quinoa for a convenient price, whereas farmers value external support with inputs and machinery and the company reliability (information based on interviews). Those interactions are managed in the various quinoa channels. Associations have the character of family ties and are based in one or more communities, meaning that there is spatial proximity. The companies' interest lies in guaranteeing their quinoa supply and since they are located further away from the producers (except Jatariy, Quinbolsur and a few other companies) other forms of ties have to be created, through the suppliers program for example (will be explained later). Middlemen that are involved in these programs and operate in communities appear to be farmers themselves, hence have a relation with the community members, have familiar ties or bring supplies (medicine, school material, etc.) to the villages which is appreciated by the farmers (personal communication with Martha Cordero). Ethnic relations, meaning the belonging to the indigenous groups Aymara or Quechua of field technician, middleman or company can play a role in gaining the community members' confidence and hence establishing trade relations, as Victor Laruta states.

5.1.4.2 Associative model

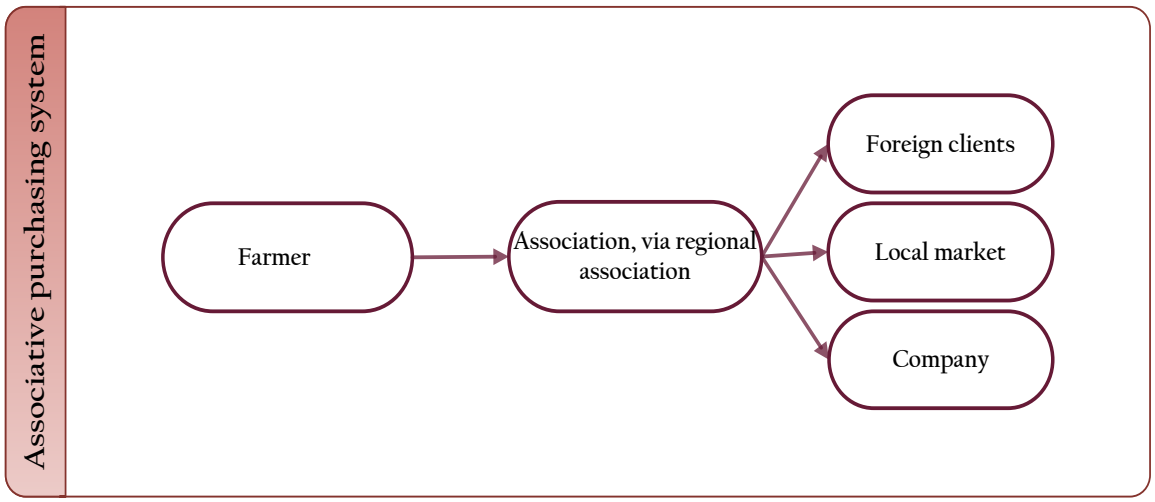


Figure 15. Associative sales channel

The associative purchasing model is the one implemented by associations like ANAPQUI and is the first international trade model that has started in the 1980s. Farmers are associated and sell their quinoa for a price which is set according to different mechanisms within the association. According to the association's size (from 50 up to 2000 farming families, see profiles in Chapter 5.2.1), the sales channels vary. Some associations sell to the local market or to companies since they have not yet established themselves or are too small to enter the international market. Bigger associations have a strong and well-established purchasing system and directly export their produce; in bulk or already processed. In the associative purchasing system, farmers have a guaranteed market, a fixed price and other services that the association offers. There are annual contracts, ICS is implemented by the association and regular meetings are held to inform farmers about market dynamics. The Graph below draws an example of the associative purchasing model.

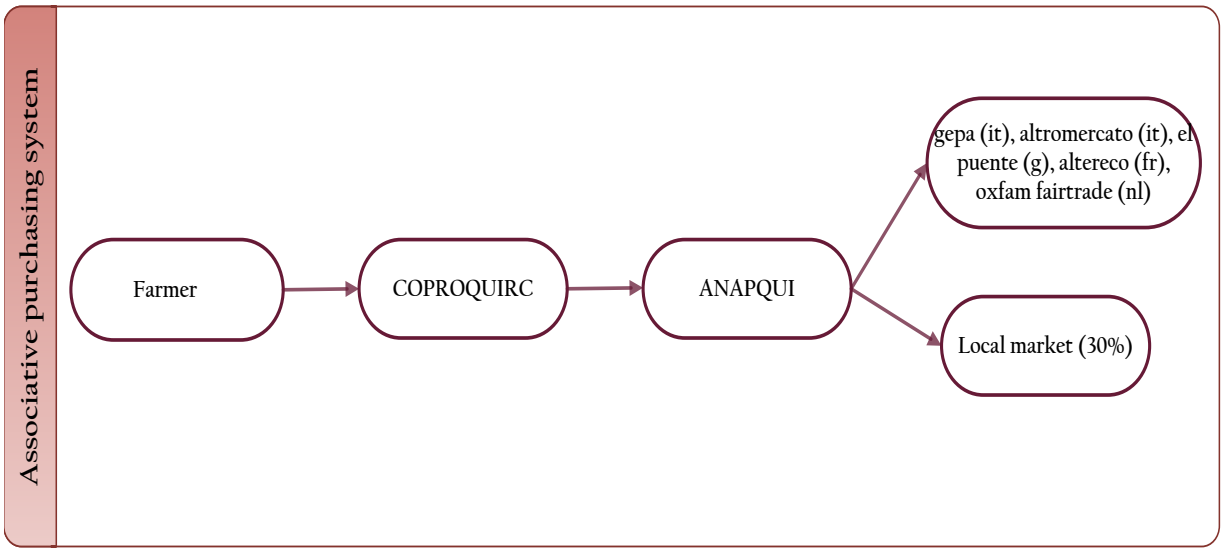


Figure 16. Example associative purchasing model

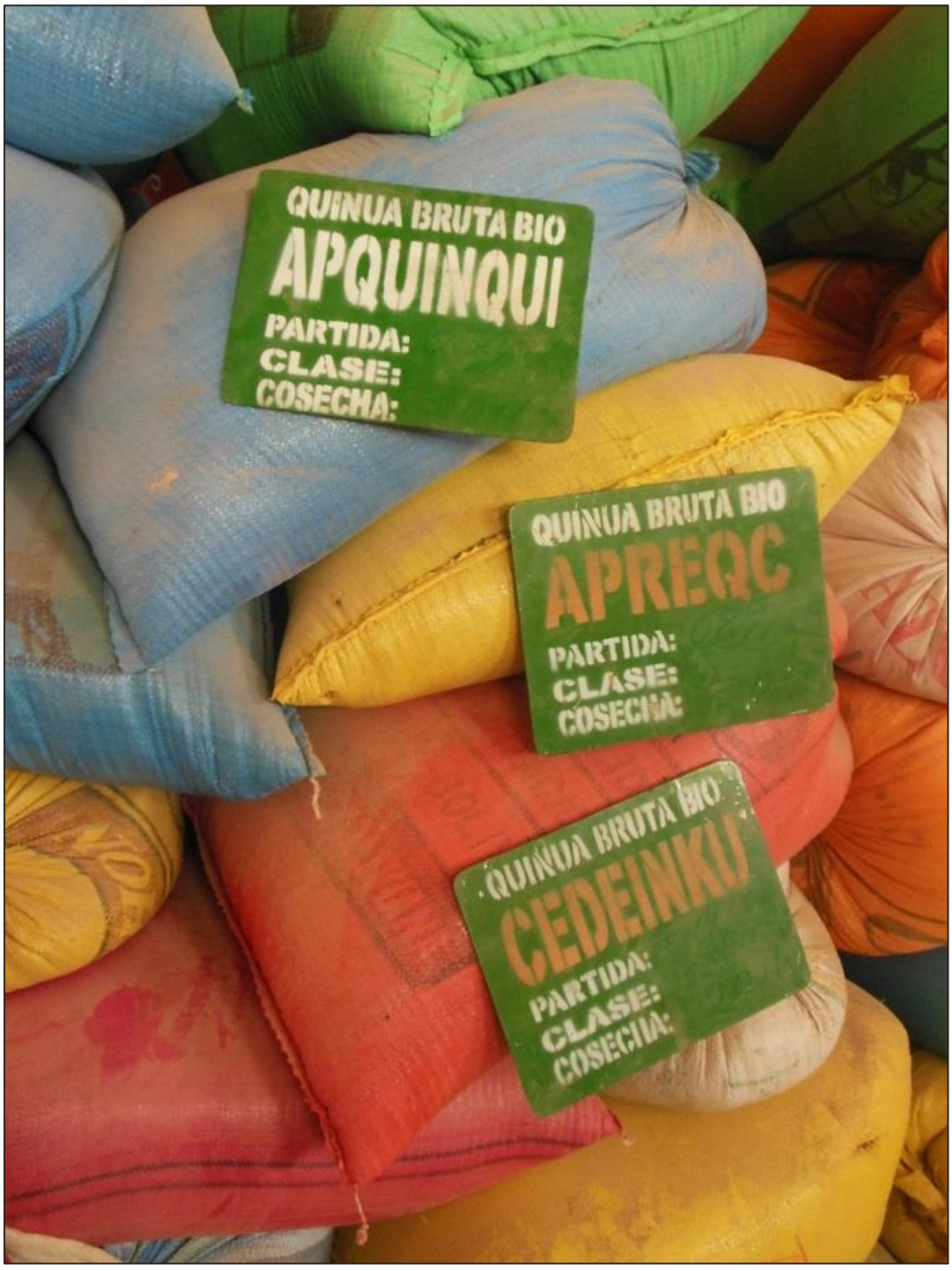


Figure 17. Storage of delivered quinoa in ANAPQUI, Challapata

5.1.4.3 Informal market model

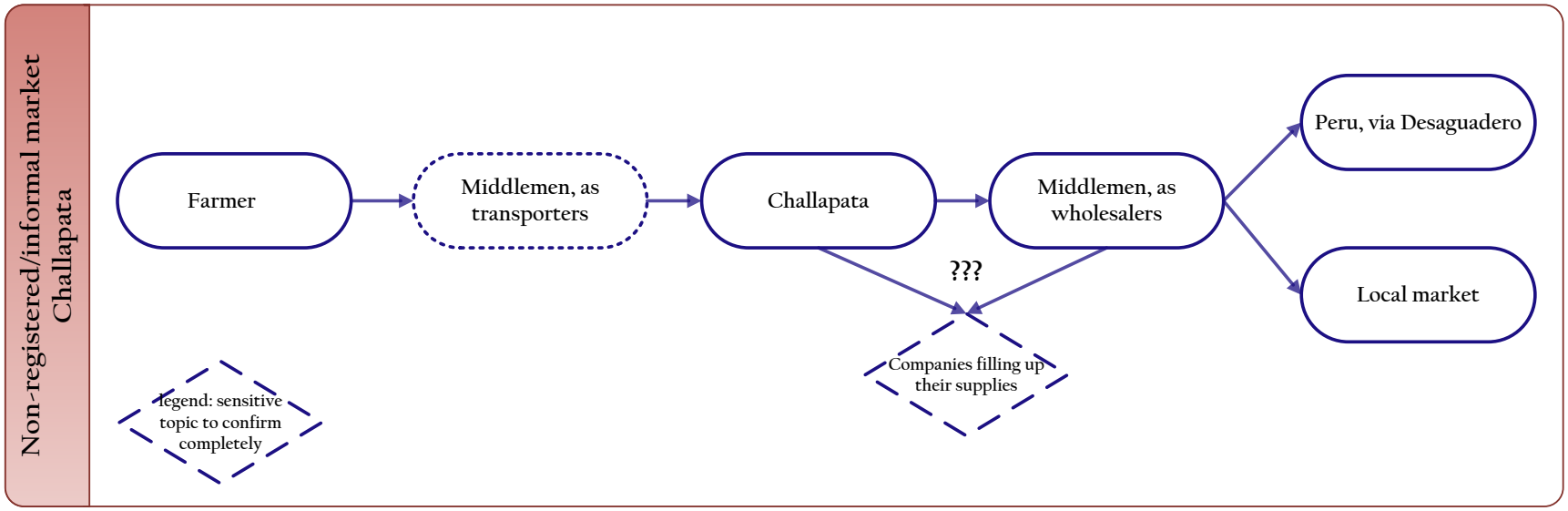


Figure 18. Informal market model

The informal market system is the one which was traditionally in place and the single quinoa channel until associations and companies entered the scene in the 1980s and 1990s. Challapata plays an important role in Bolivian's quinoa sector; small farmers that are not affiliated with associations or companies sell their quinoa on the fair according to availability of their produce and depending on their necessities. It is a spot market and difficult to predict its dynamics. It is not only one type of farmers that participate in the fair; if Challapata prices are high, association members or contracted farmers prefer to sell their quinoa on the fair, also due to the fact that they are paid immediately or due to the fact that quality requirements are low or not-existing. In the case of contracted farmers or associated farmers selling in Challapata instead of selling quinoa within the designated channels, companies and associations have difficulties in satisfying demands from their clients and rumours have been heard, that companies as well seek quinoa in Challapata. If it is not (international) exporting companies that buy the quinoa, the Challapata wholesalers forward the quinoa to national processing companies or send it to Desaguadero, where it enters Peru and is consumed and further exported. Since it is a black market, it is difficult to gather information and numbers, indicating in which quantities the quinoa is flowing in those channels. In a document of 2004, PROINPA estimates that up to 4500 tons are smuggled to Peru.

Figure 19. Crossing the Peruvian border: el Desaguadero

Challapata is the main national open market for quinoa, situated in the Southern Altiplano and named "Quinoa Wallstreet" for the consequences its price setting dynamics have on international trade. Every week, producers and traders from all over the country come to the small town to buy and sell quinoa. The price for which the grain is traded is decided weekly and can raise or drop within the day. During the research, a price drop from 750 to 680 bs/qq (7.4.) could be observed. The Challapata fair very much has the atmosphere of an informal market; people are waiting in the street, seated on their production, they bargain, it is paid in cash and the day is concluded with a communal drinking ceremony. Farmers are coming with all quinoa that they want to sell; ranging from half a quintal to 15 quintal or more. Middlemen are appearing with moveable scales to buy the quinoa, calling each other frequently to agree upon a common price and finally loading it onto trucks. According to personal information, the traders are organised in a union which makes them a strong player since little or no room is left for quinoa producers to trade. The Challapata market is organized by supply and demand and the price varies according to season and (inter-)national demand. The Challapata price is so important since it is the benchmark for most companies and associations. The price politics of most companies take the Challapata price as a basis and then adds 50, 60 or 100 bs extra. Quinoa producers come to the market according to their necessities. Since quinoa is a non-perishable product, it can be stored and farmers can sell when they are in need of money or Challapata prices are high. They bring the raw grain and sell it in polyethylene bags in quintales (1 qq=50 kg) or per libra (a bit less than half a kg). They are paid in cash which is a determining argument for them to bring their quinoa to the fair instead of selling it elsewhere.

Figure 20 and 21. Informal market in Challapata; individual farmer (left) and negotiating with middle (wo)men (right)

5.1.4.4 Firm-farmer model

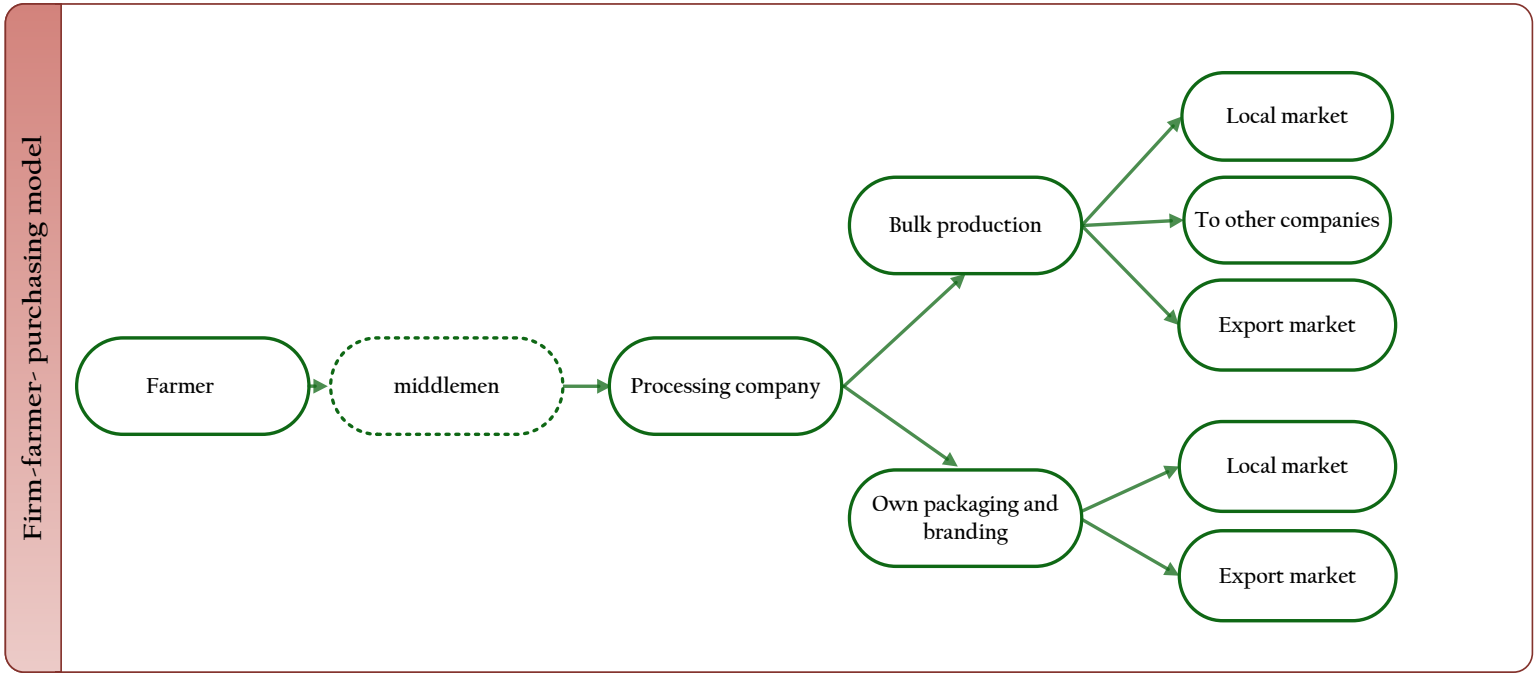


Figure 22. Firm-farmer-model

The firm-farmer-model has been introduced by private companies in the 1990s and is the most commonly used (70%) for quinoa exports (presentation Giel Ton, May 2013). The Graph above gives the impression that companies purchase their quinoa from single farmers. That can be true in some cases when large scale farmers deliver their produce directly at the processing unit but most commonly, companies have established a purchasing system that has similarities with the associative model: it is commonly named "programa de proveedores", suppliers program. Within the programs, there are field technicians, ICS, group certification, contracts and often also the support with farming tools and machinery (more information in Chapter 5.2.1). Companies buy from their "own" farmers, from associations, from middlemen and at times at the Challapata fair. The quinoa is processed in their factories, which most of the times are in el Alto, la Paz and sent to (international or national) clients. The interviewed companies indicated that a small percentage (up to 10%) is destined for the local market, the rest is exported, mostly as washed and graded grain. Companies are starting to process the grain into derivatives such as puffs, flakes or flour. Andean Valley and Irupana seem to be a pioneers with their properly packaged quinoa hamburgers, muesli and energy bars. The Graphs below show Andean Valley's and Jatariy's distribution systems.

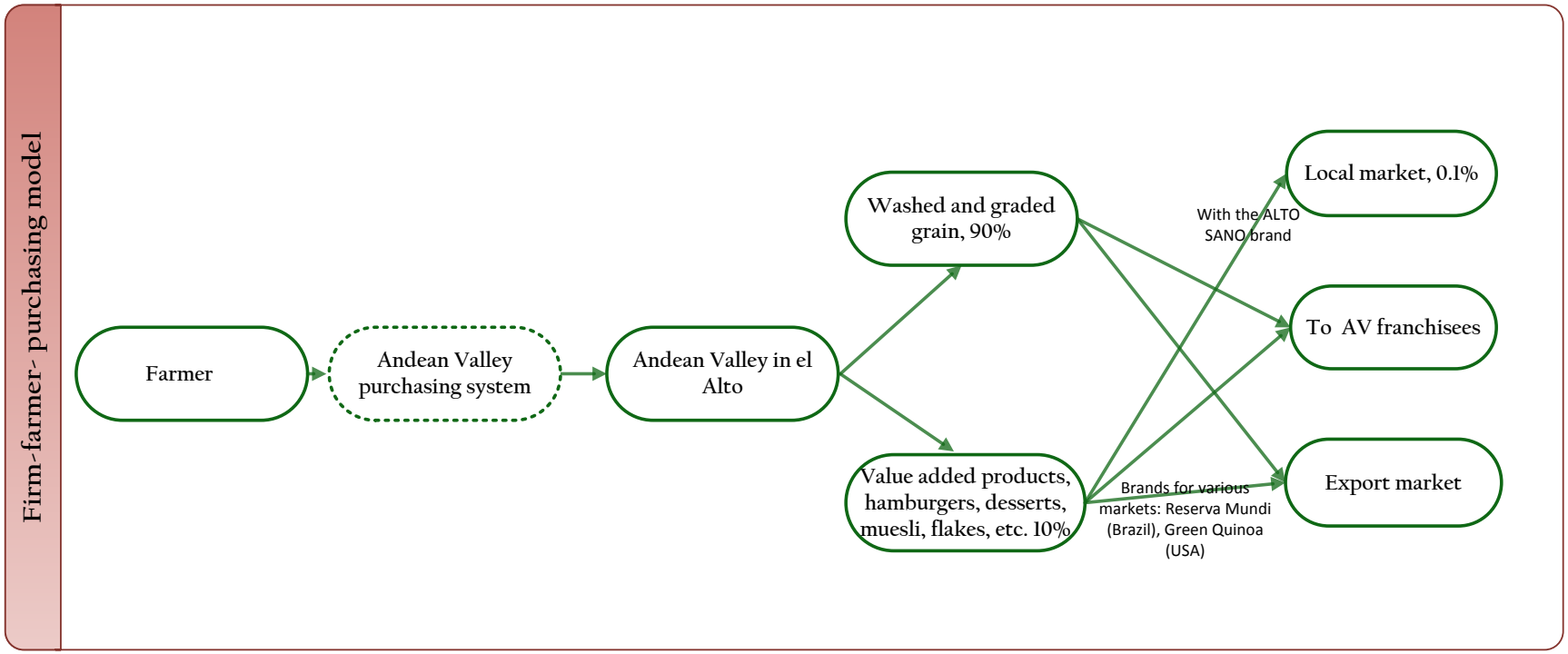


Figure 23. Example 1 firm-farmer model

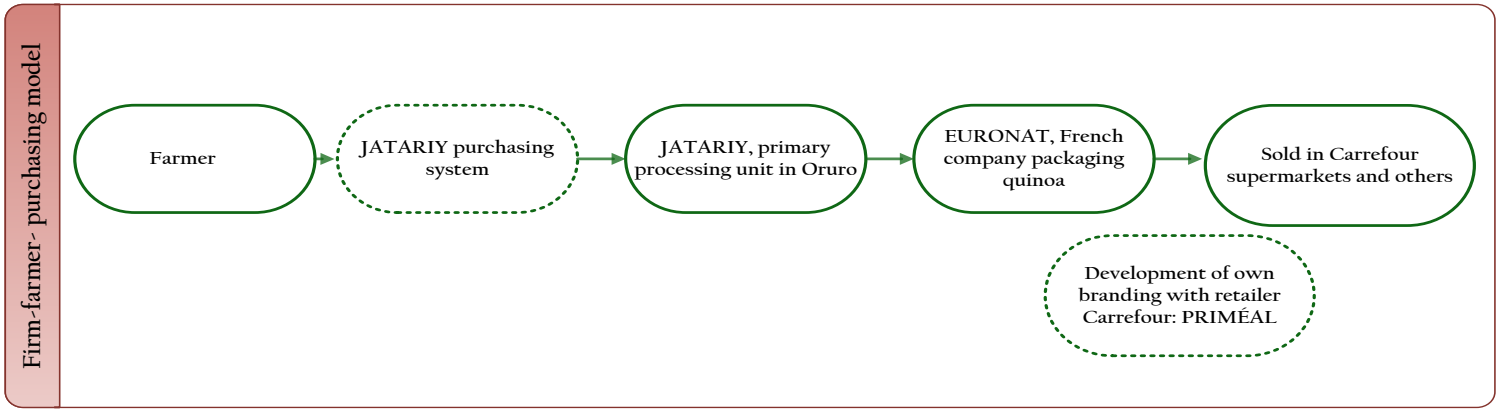
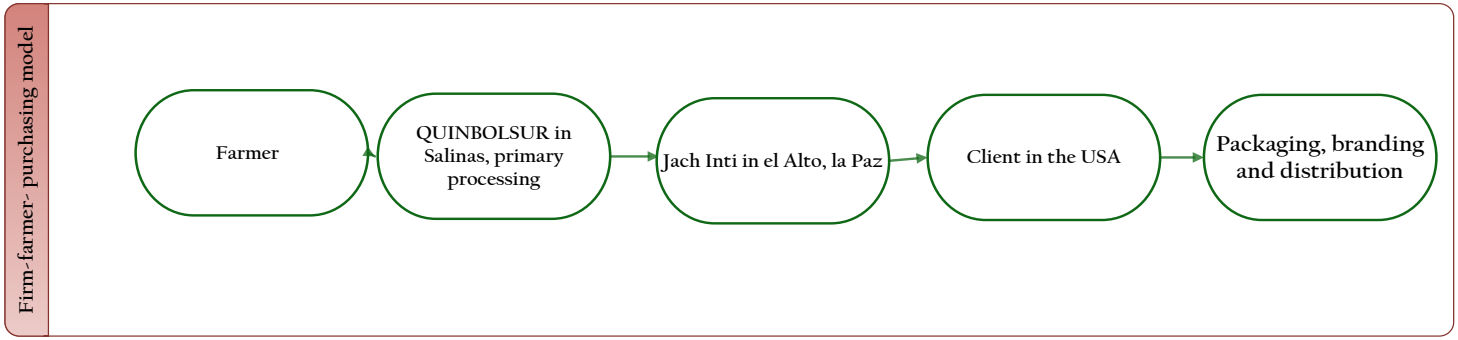


Figure 24 and 25. Examples firm-farmer-model



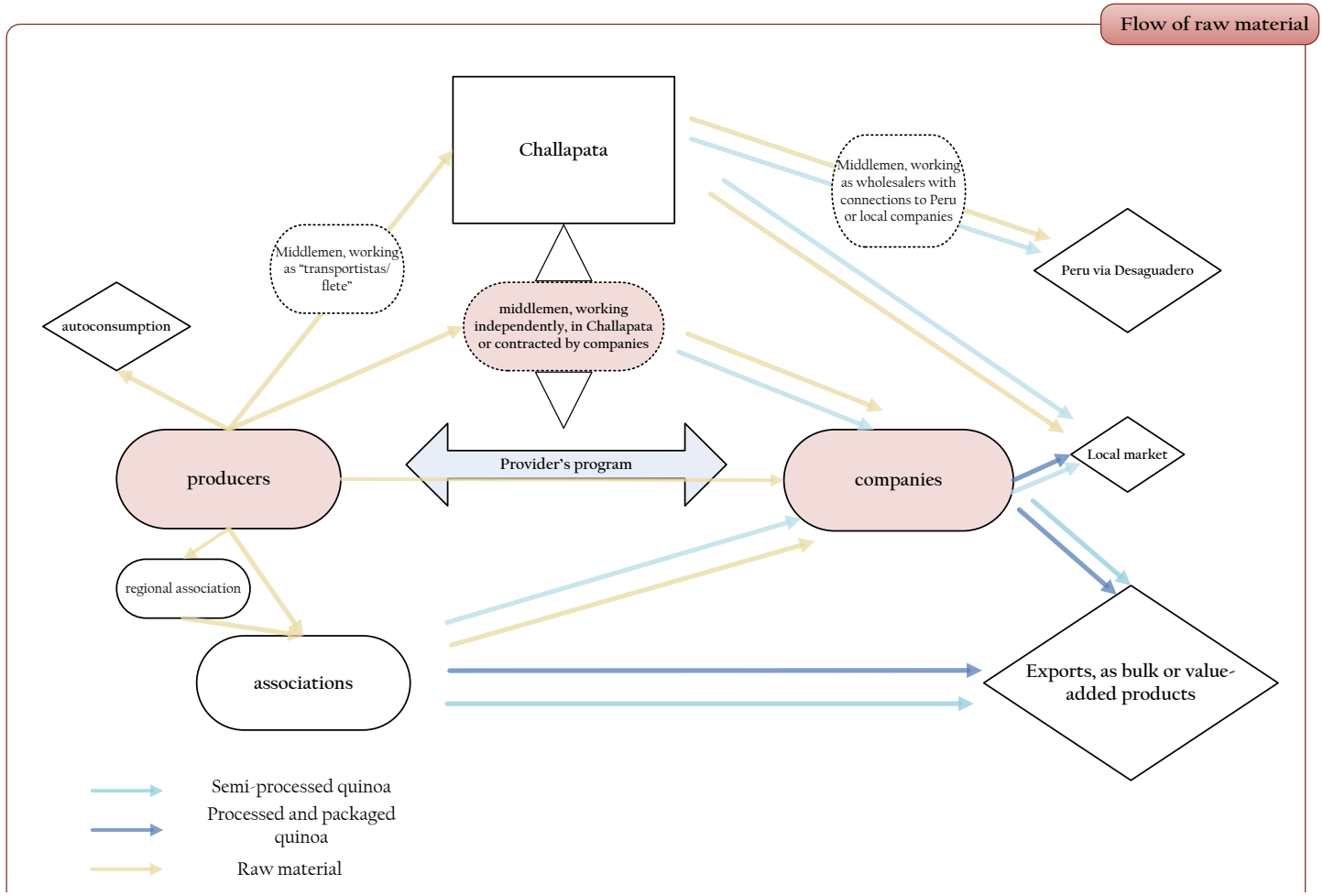


Figure 26. Flow of raw, semi-processed and processed material

5.2 Business relations of chain actors

5.2.1 Which functions do the exporting companies have in terms of firm-farmer-relationship? Which functions do the producer groups have in terms of firm-farmer-relationship?

This question has been answered with the results of the qualitative interviews and a summary of those is presented in the paragraphs below

The Table below (3) is a summary of the interviews that have taken place with representatives of the quinoa processing (and exporting) companies during the 5-week field research. It gives a profile of the company and explains their price setting mechanisms, the supply with quinoa and the type of relationship they are maintaining with their suppliers. Every company has a different system guaranteeing their quinoa supply as well as differing mechanisms to set the price for the raw material. Most of the times, the relation between firm and farmer is not direct since the connection is via an association, or contracted (and not contracted) middlemen. In case of the suppliers' program, the field technicians and transporters are the link between company and farmer. Except a few cases (like CITY or QUINBOLSUR), companies do not have one single channel for their quinoa but multiple and the suppliers programs (see text box) are targeting a part of their suppliers.

In case of a firm-farmer connection, the companies fulfil several activities to maintain a good firm-farmer relationship (and so guarantee their quinoa supply). They organise and pay the certification for the producer group and install an internal control system (ICS) to guarantee the compliance with criteria. There are field technicians, working for the ICS and giving advice on production issues. In case of Fairtrade certification, the Fairtrade premium is to be invested into community development and in the example of JATARIY, the company supports the producers in building health centres in the villages. Other activities are the facilitation of transport of quinoa from the field to the factory and the provisioning of inputs for quinoa production (Andean Valley mentioned gloves, masks, light traps, tools, etc.) as well as support with machinery to already clean the quinoa on the field level (trilladoras=threshers e.g.). Another issue that should be mentioned is the higher price that the companies are paying in comparison to the informal market. The Table below indicates that farmers receive up to 100 Bs (14.29$) more per qq than on the Challapata fair. Prices are not fixed in contracts since the Challapata price is fluctuating too much so that many companies decided to take it as a base and add a certain percentage to it. Contracts, which are an agreement of a) the farmer to deliver quinoa and b) the company to purchase quinoa and both complying with the organic standards, are done on an annual basis.

5.2.1.1 Companies

The Table below (Table 3) gives an overview of the companies' profiles. Looking carefully at the Graph, huge differences in processing capacity, quinoa producers involved or supply and price policy can be noticed. The chronological order is alphabetical and should not be confused with companies' importance/ dominance in the market. In fact, each of the companies is recognized for unique characteristics (that are not specifically mentioned here since those recognitions are rather subjective).

Company	Products	Processed quinoa in 2012 (containers/year) *container=20MT	Certification	Producers	Price policy	Quinoa supply	Challenges
ANAPQUI, association, 1983, Challapata	Grain, flour, flakes, puffs	No information	Organic with Bolicert, FLO with Flo cert	2000 producers in the area around Challapata	Price decided in reunions with farmers, depending on the market situation	Producers are owners of the association, they deliver at the regional assocations	No information
ANDEAN VALLEY, SA, 1997, el Alto	Flour, grain, flakes, hamburgers, desserts, pasta, musli, etc.	180	Organic with Bolicert	400 producers: AV producers' society (part of suppliers program) 35%, 65% other associations (SAGAMA, BIOQUINUA, etc) in the Intersalar	Weekly Challapata base +30 Bs for producers, +70 Bs for farmers that are part of the program	2 field technicians, AV certification, input, machinery and materials for quinoa production (paid bt AV), transport done by their own middlemen	Price fluctuation , external middlemen that buy quinoa from AV producers› reason for AV to buy from external producers
CITY, SRL, 2002, el Alto	Grain, flour, flakes	120	Organic	3 producers in Salinas	Producers set price for raw material	Producers deliver raw material at the factory, near future: field technician and support with inputs	Price fluctuation

IRUPANA, SA, 1985, el Alto	Grain and many derivatives (flour, puffs, drinks, energy bars, etc.)	180	Organic (USA, EU) with CERES, ISO 9001, HACCP, ISO 22000, Alliance	Altiplano Sur, no information, 40% of farmers are part of the IRUPANA program	No information given	"Programa de proveedores": 2 field technicians (certification, training), work with assocations, support with technology, middlemen that work with their own producer group (transaction certificate)	Price fluctuation, quality of raw material, problems with shipping companies
JACHA INTI INDUSTRIAL, SA, 2008, el Alto	Grain and flakes	144	Organic with Bolicert	Trust relationship with APQC, APROCAY associations (500 prod) and commercial relation with 8 middlemen (200 prod) in the Altiplano Sur	Weekly Challapata price (CP) as a basis, CP+XY to the middlemen, CP+XY+30Bs to the associations	In the relation with the association: Annual contracts, one field technician, support with machinery	Traceability with quinoa delivered by middlemen, impurities in quinoa (stones, sand, etc.)
JATARIY, SRL, 1996, Oruro	Grain and puffs	100	Organic and Fairtrade with IMO Control	260 (‹10ha) in the Intersalar	periodically discussion with producer →min 10% on Challapata base	Annual contracts, field technicians, cash payment JATARIY pays: inputs, bags, certification, projects within Fairtrade, transport, farmers' health care	Producers selling outside of JATARIY supply channel

QUINBOLSUR, SRL, 2003, Salinas	grain	24, and insourcing	Organic, plans to adapt Fairtrade as well with CERES	120 in producer group around Salinas	An agreement of the following facts: price set with clients for one container and the price decided by the producer group	Producers deliver quinoa at the factory, one field technician, certification paid by company	No information
QUINOAFOODS, SRL, 2002, el Alto	Grain, flour, flakes and puffs	No information	ISO22000, ISO 9001, Kosher, Organic with CERES	25 producers within suppliers program	Base en Challapata +20 Bs	1 técnico para grupo one field technician for the producer group, certification paid by company, 6 permanent middlemen with their own group of suppliers	Delayed payment, not enough processing capacity (outsourcing)
SINDAN ORGANIC, SRL, 2011 (antes parte de SINDAN durante 20 anos), el Alto	Grain, flakes and puffs	160	Organic with CERES, Kosher, ISO 9001 and 22000 with TÜV, NVNA with IBNORCA, FLO with FLO cert	168 producers from Challapata to Llica	Challapata base + 100 Bs	"Programa de proveedores": producers deliver at the factory, if they have no means, SINDAN transports the quinoa , field technicians	Smuggling to Peru, high price for raw material, middlemen without certification and contracts, impurities

Table 3. Profiles exporting companies

5.2.1.2 Producer groups

The functions of producer groups are less complex than the ones conducted by the companies. The groups that are denominated producer groups and obviously act as such are the regional associations of ANAPQUI for example. The goal of associations interviewed is to find markets for the quinoa producers; preferably with a direct connection, avoiding middlemen. In that case, processing units are installed in the field and the quinoa is washed and prepared to export. Producer groups, in this case associations, organise their certification, install an ICS and advice farmers on cultivation aspects. Further, information exchange and communication between clients and farmers is stimulated.

Producer group	Members	Tot. annual production in tons	General prod.	Certification	Clients	Price setting	Challenges
APROCAY, association, Caynni, 2012	86	2400	1500-2000 kg/ha	Organic	Mainly Jacha Inti, 10% auto consumption and bartering	Challapata as reference, % added in sales to small companies, a higher % added in sales to exporting companies (up to 100Bs/qq)	Climate, especially frosts; production costs (expensive inputs)
APROECH, association, Challapata, 2012	150	75	500 kg/ha	Organic, CNAPE in the future?	Still selling in Challapata, no contracts with clients yet	Challapata price	Pests, climate (frost and drought)
CEDEINKU, association (regional ass. of ANAPQUI), San Augustin, 1982	250	200	400 kg/ha	Organic, FLO	ANAPQUI	Farmers' reunion among ANAPQUI members, appr. every 3 months	Pests, climate, availability of land
COPROQUIR, association (reg. ass. Of ANAPQUI), Irpani, 1984	210	500	780-1170 kg/ha	Organic, FLO	ANAPQUI Alter Eco	Farmers' reunion among ANAPQUI members, appr. every 3 months	Pests, climate, availability of land

Table 4. Profile producer groups

The Table above (nr.4) gives further details about the associations that were interviewed during the research. The associations are listed in alphabetic order, not according to annual total production, members or importance. Special attention should be paid to the column describing the farmers' general production. Huge differences are at stake.

5.2.2 Which challenges do the firms and producer groups face in the value chain?

The results of this question are a combination of the answers given during the interviews and results of the questionnaires

The challenges, farmers and firms are facing in the quinoa trade in 2013, have been answered subjectively during the interviews with board members of farmer associations and companies' persons responsible for supplies and value chain management and are listed in the table in Chapter 5.2.1.

Producers: Farmers mostly mention production-related issues such as the dependency on the weather and the consequences that frosts, droughts and winds have. Next to the climate, they mention pests that destroy the harvest, especially the ticona and the polilla, a nocturnal butterfly and a moth. Most farmers produce their own inputs (as they keep lamas and do seed selection, etc.) but a representative of APROCAY mentioned the increasing prices of inputs as a challenge.

Companies: In the interviews, companies mainly mention the price fluctuation. Next to that, quinoa which is sold outside the designated firm-farmer channels -due to middlemen or farmers seeking alternatives, cause a challenge for companies. Low quality of raw material entering the processing factories as well as delayed payment or too little production capacity are mentioned as well.

22-Tango results

Another source to identify farmers' challenges are the results derived from the 22 Tango questionnaires. The statements that these questionnaires are composed of are not designed specifically to answer this (sub-)research question but can give an indication of topics that farmers and companies are struggling with, and especially show, in which topics, perceptions of both are differing from each other. 7 different topics have been researched within this method but only the most relevant ones are presented here. Interviewees could answer a statement with 4 categories, which were "I fully agree", "I agree", "I don't agree" or "I don't agree at all" that gave according points from 3 to 0. The results below are presented with those categories and show the overall agreement of farmers and companies with the statements.

Figure 27. 22 Tango results, markets and prices

1: there are several companies buying quinoa from the producers

2: company knows the quantity that it wants to buy

3: producers can satisfy the required quantity

4: producers decide to whom to sell their quinoa long before the harvest

5: producers know the end-market for their product

6: producers think that they are paid a fair price

The most outstanding topic is the one which deals with markets and prices. The first statement says that **"there are several companies buying from the farmers".** Both companies and farmers state that this is correct; for farmers, this issue has little relevance but interviewed companies mentioned other companies "stealing their quinoa or their farmers" as a threat.

Statement number 3 is about the supply with quinoa: **"Farmers can satisfy the quantity requested by the company"**. 80% of the farmers but only 50% of the interviewed companies agree. It has been mentioned earlier that companies seek alternative provisioning systems if they cannot satisfy their need with the quinoa supplied by their own farmers. In these alternative ways, guaranteeing traceability and the organic origin of the quinoa is a challenge.

Statement number 6 talks about the price which is paid to the farmer and whether **"the farmer thinks that he/she is paid a fair price".** Only 47% think that they are paid a fair price whereas almost 60% of the interviewed companies agree with this statement. The price issue is a very delicate one since a fair price is differently defined by companies and by farmers. One important issue that has been mentioned at more than 50% of the interviews is the fact that farmers receive cash money in Challapata whereas the payment of companies and associations can arrive with a delay of 4 weeks; a crucial motivation to sell their quinoa there.

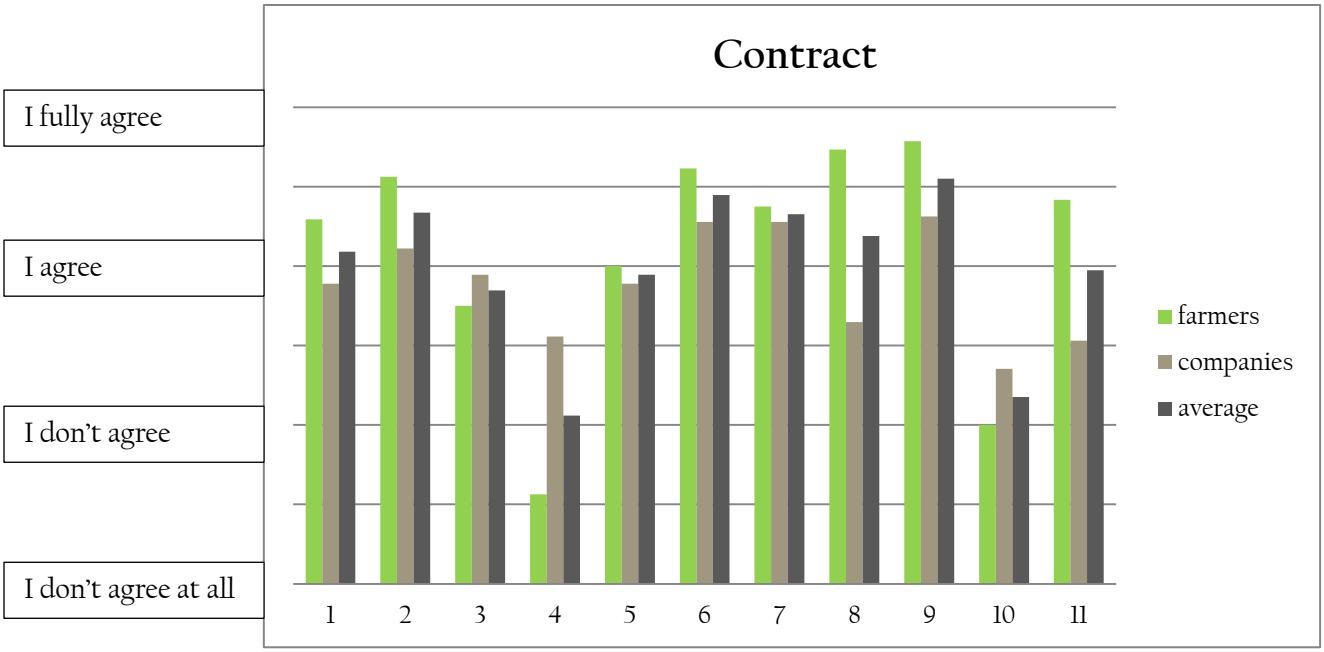


Figure 28. 22 Tango results, contract

Another challenge lies in the differing perceptions concerning contract and complying with agreed regulations. In statement 5.8, 91% of the farmers agree that "**farmers comply with the contract"**, whereas less than 55% of the companies agree with that. The same goes for statement 6.1 which asks whether "farmers follow Good Agricultural Practices (GAP)". 96% of farmers say that this is the case and 63% of companies agree with that statement. The results of these two statements can be summarized as farmers and companies having a very different perception when it comes to fulfilling the contract. Farmers are convinced to operate correctly but companies don't see their contract requirements fulfilled correctly. This is threatening the quinoa trade especially when it comes to complying with GAP in order to guarantee a 'good' quinoa production and a safe product.

Results of statements in topic 2 which deals with production issues show low scores on farmers' sides, meaning that there is little agreement with statements such as "**the company reacts to the farmers' necessities**" or "**there is sufficient technical assistance in the field**". These results are not taken into account since interviewed farmers have been affiliated with associations or have been working individually so that they are not targeted by companies' services.

5.3 Effects of quinoa commercialization

5.3.1 What role do producer groups and exporters have in the upgrading of the quinoa trade?

In order to answer this question, literature has been studied and is presented below

The quinoa trade has obviously been shaped by producer groups, here mainly associations and (exporting) companies as the history Chapter shows. Producer groups have been the ones establishing links with Western importers and so initiated the first exports. In Avitabile's PhD thesis, he mentions that producer associations have contributed significantly in improving farmers' living conditions –especially in their starting years, making it possible for them to invest in basic elements of such. The exporting companies, that entered the scene some years later have transformed the solidarity trade into a business, making it possible to process and trade bigger quantities and comply with Western quality standards.

Nowadays both associations and companies have systems in place to guarantee a certain quality (meaning no impurities and stones, homogeneous grain size and colour, little saponine content, etc.) and, in most cases, compliance with organic standards and, in fewer cases, with Fairtrade standards. For international traders, quality and reliability are two very important aspects (personal communication with Jorn van den Dop, 2013) and –although still struggling with regular supply and traceability, companies and associations are the ones, setting up and upholding those trade requirements.

Next to setting up trade relationships with international clients, the companies also provide a guaranteed market for the farmers; at least for some affiliated with them. 84% of interviewed farmers stated that they are **"happy to have a guaranteed market for their quinoa".** Companies and associations are interested in a continuous supply with quinoa, meaning that long-term agreements would be a win-win arrangement for both farmers and companies. Nevertheless, due to the fluctuating prices and the flexible middlemen, this direct and stable relationship is threatened since both farmers and companies are acting outside of the designated channels.

5.3.2 Has the commercialization of quinoa improved the livelihoods of farmers in the research area?

The information provided in the following paragraphs is a combination of literature study and own observations

Avitabile (2013) concludes, that with increased incomes generated from quinoa production, farmers have been able to do basic investments (education, sanitary services, etc.) to improve their living conditions. The often criticized issue of farmers that would consume less quinoa has been confirmed in Avitabile's thesis, but at the same time, they have better access to -and can afford- nutritious food products such as fruits and vegetables so that there is no threat in terms of food security.

In its Atlas, FAUTAPO has dedicated one chapter to economic aspects, in which one part is addressed to the Human Development Index (HDI), comparing the years 2001 and 2005. The HDI is the average of measures of three indices: life expectancy, education/literacy, and standard of living. Countries with a HDI of 1 - 0.8 are considered very well-developed; between 0.8 and 0.5 there is average development; and below 0.5, countries are poorly developed. In the ranking of 2012, Bolivia has been 108 out of 186 with an index of 0.675 (Wikipedia website, 2013). In 2001, all municipalities of the Bolivian Southern Altiplano had a HDI of around 0.5 (some a bit less like Quillacas with 0.437; some a bit more like Colcha K with 0.539). In year 2005, the HDI of the whole area has increased with an average of 5%. It would be an assumption to relate this development to the quinoa trade but the increased production and higher prices can be one of the reasons for the improvement of that index (contributing to the indices life expectancy and standard of living).

In PROINPA's study (2004), the environmental effects of the intensified quinoa production are stated quite explicitly, including desertification, increased attack of pests and less productivity of the soils (in some areas). These issues can be related to the quinoa producer's livelihood on the long-term since over-exploited soils could eventually mean less productivity which means less income generated through quinoa. This producers' vulnerability is mentioned by Avitabile as well and associated with the intensification of production systems. Farmers that depend exclusively on quinoa are threatened most since they do not have another source of income and are more affected by the unpredictable quinoa yields and prices. Obviously, if producers succeed in managing the mentioned issues properly, such negative effects do not need to occur.

At the same time, the intensified production systems can cause socio-economic inequalities among farmers. Farmers with machinery often cultivate bigger plots of land in the pampa and hence have a higher production per hectare whereas farmers in mountain communities are excluded from the mechanized production system (Carimentrand & Ballet, 2010). These differences cause economic inequalities in the first place but can be the cause for conflicts within communities as well (Avitabile, 2013). Avitabile (2013) concludes that conflicts can arise with reduced availability of natural resources, as it is the case with land for example.

Observations that have been made confirm the results of the above mentioned studies; great differences can be seen between the different types of farmers: some interviewed association members seemed to be very satisfied with their economic situation that resulted of the quinoa trade, having a plot of land, a (relatively fixed and high) price for their produce, a board position in the regional association or a function as transporter, organizer or field technician. Some farmers were mainly living in urban areas, were educated, had some occupation in the city and only returned to the communities for certain periods of the year. One of them spoke of having reached a yield of more than 2200 kg/ha. Other few farmers seemed to be not affected by the quinoa trade at all, coming from small communities, producing quinoa only for their auto-consumption and selling remains (not more than one bag of 50 kg) sporadically on the informal quinoa fair in Challapata for any price the middleman would offer.

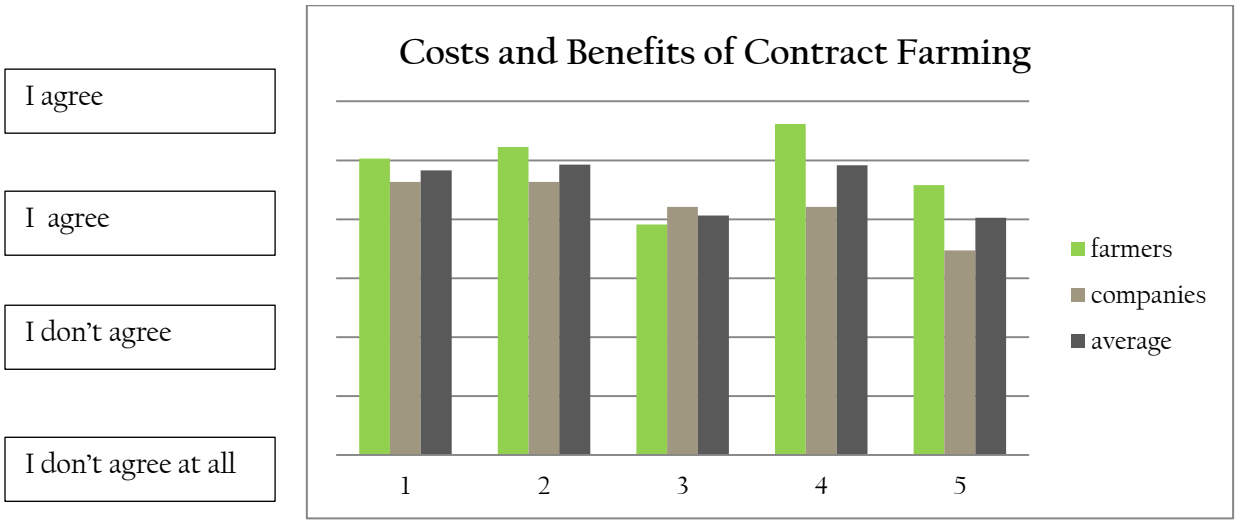


Figure 29. 22 Tango results, costs and benefits

1: producer is satisfied to have a guaranteed market

2: quinoa provides a stable income

3: producer is happy with the services offered (by companies and associations)

4: company is satisfied with the relationship

5: producers have money-generating activities apart from quinoa

In the questionnaire that was conducted with farmers, more than 80% answered that they are happy to have a guaranteed market and almost 90% answered that quinoa provides a stable income for them.

To conclude, it can be stated that the "quinoa boom" has contributed to the improvement of some elements of farmers' livelihoods. The increasing prices for quinoa on the (local and international) market mean an increased income for the producer with which investments in basic elements of livelihood can be done as well as allowing for having access to a more diverse diet. Nevertheless, this conclusion does not target all quinoa producers, since only 21% are involved in export (PROINPA, 2004) and only some of them have managed to produce quinoa in large quantities.

Chapter 6. Discussion

6.1 Discussion of results

The first topic to be researched were the features of Bolivia's quinoa value chain; meaning an analysis of the chain actors, historical happenings that have shaped the Bolivian quinoa sector, the challenges within the (international) sector and finally the different sales channels the product is going through. Another topic has been an assessment of the business relation between exporting firms and farmers, analysing the functions of both producer groups and companies speaking of the challenges they are facing. The last topic touches upon the impact of the quinoa commercialization on farmers' livelihoods. The three topics will not be discussed in order of their appearance in the report, but according to the analogy of a model of a house (Figure 30), starting with the construction, the issues around it and finally the effects, the environment has on it.

In summarizing and evaluating the results derived from interviews, questionnaires, literature and information and impressions gathered during the quinoa conference, it can be stated that there is no one value chain as such. The present sales channels that exist parallel to each other neither can be classified according to the model suggested by Gereffi (2005) which speaks about different forms of value chain governance. The system prevailing in Bolivia can rather be compared to Hellin and Mejer's (2006) approach of comparing value chain mapping with the painting of a house which requires different layers to show the complete picture. In the quinoa value chain(s), one can go one step beyond even and compare the interactions of quinoa companies, producer groups, middlemen and support institutions with renovating a house, keeping old elements, enhance them or add completely new ones.

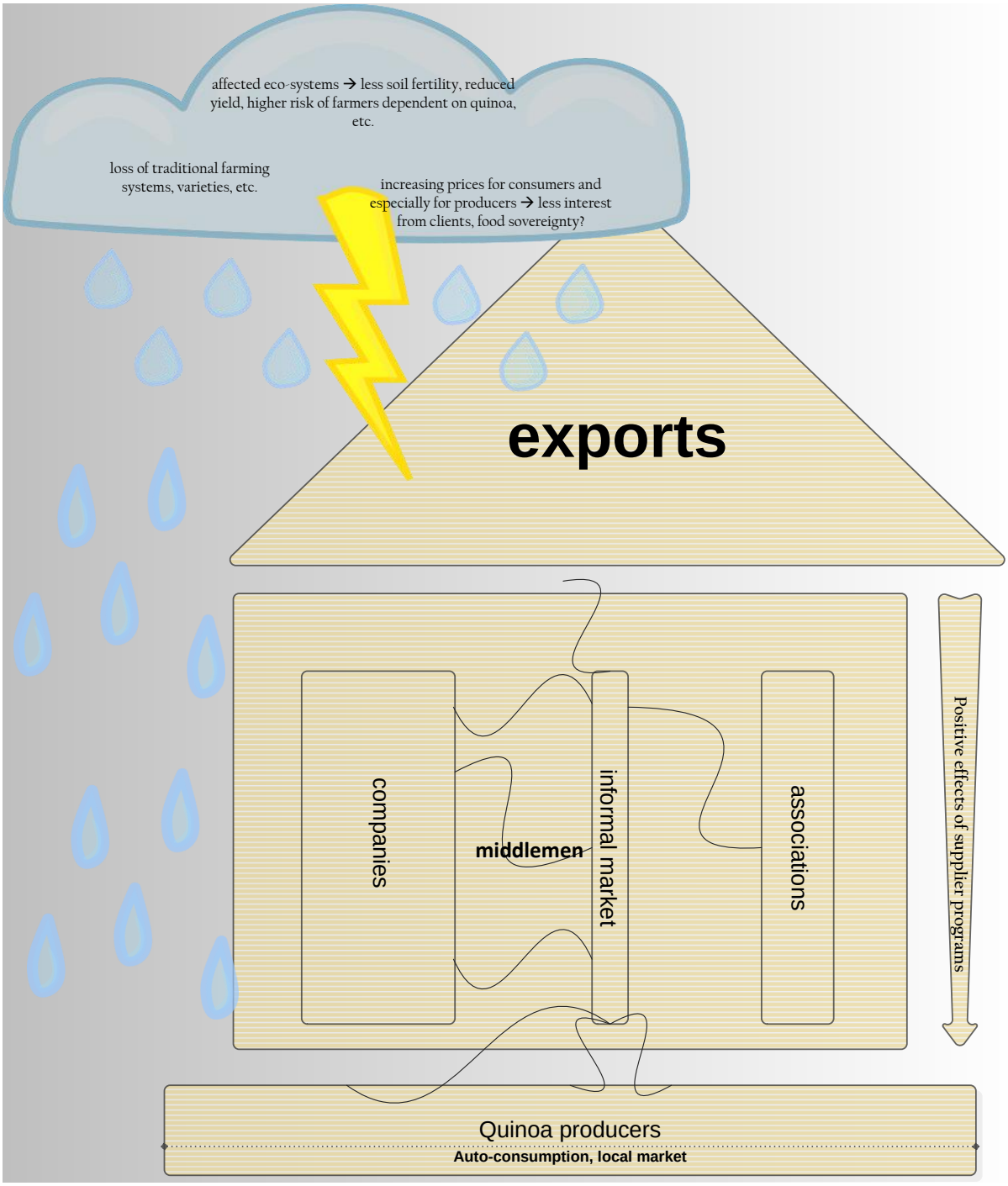


Figure 30. Construction of the Bolivian trade system

6.1.1 Intertwined value chains

Some elements are still in place from the traditional system (the original house that is being renovated) in which farmers would sell their produce to middlemen or on the local market, the market price is set in Challapata and there is a familiar relation to (some) middlemen. A pillar, which has contributed in setting up the "house" of the international trade, are the producer organisations and associations that have established international trade relationships in the 1980s, setting up long-term agreements between producers and consumers and so have built an important construct in

terms of connecting the upper part of the house with the lower one (speaking about international traders and the producers). Nevertheless, that pillar is slowly replaced by a more powerful one, which is the companies that started building at the construction site in the 1990s. With gaining increased market share since then and covering more than 70% of the country's exports, they have become an irreplaceable building block in the house of international trade as well. Although the associative and the companies' purchasing models are two pillars standing apart from each other, there are connecting wires, which are the middlemen that still have important roles for farmers in marginalized areas or sourcing quinoa for the companies. The ingredients of companies' and the associations' pillars are partly the same since both are having suppliers programs and organic (and Fairtrade) certification. The middlemen present in the purchasing systems do not have their own pillar since they are difficult to grasp but they are the ones, electrifying the house/system.

6.1.2 Opportunistic business

The companies' purchasing model is actually a building block which is made from business relations between exporting companies and farmers, middlemen providing quinoa as well as companies, buying on the spot market. The focus of the research was on the relationship that exists between firms and farmers but it is not so easy to draw conclusions on that topic since the farmers that have been interviewed are not the ones targeted by the companies' programs. The intention of the thesis was to compare and analyse perceptions of exporting companies and "their" quinoa producers on trade related topics but the available results are from participants of two different pillars/purchasing models. Nevertheless, the results from companies' and farmers' perceptions can be considered separately in order to get an idea of the opinions on each other. For some of the presented statements, it is irrelevant to which purchasing model the interviewees belong.

According to the companies' policies, their purchasing models in place are meant to benefit quinoa producers and at the same time guarantee the companies' quinoa supply. The fact that farmers of that specific model could not be interviewed might be due to the fact of network sampling but also due to the fact that those relationships cannot easily be crystalized, meaning that there is not always a direct or stable relation. Companies themselves mentioned the issue of competitors (companies as well as middlemen) seducing "their" farmers to sell to them. And middlemen that are supposedly involved in the system avoid to reveal information. Farmers were called "opportunists", selling wherever and whenever it would suit them best. Looking into the companies' programs, they seem to be beneficial to farmers and the satisfaction of interviewed farmers, participating in similar programs of associations does confirm that. One of the biggest associations interviewed criticized the exporting companies for copying the association's (ANAPQUI's) purchasing model and benefiting from its efforts and success in establishing relations with farmers and international traders.

In general, the atmosphere in the Bolivian business world is dominated by a high sense of competition and little cooperation is at stake. Opinions about sensitive topics (the purchasing on the black market e.g.) differ very much according to different parties and it has not always been easy to shed light equally from all sides to get the realistic picture. Although there is much information and knowledge available within institutions, companies and associations, there is a hesitation to share it. CABOLQUI is making a first step in bringing the stakeholders together; joining processing companies to negotiate about a common price they would pay to their suppliers or in organising the International Event on Quinoa in La Paz in March 2013 pairing up traders, researchers, farmers and exporting companies to discuss issues at stake.

6.1.3 Quinoa's benefits for its consumers and producers?

A positive contribution of the trade promotion in general-and that is recognized widely, has been the upgrading of the quinoa sector, including quality requirements, certification and contracts

(agreements), making it possible for Bolivian producers (and producer organisations) to participate in the international market. Another remark is that the improvement of the sector, with a percentage of direct beneficiaries, contributes to a general improvement of the Bolivian economy; taking into account that not only quinoa producers but also companies' employees, the transportation sector and other industries indirectly benefit from an increased quinoa trade.

A criticism about the companies' entrance and the (positive and negative) effects of their programs is that they are targeting and benefiting only a few farmers and would adversely affect others, who cannot keep up with the companies' requirements. At the moment, 50.000 ha of potential land (in the Southern Altiplano) for more quinoa cultivation are still unused, which could affect about 10.000 farmers, depending on size of plot. With increasing international demand for quinoa and the companies' importance and influence, they have an important role in expanding the quinoa cultivation carefully, so that more farmers could be affected positively by the increased trade. So instead of stimulating mechanized cultivation of quinoa on large plots (which would take possibilities for small-scale farmers), programs need to be developed that respect traditional cultivation practices and target farmers, that do not have access to machinery or big plots of land.

Western media has been criticizing the booming quinoa commercialization to be unsustainable, (threatening the house of international quinoa trade to collapse, represented by the lightning) since market prices for quinoa are increasing and hence are setting food security for Bolivians at risk and threatening the fragile eco systems in the Altiplano area. Intensification of production systems, that the growing export numbers are provoking, run the risk of not being as sustainable as the traditional cultivation system. The latter respects the fragile ecosystem that comes upon in Bolivia's quinoa producing areas. Associations as well as companies, research institutions and international organisations are concerned with decreasing soil fertility and less productivity and are working on the development of organic production systems that (re-)include llama raising, advanced technology, conservation of local seed varieties, etc. The building of the International Centre for Quinoa that is kicked off by FAO and the Bolivian government can have an important role in addressing these issues.

The criticism that Bolivians would be threatened in their food security because of not being able to afford quinoa themselves anymore, finds opposing evidence in conducted research. With the increasing market prices, quinoa producers often prefer to sell their quinoa but the higher profits allow them to buy nutritious food stuffs, if part of their preferred diet. Many companies have a production line for quinoa that is sold on the local market. That is of poorer quality and often not processed into value-added products but is affordable for the Bolivian population. At the same time, the Bolivian government has launched programs to stimulate an increased consumption of quinoa within the country.

The high prices also mean a threat to the exporting companies. The (often irregularly) increasing prices are unwelcome for international traders. Companies, which pay 85% of their quinoa's sales price for raw material have little margin to buffer the jumping prices. The risk of the increasing prices thus is that clients turn away from the Bolivian quinoa (producers and companies), looking for cheaper and more stable alternatives.

Figure 31. Uyuni salt lake

6.2 Limitations of the thesis

6.2.1 Gathering secondary data colliding with Bolivian business culture

The features of the quinoa value chain in Bolivia have been studied and discussed relatively well, although much literature studied has not been more recent than from 2008 and numbers provided (about quinoa producers e.g.) are differing very much among the different sources. CABOLQUI which has these data available had committed itself to provide actual numbers to the researcher but that hasn't happened until the moment of handing in this report. It is very essential to know updated and accurate numbers about quinoa producers in Bolivia, farmers involved in exports, farmers participating in suppliers programs and hence farmers benefiting from the quinoa commercialization.

Except FAUTAPO, which has been very willing to share documents, inside information and contacts, unwilling gatekeepers have been encountered more often during the data collection in Bolivia. Companies have been asked to link the researcher to their suppliers and after promising their help, telephone calls have not been answered or field technicians were not available within the timeframe of this research.

6.2.2 Gathering primary data

Since the researcher was not familiar with the case on beforehand and there was little time to prepare the field work, expectations of the case were different from the reality. The research design did not sufficiently take into account these aspects. The research framework and methods have slightly been adapted in the course of the field work to the circumstances at stake.

In the quinoa supply chain, three main types of farmers are present; individuals, members of associations and farmers having certain agreements or contracts for delivering quinoa to companies. The latter type of farmer could not be located and hence interviewed. The contacts with the interviewed farmers have been established by FAUTAPO but since the foundation mainly works with farmer associations, the sample is one-sided. As explained above, efforts have been made to reach the companies' farmers but have been unsuccessful. The associative model is studied relatively well with 4 qualitative interviews with farmers and associations' board members and 19 questionnaires with farmers. Eleven farmers participating in the informal model took part in the questionnaires but only three middlemen of the upper part of the chain could be reached. Finally, the firm-farmer model has been researched with nine interviews and 19 questionnaires but only from the buyers' (companies') perspective. Interviewing farmers involved with companies would have been essential in drawing conclusions about the firm-farmer-relationship.

Chapter 7. Conclusions

7.1 Research Question 1: What are the features of Bolivia's organic quinoa value chain?

Summarizing the results of the previous Chapters, it can be concluded that there are various forms of value chains in the Bolivian quinoa sector. During the last 40 years, there has been a shift from traditional to more modern and intensified production systems as well as a development of more sophisticated purchasing and distribution systems. This shift has been initiated by associations and has quickly been picked up and enhanced by private companies when they entered the market in the 1990s. It has to be noted, that the producer groups' approach has been a more associative one than the rather business-driven approach of companies. The recent forms of commercialization that are in place in firm-farmer-business-relations involve suppliers programs. These programs- which often comprise group certification, field assistance and transportation- guarantee quality, traceability and a steady supply to international clients. There is some evidence that these programs can be beneficial to farmers.

The various forms of value chains can be described as follows: Considering the FAO's distinction of modern and traditional value chains, both are still present in Bolivia's quinoa chain. The traditional system can be found on the weekly quinoa market in Challapata where there is spot market behaviour, whereas in the companies' supply systems, internationally applying quality and organic requirements and large-scale processing can be found. In the firm-farmer model that has been looked at more closely, both farmers and firms do not comply fully with contracts or business agreements that are set up within. Both mentioned several reasons why doing so. This feature bears a challenge especially for international traders since stable trade relations with (especially) a stable price cannot always be guaranteed. That sets the sustainability for trade at risk since traders might look into finding other partners, offering better prices and reliable supply.

Another issue that is criticized to threaten sustainability is the production of quinoa itself. The modern production systems that are in place- although the ones producing for exports are mostly organic- are more intensive; farmers have larger areas, use more machinery and limit their production systems on the cultivation of quinoa only. The traditional production systems include traditional land distribution, cultivation of other Andean crops, lama raising, cultivation on slopes and hence with manual tools only. The effects on soil fertility and yields have been studied and organizations such as ANAPQUI and FAUTAPO develop programs to re-introduce elements of the traditional farming systems.

Since 2003, the whole quinoa sector is experiencing a boom and has been in the spotlight, especially in 2013, which is denominated International Year of Quinoa. Besides the glorification for the health benefits of the grain, its commercialization has been criticized by the international press, for the above mentioned effects. Both aspects could be observed but this thesis could not find out in which dimensions negative effects outweigh the positive ones or the other way around.

7.2 Research Question 2: What is the status of business relations between producers and exporters in Bolivia's organic quinoa value chain?

Although much trade is still organized informally, there are cases in which we can speak about business relations, namely in the purchasing model of private companies. The business relation which exists between farmers and companies/associations is seemingly good, taking all the services provided by the company or association and the farmers' opinions into account. In order to guarantee supply, suppliers programs are set in place, which include ICS, group certification, transport, higher prices (up to 100Bs/qq), etc. for the producer (group).

The side selling bears the biggest challenge for companies, next to the price fluctuation and low quality of quinoa delivered to the processing units. When contracted producers sell their quinoa outside of the firm-farmer channel, expected (and maybe already sold) quantities cannot be reached and companies see themselves forced to do side buying. That can provoke certification issues since traceability and organic origin cannot always be guaranteed. Challenges from the farmers' side are mostly not related to the business relation, rather than to climatic aspects and pests, although the unsatisfying price could be a reason for farmers to breach the contract and sell outside of the designated channel.

Generally, a challenge that could be observed during the interviews, and is supported with the results of the questionnaires is that there is little communication between firms and farmers and that perceptions vary a lot. Especially the topics dealing with production, market, prices and contract, farmers' and firms' perceptions differ a lot.

7.3 Research Question 3: In how far does the quinoa commercialization affect the livelihood of quinoa producers? In how far do organic producer groups and exporters contribute to an improved market position of quinoa growers?

The basic contribution of associations has been in the starting years of commercialization in which trade relations between producers and international clients have been established. With the generated money, a general improvement of living circumstances could be achieved. Some years later, the companies transformed the sector into an international, more demand-driven trade. An improvement of the Human Development Index in producing areas since then has been observed.

A positive contribution to the trade in general has been the establishment of trade relationships and contracts. Quality and reliability are on the companies' agenda, which is important to international traders but affects producers as well. Some farmers (21% in 2004) benefit from a stable relationship which guarantees services and a guaranteed market for their produce. But it excludes others, more marginalized farmers that cannot keep up with quality requirements, e.g. This selection causes socio-economic differences among farmers, separating those, who obviously benefit(ted) from the quinoa commercialization and could invest income into education, improved diets and machinery, and those, that continue as before.

A final aspect that is to be mentioned when speaking about effects of quinoa commercialization is the overexploitation of the soil which is to be observed in many cases. The overexploitation indirectly

affects the quinoa growers since less fertility means less productivity which means less income on the long term.

Figure 32. Typical landscape in the south of the salt lakes

Chapter 8. Recommendations

The idea of giving recommendations in this report is that the thesis is conducted for a commissioner who is working in the sector and is interested in results of the research but especially in suggestions of how to follow up on them. In the present case, the commissioner's - Freek Jan Koekoek's interest lies in knowing more about the impact of increased trade on quinoa and thus engage in the public debate about effects of trade and to advise better his public commissioner- which is the CBI, in developing trade programs. A second concern lies in learning more about the value chain and the relation between buyers and sellers of quinoa and thus advise better MERCADERO's clients, the exporting companies on improving their market performance. After the collection of arguments in the Table below, the recommendations are given in the Table in Chapter 8.2. They are ordered according to the chain actors and topics that are concerned. In the text underneath the table, specific activities for implementing the presented recommendations will be suggested; at least for the chain actors, that the researcher is familiar with.

8.1 Table of arguments

TOPICS and CHAIN ACTORS	DIRECT CHAIN ACTORS CONCERNED (especially exporters and importers)	BUSINESS SUPPORTERS (CBI/MERCADERO/FAUTAPO/ CERTIFICATION BODIES, etc.)	CONTRIBUTION TO KNOWLEDGE (ENABLING ENVIRONMENT)
VALUE CHAIN RELATIONS	Breach of contract at stake (between producers and companies) Anti-collaborative mentality between companies (and associations) Importance and hence impact of companies is increasing	Anti-collaborative mentality, especially between Bolivian actors Traceability issues resulting from side-selling and buying	Missing correlation of perceptions between companies and farmers within their programs
SUSTAINABILITY CHALLENGES	Instable prices resulting from instable supply (caused by: Vulnerability to environmental aspects (farmers), opportunistic behaviour Rapid intensification of cultivation systems	Trade promotion vs. environmental challenges	Negative reputation of trade promotion is increasing, due to generalisation of facts (soil fertility might decrease in one area, in the other not, e.g.)
TRADE IMPACT	More than 50.000 ha of potential land unused Socio-economic differences between producers included and excluded in quinoa commerce	Lack of knowledge on connection between growth of quinoa sector and Bolivian economy Dispersed knowledge on potential of by-products from quinoa production	Actual numbers on companies' market share, farmers involved in programs, price development, etc. missing Due to criticized sustainability of quinoa

	Producing area has potentials apart from quinoa production	Conducted studies(FAUTAPO's Atlas) miss linkages (which are the reasons for little yield on plots; is it only soil fertility or others, e.g.) Due to criticized sustainability of quinoa sector, reputation of institutions promoting quinoa is threatened	sector, reputation of institutions/persons promoting quinoa is threatened

8.2 Table of recommendations

TOPICS and CHAIN ACTORS	DIRECT CHAIN ACTORS CONCERNED (especially exporters and importers)	BUSINESS SUPPORTERS (CBI/MERCADERO/FAUTAPO/ CERTIFICATION BODIES, etc.)	CONTRIBUTION TO KNOWLEDGE (ENABLING ENVIRONMENT)
VALUE CHAIN RELATIONS	Incentives for guaranteeing quinoa supply Recognize responsibility and impact on the sector ⇩ Strengthen suppliers programs: involve more farmers, employ field technicians, guarantee transparency, trade finance Exchange ideas and experiences with other stakeholders on stakeholder "round tables" or international events	Establish stakeholder communication	Stimulate further research on perceptions of farmers involved in companies' programs
SUSTAINABILITY CHALLENGES	Improve and expand field assistance for more sustainable cultivation practices ⇩ Collaborate with knowledge institutions to implement improved cultivation techniques for guaranteeing future supply with quinoa	Develop strategies to satisfy international demand and maintain organic, small-scale production; focusing on good quality instead of quantities and maintain image of traditional farming practices	Collect arguments for sustainability of Bolivian quinoa Expert knowledge needed on how to most efficiently and sustainably produce quinoa in areas of Bolivian Altiplano, meeting the required export quantities and not exploit ecosystems

TRADE IMPACT	Primary processing on farm level, for added value for producers and better quality entering the companies' processing units Make room for small-scale producers in programs; preferred buying from them	Further market studies relating to trade impact (taking into account other elements related to quinoa trade) (CBI, FAUTAPO) Market studies to assess potential for by-products of Bolivian quinoa cultivation: for llama derivatives, organic fertilizers or tourism, e.g. (CBI, FAUTAPO, VHL) Adapt 2 2 Tango methodology and combine it with the "text to change" method (FAUTAPO)	Publish findings of this thesis Collect "anecdotal evidence" of successful farmers

8.3 In practice: what can the different stakeholders involved do?

8.3.1 DIRECT CHAIN ACTORS (EXPORTING COMPANIES)

To facilitate a frictionless business and trade, it is most important for companies to have a guaranteed supply with qualitative good quinoa. At the moment, the companies' quinoa supply is a combination of different models and still sporadic in some cases. ANAPQUI has been the pioneer in developing beneficial supply systems which make farmers be faithful and regularly supply their quinoa. Nowadays, companies such as ANDEAN VALLEY or JATARIY are known for their innovative programs which –according to them- seem to work out well for both farmer's and the company's business. An **evaluation of the existing supply programs** or ideas should be facilitated and instead of copying or "stealing" other companies' ideas, a transparent **exchange of ideas** should be facilitated with the common goal of strengthening the firm-farmer models. A first step of collaboration could be seen when CABOLQUI members showed the initiative to sit together and decide about price-setting policies.

The strengthened supply system should not only provide incentives for farmers to deliver their produce to the companies but also focus on field activities, meaning that quinoa producers are supported and monitored during quinoa production in order to guarantee for qualitative good and organically produced raw material. **Field assistance has to be upgraded**, which means that the role of field technicians (preferable agronomists with an indigenous background) has to be enhanced and the technician-farmer ratio should be less than 1 to 200.

At the same time, focus on field activities can involve expanded programs that **include more farmers**; new associations are emerging and there is enough potential land for cultivation available so as to integrate it into companies' supply programs. If not for cultivation, peasants (or the Andean local population) can be involved in **quinoa-related activities** which is transport, primary processing or developing value-added products of quinoa for the local population. If companies would invest in machinery in the field, they create added value on field-level and at the same time guarantee for a cleaner product entering their processing facilities in el Alto. The company CITY is experimenting with saponine, that is washed off the quinoa to develop an organic fertilizer for quinoa production.

Trade finance would be another aspect to look into since it is important for most farmers to get paid cash money. Companies like JATARIY manage to pay farmers cash and programs are being developed by Triodos bank that provide loans to exporters before their products are shipped (*http://www.triodos.com/en/investment-management/impact-investment/looking-for-funding/trade-and-agriculture/why-triodos/*) and Banco Desarollo Productivo has developed the program "Credito Sectorial de la Quinua Organica" which provides credits to farmers especially for the imporvement of cultivation practices and infrastructure (*http://www.bdp.com.bo/es/FolletoCredito9uinuaOrganica.pdf*).

8.3.2 CABOLQUI

As a chamber of quinoa exporting companies, CABOLQUI has an important role **in stimulating stakeholder dialogue**. The International Quinoa Event that was held in March 2013 in La Paz has proven to be successful and appreciated by international and national stakeholders that have been participating. That communication needs to go beyond CABOLQUI members and their clients. An open stakeholder platform should be created on which exporters, importers, financing institutions but also farmers can exchange knowledge and room is provided for discussing burning issues among stakeholders.

There is a big amount of knowledge being developed by Bolivian institutions in terms of quinoa cultivation practices, conservation of seeds, development of quinoa by-products or development of machinery. Knowledge institutions like FAUTAPO for example have a wide knowledge on issues coming upon in quinoa but are focused on working with associations and hesitant or even opposed to collaborate with companies. Since companies are gaining in importance, it would be more effective to **disseminate knowledge and programs via the companies' farmers networks**.

8.3.3 CBI

It seems that there is little need in the Bolivian quinoa sector for developing a complete program for trade promotion, such as the CBI is offering. Nevertheless, the contribution of CBI's expertise or services can be of great importance to single chain actors or the general public debate. With its **market intelligence platform**, CBI can contribute essential knowledge for **studying the potential** for Fairtrade-certified quinoa, quinoa by-products or tourism in the quinoa producing area, e.g.. Since CBI has a high expertise in value chain intervention, doing an analysis of the quinoa chain's bottlenecks and giving constructive recommendations for its enhancement could be one of the activities reserved for CBI's proficiency.

8.3.4 FAUTAPO

Working together with the Dutch embassy, which has supported the quinoa sector significantly in recent years, FAUTAPO should have first-hand information on production, productivity and export numbers. Being in the last phase of the COMPASUR program which will end by the end of 2013, an **impact evaluation** is to be done and published for stakeholders to draw their **conclusions and learn from positive as well as negative interventions.**

In order to conduct further studies on impact evaluation, more accurate numbers on farmers participating in associations' or companies' programs collected in one **database** would be needed. Since FAUTAPO has the expertise and insight, they should be incorporated in such studies. Further, they can contribute to providing insight into development of food security and livelihood

development in the producing areas since adequate data has been collected for the creation of the "Atlas de la Quinua Real". With the knowledge provided in this atlas, correlations could be drawn between harvest and climatic conditions, harvest and soil conditions, improvement of HDI and quinoa sales, etc.

In line with expertise and databases; a **continuation on the 2 2 Tango method** has been planned, using the information distribution (and reception) tool 'Text to Change' (*http://www.texttochange.org/*). Via a database, short statements that can be answered with a simple coding can be sent to the farmers' mobile phones and essential information about farmers' perceptions can be gathered.

8.3.5 VAN HALL LARENSTEIN

The applied university can contribute especially to the knowledge element of the quinoa sector by further studying and **researching the firm-farmer relations** that the researcher of this thesis has started with, e.g. This initiated project can be continued by students doing their internship or thesis and that can design the 2 2 Tango method more accurately and focus on companies and farmers who are part of their programs.

Since curricula at VAN HALL LARENSTEIN are organized in periods that target different topics or commodities, it could be considered to **include quinoa as one topic in the curriculum** to be addressed in the study programs of Fair Trade Management, International Agribusiness and Trade, Food Innovation Management or others. During the period of entrepreneurship, student groups could be asked to design innovative products with quinoa or its by-products; during the period of sustainable farming systems, improved cultivation techniques could be developed or market research for quinoa (by-) products could be done.

8.3.6 MERCADERO

Being the commissioner of this research and its results and recommendations, MERCADERO has the important role to put the above given recommendations into action. Freek Jan Koekoek's position in the sector is unique since he is connected to exporting companies and CABOLQUI (which are his private clients) as well as to support institutions like CBI and the Dutch embassy and therefore also to FAUTAPO. At the same time, his network includes many international/European traders as well. The neutral interaction with the different stakeholders is very essential in acting as a consultant or even as a **mediator; making the stakeholders close ranks and collaborate more**. Since the collaborative business attitude in Bolivia is not as developed yet and the given recommendations suggest activities that require collaboration, MERCADERO has the crucial role of **convincing and connecting chain actors**. During the course of this thesis, it has been noted that all chain actors are very receptive towards suggestions of MERCADERO and that should be taken as an advantage to get the ball rolling.

If not implemented by the chain actors mentioned above, MERCADERO has the expertise to execute certain activities itself: Talking about a **stakeholder platform or dialogue**, this does not necessarily have to be initiated by CABOLQUI but can be and should be introduced by MERCADERO as well; at least for its clients so that they can exchange information and interact more easily.

As a participant and at the same time representative in the public debate, MERCADERO should **capitalize on recently published studies** on impact evaluation, such as the PhD thesis of Enrico

Avitabile or Pablo Laguna that deal with food security and social systems among quinoa producers, respectively.

Coming to speak about concrete steps for its consulting activities, MERCADERO should focus on strengthening CABOLQUI and its exporting companies: voices about CABOLQUI's inefficiency or passive attitude have been heard but its position in the chain is very central and its activities could have an important impact on quinoa producers and the sector in general. MERCADERO should **monitor and evaluate CABOLQUI's activities** and bring sustainability (collaborative development of sustainable farming systems with knowledge institutions) and stakeholder dialogue into its focus.

Advises for exporting companies need to focus on an enhancement of their quinoa supply with the main task of finding incentives that make the quinoa producer deliver raw material of good quality, in time and for stable prices. Those advises could include to have a deeper look into trade finance for providing cash payment to the farmers; offer a reliable and effective field assistance, which includes a well-established ICS and training programs; and finally think about primary processing or value-addition on the field, which would allow for better quality products for companies and increased income and food security for the producers.

It should be researched in how far the Fairtrade system offers the above mentioned services (like trade finance, internal control system and increased income generation) and if **being part of the Fairtrade system** (being certified) would be beneficial and profitable for farmers as well as for companies.

Figure 33. Quinoa growing around the Salar de Uyuni, April 2013

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