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2002

Lund Papers in Economic History

No. 74, 2002 *Development Economics*

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Lund Papers in Economic History
ISSN 1101-346X
ISRN LUSADG-SAEH-P--02/74--SE+42

Printed by KFS, Lund, Sweden, 2002

Orders of printed single back issues (no. 1-65)
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Full-text electronic issues (no. 60, 61, 66--)
www.ekh.lu.se

Patterns of Entrepreneurship

Development of Chilean Wine Industry 1850-2000[1]

Paulina Morel-Astorga

Chile's Wine Industry has undergone two waves of transformation. The first was the period of industrialisation between 1850-1930 and the second is connected to the current transformation of the international wine business from approximately 1980 until today. The period between 1930-1980 was characterized by the emergence of monopsonic tendencies and a strong protectionistic influence over policy emerging from the wine sector The patterns of entrepreneurship influencing development show the ability of rapidly responding to foreign changes in demand and supply and a flexibility making the adoption of new technologies a swift process when the right market conditions appear. The agents of change have been characterized as pattern breakers with a strong influence over the rest of the industry..

1. Introduction

1. 1 Background

Chile's wine industry, one of its oldest, has represented an important part of the value of agricultural production since the turn of the 20th century. Over the last few decades it has gone through a profound technological and organizational metamorphosis and become, in a few years, one of the most successful Chilean export industries. There are three important reasons to try to understand the history and most recent transformation of the Chilean wine industry. *First*, it is Chile's first agricultural industry and its long existence provides an excellent opportunity to study changes over a long period of time. *Second,* its latest technological transformation occurred after the

[1] I am greatful for the comments from my supervisors Christer Gunnarsson and Neelambar Hatti, to Göran Holmqvist for comments on an early version of the paper and to Professor Erik Dahmén for theoretical guidance.

development of the rest of agriculture. *Third*, it is part of the technological transformation of the international wine industry under the process of globalization.

The aim of this paper is to study the patterns of entrepreneurship in the Chilean wine industry between 1850 and 2000, as well as shed light over the general development of the industry in order to open up a new research field.

1.2 Previous Research, Theories and Sources

The bulk of academic discussion about Chilean Agriculture concerns the export development from the late 1970s and onwards, and may be divided into two main streams, one concerning the role of the state and the other the Schumpeterian discussion about entrepreneurship. All authors interpret state-market relations to be a crucial part of this development, seeing development as a macro phenomenon. Even though most arguments are concerned with a rather short period of time, the frame offered by these authors may be valuable for analyzing long-term changes.

The first stream of discussion concerns state-market relations. Actually, most scholars can, to a greater or lesser degree, be placed in this group. The main argument is that the shock treatment of the neo-liberal policy of the military regime and the subsequent changes in institutional setting were responsible for the actual changes in the economic development of agriculture. The most radical and influential measures were the cessation of state interventionism; massive privatization; opening of the economy to foreign competition; and liberalization of the price system. Patricio Silva studied the interaction and relation between the agrarian sector and the State during the military regime[2]. Hojman argued that the principle of subsidiarity, as adopted by the military regime, transferred all regulatory activities, previously performed by the state, to the market[3].

Theoretically, this first stream is most clearly connected to institutional theory. North showed that economic performance was dependent on how institutions define and protect property rights. When property rights are unclear, transaction costs will be high, creating

[2] Silva Patricio, *Landowners and the State,* in Development and Social Change in the Chilean Countryside - From the Pre-Land Reform Period to the Democratic Transition, CEDLA No 62, 1992.
[3] Hojman David, *Neo-Liberal Agriculture in Rural Chile,* Macmillan 1990, pp 1-15.

imperfections that will limit economic growth and increase the cost of economic transactions[4].

The second approach is the entrepreneurial discussion highlighted by Cecilia Montero's study of different entrepreneurial models in Chile during the 20th century. As a theoretical contribution, her work stands for a different view. One of her main points is that the application of a neutral economic policy helped to develop economic activities that presented immediate comparative advantages. The institutional and structural brake was so profound that the entrepreneurial structure was transformed from a rent-seeking system to a Schumpeterian entrepreneurial system. This was achieved through the implementation of 1) A new system of incentives and the fact that the state had the capacity to actually implement them. 2) A new ideological project that changed the social and cultural incentives and the meaning of economic success. 3) A reallocation in the use of human resources from state enterprise to private enterprise. 4) A new financial system that provided the means of development.

Entrepreneurs have been said to represent different roles, as risk-takers, as owners of the means of productions, as leaders, as bearers of a mission[5]. The most important contribution to entrepreneurial theories was made by Joseph Schumpeter who argued that entrepreneurship caused transformation. The most important mechanism to create transformation was competition, not the normally discussed external one between companies, i.e., competition through prices, but between new and old products, between new and old technologies, between new and old capital, in short, the one that takes place within companies. This competition was what he called *"the process of creative destruction"*[6]. The entrepreneur was the agent who identified the opportunities or threats over the horizon. With his/her ability to look beyond, the entrepreneur would break existing patterns by daring to apply new solutions, investing in new methods of production or transportation, producing new goods, and applying new forms of productive or industrial organizations[7]. Creative response changes economic and social situations for good, and the frequency and intensity of its success/failure is

[4] North Douglass, *Institutionerna, Tillväxten och Välståndet,* SNS Förlag 1993.
[5] Swedberg Rickard, *Entrepreneursip, The social science view,* Work, Organization, Economy, Working Paper Series No 64, Stockholm University 1998.
[6] Schumpeter Joseph, *Om Skapande Förstörelse och Entreprenörsskap,* Ratio 1994, pp 65-71.
[7] Schumpeter Joseph, *The Creative Response in Economic History,* Journal of Economic History 1947:7.

related to the quality of human resources, economic resources, decisions, actions and patterns of behavior[8].

Schumpeter's conceptualisation of entrepreneurship encompasses growth and transformation, which is achieved through an interplay between development of the new and liquidation of the old. According to this interpretation entrepreneurship ceases to exist when the transformation process ends. Thus, when an innovation passes the stage of maturity and ceases to be an innovation, market forces will try to lower costs and eliminate competition. Then competition will only be about prices and the process of creative destruction will end.

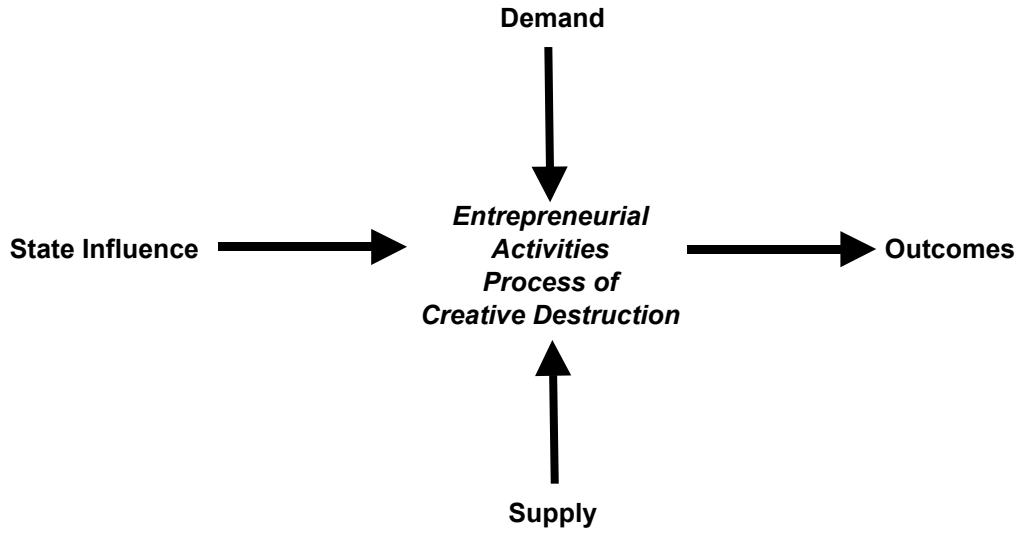
Montero argued that two types of entrepreneurs could be identified, pattern breakers and rent seekers. The period interpreted as the rent-seeking period was characterized by monopsonistic policies and activities aimed to maintain the status quo. She also argued that the incentives for entrepreneurship after 1973 were the institutional changes imposed by the military regime.

Based on Schumpeter's conceptualisation, this study maintains that rent seeking is not an entrepreneurial activity, and that, as a preliminary hypothesis, the patterns of entrepreneurship are moulded by the interplay of pattern breakers in the process of creative destruction, when new capital wins over old capital, and causes transformation from within that eventually leads to growth. The institutional frame is seen as just a frame.

1.3 Framework and Methods

The following framework visualises the interactions between the market or/and the state and the wine industry. It will be used as a guide to understand the patterns of entrepreneurship.

[8] Schumpeter Joseph, *Capitalism, Socialism and Democracy,* Harper Torsch Books 1975.



This study is explorative and aims to prepare for a deeper economic historical analysis of the wine sector. It is mainly based on secondary sources, in-depth interviews with wine experts and field visits to several vineyards between 1998 and 2001.

1.4 Earlier Studies of Wine Industry

The development of the wine industry has not drawn too much academic attention as a separate subject in either of the named streams; it has mostly been covered within studies of the agricultural sector in general, with the noteworthy exception of José del Pozo's *Historia del Vino Chileno*. Del Pozo investigated the history of the Chilean wine industry from an insider perspective, many of the sources being documents from the archives of some of the oldest and biggest producers, and on a national level, thereby limiting his conclusions to national events. He concluded that the influence of the industry over policy issues has been considerable and the relation between the industry and the state has favored large producers. Moreover, he found that there was no obvious link between the economic stagnation of the branch and import prohibitions during the period of ISI policy. Limiting the analysis to national boundaries, he concluded that no serious attempts to export Chilean wines were made before the late 1970s.

Most other academic literature treats wine as a part of larger studies of agriculture, e.g. Carlos Keller's *Revolución en la Agricultura,* an historical analysis of agriculture and a very important collection of information about the production and development of external markets. Keller's work is mainly descriptive. Other important studies are José Bengoas, *Haciendas y Campesinos,* Claudio Gay's *Historia Física y Política de Chile, Agricultura*

from 1865, Arnold Bauer's *Chilean Rural Society from Independence to 1930* and Victor Leon's *Vinos y Uvas de Chile.* All these studies offer historical insights into the history of wine production. Dealing with a later period, Edmundo Bordeu published an article explaining the success of Chilean wine exports as a result of improved quality. In addition, he stated that the wine sector stagnated between 1938 and 1982 due to conservatism among producers and the state prohibition of import of equipment during ISI policy. Changes in domestic consumption are explained through effects of substitution between wine and beer/pisco. Jarvis contributed with a critical analysis of agricultural growth figures for the period 1973 to 1980, and exposed in some respects the overestimation of growth in official sources. In addition, he analysed the termination of land reform and a shift towards a new economic policy[9]. As a source of general information, I have used some literature from the genre of popular fact books, like Melin and Duijker. They offer a very good description of production and technologies.

1.5 The Quality Concept

To understand systems of production and types of producers, it is necessary to understand the subjective concept of wine quality. The measurement of quality is almost entirely based on personal experiences of taste. The price of the product will be influenced not only by our normal market mechanisms, but also by issues that we cannot measure. Quality is also changing over time, so what we understand as high or low quality at the beginning of the period studied will not be the same at the end.

Trying to find a definition of high quality, I concluded that "French" quality was the most frequent measure. If one has two similar wines, the one more "French" is deemed the better. Such a confusing definition is best explained by the fact that France has dominated the production, quality and distribution of wine over some centuries.

Since 1935 French wine has been quality codified by *Institute National des Appellation d'Origin.* The definition of controlled origin (*Appellations d'Origine Cóntrolées)* is a quality "ladder" in which different wines are placed and connected to every French wine region. In 1987 around 40% of the wine districts and 30% of the total production were included in the ladder. The AOC is not only the result of a need to define quality, but also acts as a competitive restriction that affects not only French producers,

[9] Jarvis Lovell, *Chilean Agriculture under Military Rule From Reform to Reaction 1973-1980,* Institute of International Studies, University of California No 59, 1985.

but also and especially foreign producers. The system comprises both quality and yield demands[10].

There is a restriction of yield per hectare (between 20 to 80 hectoliters) that is necessary to keep the wine within the norms of the ladder. The lower the yield, the better the wine. The alcohol level is also limited to 12% for the best whites and 11.5% for the best reds, down to 10% for the simpler wines. The rules are very strict and only classic vines are accepted.

The different definitions are: 1*) Grand Crus* for the best and most expensive wines (Ultra Premium); 2) *Premiere Crus* for the second best (Premium); 3) *Appellation Communale* for better quality table wines (Commercial); 4) *Simple wines*[11] (Ordinary).

2. Development of the Industry

2.1 The Industrialization of the Wine Sector

Production of high quality wines was started in 1851 by *Sylvestre Ochagavia*, a very active agricultural entrepreneur and the first to import cuttings from French classic vine plants. The varieties introduced were Cabernet Sauvignon, Cot, Merlot, Pinot Noir, Sauvignon, Semillon and Riesling[12]. *Ochagavia* also hired a French technician, *Bertrand,* to work in Chile[13]. The results obtained by *Ochagavia's* production in Talagante inspired many others to follow suit.

In 1858, the former miner Matías Cousiño Jorquera bought the Macul hacienda and started production of wine. In 1870 Francisco Rojas Magallanes founded Viña Tarapacá. Other wine ventures were carried out by Francisco Subercaseaux, José Tomás Urmeneta, Macario Ossa and other newly rich people. The main source of capital came from successful ventures in mineral production in the north and coal production in the south. The surplus capital created was invested in agriculture because there were no investment alternatives. Agriculture seemed a good business[14]

The actions of Ochagavia and others were not isolated or spontaneous. Chile had tried to develop the agricultural sector as an integrated plan to increase the country's income since 1811. For agriculture, this necessarily

[10] Lachiver M, *Vins, Vignes et Vignerons,* Fayard 1989, chapter 9.
[11] Johnson Hugh, *Vinets Världsatlas,* 7 Edition, Nordstedts Förlag 1991.
[12] Ureta, F & Pszczolkowski, P, *Chile Culture of Wine*, Editorial Kaktus 1992, pp 16.
[13]Keller, Carlos, *Revolución en la Agricultura*, Zig-Zag 1956, pp 129.
[14] Bengoa José, *Haciendas y Campesinos,* Historia Social de la Agricultura Chilena, Tomo 2, Editorial Sur 1990, pp 50-53.

meant diversifying the flora and increasing knowledge of new production methods for the intensification of production and irrigation. The first real unit for the education of agronomists started in 1841 and was called *Quinta Normal*. It was also the first real plant school. *Ochagavia's* import from France was in co-operation with the *Quinta Normal*[15].

The contribution of the Quinta Normal deserves a special mention, because there was at the time an awareness of the need to add knowledge to the practice of agriculture. The person put in charge of the Quinta during its first period was Claude Gay, a French scientist who had traveled to Chile to "discover" its flora, fauna, people and society. Under Gay's leadership Chilean agriculture adopted French agriculture as its role model and Gay contributed to creating many contacts between Chile and France.

The timing of the modernization of wine production was coincidental in many ways: *First* there was the economic impact of the Atlantic economy, the gold rush in California opening up the possibility of exporting wheat, which increased the amount of available capital in agriculture and thereby the possibility of investing[16]. *Second*, mining activities in the north and south created many new fortunes that were invested in agriculture[17]. *Third*, Europe was suffering a crisis in viticulture.

The emerging wineries formed an industry characterized by a new industrial structure, better distribution channels and technology that increased yields and improved quality. Most of the best and larger wineries in Chile were started in the late 1870s and, according to Bengoa, wine production was by far the most developed part of agriculture[18]

2.2 Production Development[19]

The number of hectares under vine increased rapidly between 1873 and 1940. Around the turn of the century production was approximately 110 million litres and by 1940 it had tripled. The trend at the beginning of the 20th century was that of an increase with some natural variations[20]. The

[15] Arancibia Patricia & Yavar Aldo *La Agronomia en la agricultura Chilena,* FAO 1994, pp 89-103.
[16] Bauer Arnold, Chilean Rural Society from the Spanish conquest to 1930, Cambridge University Press, 1975.
[17] Ibid, pp174.
[18] Bengoa José, *Haciendas y Campesinos,* Historia Social de la Agricultura Chilena tomo 2, Editorial Sur, 1990, pp 53.
[19] See appendix 1.
[20] Ureta F & Pszczolkowski p, *Chile, Culture of Wine,* Editorial Kaktus 1994, pp 16-18 and Keller C, *Revolucion en la Agricultura,* Zig-Zag 1956, pp 129.

origins of this increase are varied, partly due to an increase of the area under vine. In the late 19th century there was not only growing commercial production, but also production for home consumption on large estates as well as small plots[21]. However, this production is probably not part of the official statistics. In addition, the sharp increase can also be explained by improvement of the accounting system, which in turn is an indication of a higher degree of organisation**.** An important bias is the exclusion of non-commercial production, which was considerable during the 19th century. Even if home made wine falls outside the concept of the industry, it is important to note that total production was probably higher than is shown in statistics.

There is a long-term trend of diminishing production per capita. In 1930 production per capita was 73 liters and in 1959 it was 48.6 liters per capita. Population increased during the period, so stagnation in production per capita was not equivalent to decreasing total production. Production increased on average after 1940 from around 300 million liters to 648 million liters in 1978[22]. There was one big drop in production in 1952 and one single peak around 1974. Yearly variations were moderate showing a normal pattern of increased/decreased harvest. Grapevines are very sensitive to weather changes and to attacks from different organisms. Fluctuations during the period can be regarded as natural for this type of production.

Between 1974 and 1983 production increased rapidly until it reached a peak of 648 million liters. After 1983 production went down with almost 50%, because increased output was not motivated or followed by an increase in consumption. During the early 1990s production increased slowly again.

The causes of increased production output were according to Jarvis a lack of maintenance in many vineyards between 1971 to 1973 which led to replacement of old vines with new. The full impact of vineyard renewal became evident around 1976/77, the year of the highest increase[23]. More over, closer a surveillance from the National Tax office corrected the declared amount of production upwards. Finally, the abolition of most regulations created a strong incentive for increasing the amount of hectares under vine and an acceleration in the acquisition of foreign technology.

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[21] Cay Claudio, *Historia Fisica y politica de Chile, Agricultura,* Tomo segundo, 1865, pp 180.

[22] Different sources reveal different values of production; therefore no exact numbers have been given here.

[23] Jarvis Lovell, *Chilean Agriculture under Military Rule, From Reform to Reaction 1973-1980,* Institute of International Studeis, University of California 1985, pp 43-44.

Until the late 1970s the dominating variety was still Pais and production was rather flat. From the late 1970s and early 1980s a differentiation started in the process from the vineyard to vinification. The first dimension added was horizontal when the varieties planted started to vary from mainly Pais to Cabernet, Torontel, Riesling, Pinot, Malbec, Syrah, Chardonnay, and others.

After experimenting and producing new varieties, production deepened and vertical production started to attain a horizontal dimension when qualities were added to the varieties. For example, Cabernet is now produced as a table wine, as a commercial quality, and as Premium and Ultra premium qualities. This is the case for most varieties[24].

2.3 The Economic Importance of Wine Production

On average, the production of wine represented 10% of the total value of agricultural production and occupied around 1% of the agricultural surface, but represented a yield twenty times more than the rest of agriculture. Taxation on wine production accounted for around 30% of total agricultural taxation. Roughly 10% of agricultural labor was involved in wine production. Of all grapes planted, 19% were destined for wine[25].

Until 1973, wine production started 4-5 years after planting and the vine could yield good wine for forty years if it was well taken care of[26]. In irrigated vineyards fixed and variable costs were proportional to each other, and there was equilibrium between the value of the land and the improvements and investments in elevating soil quality. In unirrigated vineyards, the value of investments to improve soil quality was higher than the value of the land. The most important bottleneck was irrigation. Taxation was partly based on the value of the land and investment in irrigated land was concentrated around capital (machines, etc) The variable costs on unirrigated land were smaller than on irrigated, because irrigated vineyards required some tasks that were not needed on unirrigated land. Del Pozo looked into the level of technology in the wineries and concluded that the vineyards and wineries were the best-equipped sector in agriculture[27]

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[24] Duijker Hubrecht, *Wines of Chile*, Mitchell Beazley 2000.
[25] Errazuriz Maximiano, *La importancia económica de la industria vitivinícola Chilena,* in Uvas y Vinos de Chile, ed Leon, Sindicato Nacional Vitivinicola, 1947.
[26] Gay Claude, *Historia Fisica y Politica de Chile,* Agricultura, Tomo Segundo 1865, pp181.
[27] Del Pozo, Jose, *Historia del Vino Chileno,* Editorial Universitaria 1999, pp200.

Between 1973 and 1980 the production of wine contributed only 6% of the sectoral GDP, which was much less than the average of 10% for earlier periods. For some years, during the over production crisis, it was much more profitable to grow fruits for the expanding foreign markets and many of the vineyards were replanted with other fruits after 1977[28]. More over, Chile left the Andean Pact in 1976, which might have contributed to a short-term loss of exports to neighboring countries.

Exports of wine have boomed since the 1980s and especially the start of the 1990s. In 1999 exports reached 500 million US$, which is quite considerable for a single agricultural product. Wine is today the second most important non-mineral export. The composition of wine exports has developed just like wine production in that it first started out as exports of low-price table wines, but the average price has increased dramatically over time, reaching an average value of 2.61 US$ per liter in 2001. This indicates that the variety of exports is just as wide as it is in the production[29].

What has changed during the latest period is that the economic base of agriculture has now been broadened and the state can tax the production of several products. The main difference between wine and other agricultural producers is that they are not only taxed based on vineyard production (which carries one type of tax), but are also taxed for the alcohol production.

2.4 Production Techniques

There are two dimensions to technique, the production of the grape at the vineyard and the wine-making itself. The time lapse between harvest and processing has shortened, and the use of harvesters means that the harvest process is much faster. The grapes are placed in plastic boxes and harvesting is most often early in the morning or evening, when the grapes are not warm and the process of grape fermentation, due to the warmth, is avoided.

2.4.1 Vineyard Technologies

The introduction of new European vines in 1851 was an important part of the new technology, because these grapes provide better qualities and yields than the traditional *Missionary*[30] used earlier. The "form" (system of light

[28] Jarvis Lovell, *Chilean Agriculture under Military Rule, From Reform to Reaction,* Institute of International Studies, University of California No 59, 1985, pp 44.
[29] Ministerio de Relaciones Exteriores, *Comercio Exterior de Chile 2001,* Informe No 3, 2001, pp 10.
[30] The most frequent variety during the colonial times was the Missionary, also called Criolla.

conduction) given to the plant was also changed. Initially the *Pergola* was the system used, but during the late 19th century and beginning of the twentieth century it was changed to *head pruned*. This system was used from the 19th century until the 1980s, when most producers changed to *vertical trellis.*

The principal varieties of vine were*: País*[31] (30.6%), Cabernet (10.1), *Semillón* 30.6%. The rest of the vineyards were covered with *Italia, Cot* and others in equal proportions. Irrigated land was dominated by *Semillón*, which covered 42.8% of the land, and artificially irrigated land by *País* (59.3 %) until the early 1980s. In 1985 around 75% of the vines were of low/ordinary qualities and only 25% were high quality, but in 1999 the inverse relation was the case, with around 75% of the vines high quality and the remaining 25% ordinary quality (mainly Pais)[32]. Moreover, every variety in itself was the result of new or improved varieties from old vines.

The vineyards used fertilizers, nitrogen, potassium, phosphoric acid and calcium at the beginning of the period. Fungicides were also used. All vineyard tasks were manual and in many cases they still are. Practically all the applications of inputs had to be exact and weeds had to be removed manually. Today it is common practice to use copper sulphate, potash and phosphor.

It has been claimed that many of the problems affecting other countries do not affect Chile[33] because of its natural geographic isolation and climate. Chile's climate offers dry summers and springs, which means that fertilizers can be applied in very small amounts, because the risk of "washing them off" is practically non-existent.

The international community has developed new clones, but Chileans work with new clones only exceptionally because new plants have to go through a 2-year period of isolation before they can be introduced into Chile. This hard practice of legislation is an old Chilean tradition.

One difference between Chile and Europe is that that the vineyards are artificially irrigated, which is not the case in most European vineyards. Artificial irrigation is common in the Southern Globe due to extremely dry springs and summers[34].

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[31] For explanation of different grapevines see Oz Clarke or other authors.
[32] Ferderación de Vinos de Chile and Duijker Hubrecht, *Wines of Chile,* Mitchell Bezley 2000, pp44.
[33] Clarke Oz, *Vinatlas,* Wahlström & Widstrand 1998, pp 11-12 and 264-267.
[34] Clarke Oz, *Vinatlas,* Wahlström & Widstrand 1998, pp15.

Another important change observed is that the mentality has changed towards a generally gentler treatment of grapes[35].

2.4.2 The Vinification Technology

Large crushers were operated manually (using oxen at first[36]) in the 19th century. During the course of the 20th century diesel and electricity were introduced. For storage and fermentation, the wineries used Raulí-barrels[37] until bottles and corks became more frequent after 1850.

Even though production had several problems when measured by present-day technology, it was modern and state of the art at least until the 1930s. The problems with cooling and aftertaste were almost impossible to avoid, but what this period witnessed was mass production and distribution made possible by the available technology. The quality obtained was also connected to the vines which, in the Chilean case, were mainly for the production of table grapes.

Del Pozo's study of the archives of several wineries showed that the investment level was high, and that machinery was replaced when necessary with locally produced machines. An insight into what machinery was available in 1945 was offered by Leon. He observed harvesters, hydraulic crushers, pumps, automatic bottling equipment, coolers, filters, laboratories, etc. A considerable part of the machinery was diesel driven. We can also find Volvo trucks with steel tanks[38]. What we do not know is the extent of the investments.

In France (the role model for Chilean wine) production was, and in many cases still is, done manually and machinery did not appear until the late 1960s. It is quite difficult to measure the development of the wine industry in any country prior to the 1960s based on the availability of machinery or other indicators of "modern" production. The best wines were, and still are, produced as a handicraft.

In the late 1970s and early 1980s fixed capital was rapidly replaced with new and modern state of the art machinery. All iron and other such materials have been replaced by stainless steel, thus eliminating the risk of container pollution. Development in general towards a better quality is

[35] Ricardo Poblete, Santiago 1999.

[36] In Chile it was very common to use oxen for agricultural work, probably due to the high prices of horses. In France and probably the rest of Europe, it was more common to use horses.

[37] Raulí is a national wood. It fulfils the purpose of storage but does not help the flavours to flourish as oak does.

[38] Leon Victor, *Uvas y Vinos de Chile,* Sindicasto Nacional Vitivinicola, 1947, pp 322.

worldwide. Among the most important improvements are the discontinued use of chemical additives and prevention of evaporation of aromas, which immediately result in higher qualities[39].

Chileans are increasingly using oak casks or vats, which are replacing the raulí casks. Oak adds new dimensions to the wine. The aromas added by the oak casks help to give the wine a smoother body and a heightened nuance of the region.

Work in the vineyard has become mechanized, but perhaps one of the most important changes is the improved educational level of the work force. The educational level of enologists has improved considerably, and the workers have become highly skilled and specialized in what they do. The most important factor behind improved labour skills is the training on the job that all vineyards and wineries must have, to secure a high quality production[40]. A big difference between today and only thirty or forty years ago is that almost the whole labour force has a secondary school education, which enables the worker not only to read instructions, but to have a deeper understanding of the importance of every step in the line of production.

2.5 Structural Changes Over Time

Grape production was dominated by small vineyards. The principal wine production areas were situated in the central provinces between *Aconcagua* (central valley) and *Cautin* (8th Region), with only 86 vineyards owning more than 100 hectares, but there were 17,224 vineyards with less than one hectare. If one only considers those vineyards of commercial importance, there are 12,753. Only 1,932 vineyards formed a stratum of more than 10 hectares[41]. This very peculiar market structure induced the creation of co-operatives. In 1945 there were six co-operatives organizing around 1,000 vineyards with a total coverage of 6,000 hectares. The emergence of co-operatives was a combined effort to improve quality and profitability for small producers. The rest of the small vineyards sold their grapes or produced wine with very small technical means[42].

The distribution system that emerged is reminiscent of the system in Europe. The industry took care of its own distribution selling directly to

[39] Ricardo Poblete, President of the Chilean Wine Federation, interview in March 1999.
[40] Toretti Ximena, *Wine House Toretti,* 2000.
[41] Ministerio de Agricultura, *La Agricultura Chilena – En el quinquenio 1956-1960,* Dirección de Agricultura y Pesca, Departamento de Economía Agraria, 1963.
[42] Raffo Inostroza Raul, *Uvas y Vinos de Chile,* Leon Victor Ed, Sindicato Nacional Vitivinicola, 1947.

liquor stores, etc. Many small producers sold their wine in their own cellars, directly to the consumers or local restaurants. The Catalanes (retailers) in Santiago also distributed much of the wine from the small producers. They traveled around and bought the production from different producers and transported the wine to their bodegas in Santiago[43].

A few well-established producers exercised almost total influence, while the many small or medium sized producers did not have any influence at all. *Concha y Toro, Santa Rita, San Pedro and Santa Carolina have* were some of the dominant vineyards in the 20th century[44]. The oligopolistic structure, which was accentuated over the course of the 20th century, has an important implication because it can prevent companies or at least make it difficult for new companies to enter the business. The methods of the controlling companies may take different expressions, e.g. newcomers may be excluded from access to production inputs and marketing channels. Moreover, companies participating in an organized limitation are protected from bankruptcy[45].

2.5.1 Substructures

Different substructures have been observed over the years; 1) The big and middle-sized wineries with forward and backward integration; 2) Cooperatives with forward and backward integration; 3) Small or large vineyards selling their grapes to independent buyers and; 4) Cellar door production and sales with small-scale production and local distribution.

The main change of the last few decades is the accentuation of the oligopolistic structure, where the four biggest producers have gained more and more power, and the emergence of boutique vineyards. Four major producers account for around 80% of the wine production. At least one of these big producers is listed in the New York Stock Exchange and all have strategic cooperation with some important foreign producer. The big producers have also had the technological leadership of the industry over the last 100 years.

There are around 15-20 middle-sized producers who concentrate much of their production for export. Boutique vineyards, representing the third group and producing mainly for export, are very small (in terms of

[43] The wines distributors in Santiago were called Catalenes because many of them came originally from Cataluña For a description see Del Pozo.
[44] Morel, Paulina, *Utmaning från den Nya Världen, Om Vinglobalisering ur den Nya Världens Perspektiv,* Stockholm University, chapt 2, 1997.
[45] Dahmén Erik, *svensk Industriell Företagarverksamhet,* Industriens Utredningsinstitut 1950, pp56.

hectares), but very modern and technology intensive, with their own vinification plants. This category is new in Chile. In this new structure the production of low quality wines by small vineyards for local consumption has almost disappeared.

The changes in the structure of the industry are partly linked to events in other parts of the world. During the 1950s and 1960s a revolution of technological development started out in Californian wine districts[46], spreading to Australia at first and later on to the rest of the world. This process is still going on. The development strategy of the wine industry has been competitive co-operation[47].

Large companies have had a continuous updating of their technology and their knowledge of modern technology is well established. Large companies started this latest modernization in the 1970s and signed some strategic alliance treaties quite recently[48]. Smaller wineries are more likely to have been influenced by Miguel Torres[49], who established state of the art and small-scale quality production of wines in 1978. Torres not only used modern technology, he also spread the results of his deeds. Victor Costa from SAG refers to Torres as the trigger that created a domino effect[50].

Foreign ownership has increased since the 1980s, but, as I see it, it is almost without exception in the form of Joint Ventures or strategic co-operations. Co-operation with foreign agents is most often due to strategic reasons, such as lack of capital, access to foreign markets, established chain of distribution, etc. The foreign investments seem to have slowed down[51]. Joint ventures and strategic co-operations have become important tools to

[46] Wine production was devastated in the United States due to the policy of prohibition adopted in 1920. The wine industry in the USA started to recover first after the Second World War and many people believe that the fact that wine producers started all over again meant a fresh start that allowed a new search for new technologies and methods of production that eventually resulted in a revolutionary change in wine production.
[47] Morel Paulina, *Utmaning från den Nya Världen,* Stockholms Universitet 1997.
[48] Memorias Viña Concha y Toro, several years.
[49] Spanish Wine house Torres has been around since the 18th century. The winemaking tradition in the Torres family is both long and successful. The family has also acquired knowledge of exporting wines over several generations. They have exported to, among others, USA for the past 120 years. The Torres Children have become known by their establishment abroad – Miguel in Chile and now Argentina and his sister in the United States. At "home" in Spain it is Torres the father that runs the company.
[50] Interview with Victor Costa, SAG (Servicio Agricola y Ganadero) Section of Wines and Spirits, march 1999.
[51] Ricardo Poblete, *Chilean Wine Federation,* Interview in march 1999.

transfer new technology, knowledge or access to new markets. One important difference between wine production and exports of fruit is that while some general tendencies of marginalisation can be observed in production and exports of fruit, no such tendencies are observed in wine production.

2.6 Capital Market

The extension of agricultural credit through the banking system began in 1850 when mortgage laws made rural property security for loans. There was a floor of 2,000 pesos for mortgages, and long-term loans from *Caja de Crédito Hipotecario* were available only to the larger landowners[52]. During the 19th century the availability of credit was limited and the risk involved was quite high, with high interest, and it was not until 1926 that the government legislated for safer conditions for producers in need of finance. This eventually resulted in the start of *Caja de Credito Agrario* (Agrarian Credit Bank) in 1927, allowing landowners to take greater risks, with payments over longer periods of time and at a lower interest rate. The new loan institute financed a large part of the investments made by the wine sector[53].

As the lack of access to capital marginalized small vineyards because they only had access to loans in the informal market[54], the state tried to help small peasants by establishing Indap in 1962, a government agency to facilitate financing the investments of small farmers and peasants. Over the years, except for the period between 1973 and 1986, Indap has played an important role in financing small farmer agriculture. After the start of land reform, Cora[55] became another important institution, gradually increasing its share of the total agricultural credit that was intended for land purchase, culminating in 1972 and then gradually decreasing.[56] Commercial banks have a dominating role in agricultural credits and the most important institution today is Banco del Estado (State owned bank). The state has also been active in handing out development loans through the state agency

[52] Lundahl Mats, *Agricultural Stagnation in Chile 1930-1955, in The primary Sector in Economic Development,*Croom Helm 1985, pp 119.
[53] *Leon Victor*, Uvas y Vinos de Chile, Sindicato Vitivinicola de Chile, 1947, pp315.
[54] Lundahl Mats, *Agricultural Stagnation in Chile 1930-1955, in The Primary Sector in Economic Development,* Croom Helm 1985, pp 121.
[55] CORA= Corporacion de Reforma Agraria = Agrarian Reform Corporation. State Agency in charge of the land reform.
[56] ODEPA, La Agricultura Chilena 1965-1974, Ministerio de Agricultura 1975.

CORFO. The role of CORFO, promoting government initiated development programs combined with state loans, has intensified over the years, especially after the reinstatement of democracy.

2.7 Institutional Changes

The nature of the product forced even small vineyards to enter commercial agriculture and induced all farmers to plan for a surplus at the beginning of the period.

Production increased greatly and, with a stable consumption in the home market and an export sector that could speed up, a surplus production already started to appear in the 1920s. This created a severe problem because the national population could only consume a limited amount of wine. Surplus production could be sold for transformation to industrial alcohol, but the price was very low. It is, therefore, no surprise that in 1938 a law was passed regulating the number of hectares under vine. After 1938 the only vines that could be planted were those replacing old ones. This is a competitive limitation that effectively kept newcomers from legally entering the wine market for almost 40 years.

In addition, the second alcohol law passed in 1938 coincided with the start of the ISI policy in Chile. The country had suffered greatly during the last part of the period of outward expansion, and the loss of the world market for natural nitrates led the country into an economic depression.

The political influence of the big wineries was well documented by Del Pozo, an influence that rendered special favors from the government. I believe that the limiting legislation is an expression of that power. Bordeu, Melin and the Industry itself have argued that the limitations on new planting and the Import Substitution Policy in Chile have been major obstacles. I must agree with Del Pozo. The political influence of the wine producers was expressed by their active participation in political office[57]. They also wielded considerable economic power, because they paid a great deal of taxes. In view of their privileged position, I argue that any measures affecting or limiting the production of wine were adopted, if not on the initiative of the big producers, then at least with their blessing. Thus it is not the State, but the industry itself that imposed limitations to keep out new competitors, because the doors to Europe were closed by protective policies[58], and because industrialization of national wine production had

[57] Del Pozo, José, *Historia del Vino Chileno,* Editorial Universitaria 1999, pp 216-217.
[58] Svennilson Ingvar, *Growth and Stagnation in the European Economy,* United Nations Economic Commission for Europe 1954, pp 88.

increased production beyond what the home market could absorb. French wine producers had, in fact, the same objective as their Chilean counterparts when they started the AOC system in 1935. There, the reasons were over production, increased level of competition and, of course, the need to control quality.

Over the whole period the State seems to have had a developmental attitude towards the wine industry. During the 1960s, there were important improvements in production financed by the Government through CORFO. The problems targeted were sanitary, increased knowledge about fertilizers, pesticides and technical development of planting, replanting and transplanting of vines[59]. From 1952 and onwards different governments took both continuing and different measures to improve the quality of agricultural production.

In 1952, the new legislation that came into effect contained very positive aspects concerning standards and minimum quality requirements[60]. In 1965 vineyards were allowed to increase their areas under vine by 10 hectares. Within the frame of the implementation of development plans, 11 new vinification plants were built, 4 for wine and pisco[61] in Coquimbo and Atacama and seven in the Central Valley[62]. In the southern regions vinification plants were built in 1967 in Talca, Cauquenes, Coelemu, Quillón, Ñuble and Yumbel, all of which were driven collectively and were financed by Government loans through CORFO[63]. The governments of the 1960s also allowed imports of filters and bottling equipment from Argentina, as mentioned before, and the frontiers were closed to imports from 1939, the start of the ISI policy, to 1960. But Del Pozo argued that imports were not necessary, since there was a vast production of equipment for wineries in Chile. The fact that many of the wine industrialists were politically involved[64], combined with the performance of the industry, is strong reason to doubt that the industry lacked the possibility of importing equipment.

One crucial investment, which benefited all of agriculture, was the development of a research body of academics. The start of INIA (National

[59] Ministerio de Agricultura, *Informe Sobre los 3 Años de gobierno*1967.
[60] Ureta F & Pszczolkowski, p, *Chile Culture of Wine,* Editorial Kaktus 1992, pp 20.
[61] Pisco is a distilled alcohol made with grapes.
[62] Trivelli, Hugo, *Testimonio sobre la Reforma Agraria – Realizada por el Gobierno del Presidente Eduardo Frei Montalva Nov 1965- Nov 1970,* pp 6.
[63] Ministerio de Agricultura, *Informe Sobre la Labor Realizada en los 3 años de Gobierno,* 1967, Graph nr 7.
[64] Del Pozo José, *la historia del Vino Chileno Desde 1850 hasta hoy,* Editorial Universitaria 1999, pp217.

Institute of Agricultural Investigation) and other academic organizations, with the support of, among others, the Chile-California Program, enabled many Chilean agronomists to take doctoral degrees at the University of California. It is difficult to quantify the results of each program, but at least 3 PhDs from the Chile California program started to work for INIA at its start, and one of their first and most important experimental fields was started at La Platina, which is located in the green belt around Santiago and across the Street from Antumapu, Universidad de Chile's department of agricultural sciences. The contacts between the two institutions were and still are very important for the education of new agronomists and other specialists in agricultural sciences. At La Platina the first research was concentrated around the production of fruit. For vineyards, the most important knowledge concerned transplants and replants, disease control, plagues, fertilizers and pesticides. All governments, from 1952 and onwards were, in some sense, part of a process that reflected the shared intention of all political strands to develop agriculture.

2.7.1 Land Reforms

Perhaps the most dramatic long-term impact on Chilean agriculture has been the implementation of successive land reforms. The adoption of the Land Reform Law was based on a development plan presented by the Chilean Government to the Bank of Reconstruction and Development (World Bank) in 1954[65]. Initial reform considered wine as an important sector, but planned only an increase of the number of hectares under vine.

Land Reform policy went through several stages, the first of which was the acceptance of a Land reform through adopting a new legislation, but the actual reform was very limited. The initial period has been referred to as the "Pot-Reform" (1958-1964). The second stage was influenced by structuralism and marked the actual start of the land reform with the confiscation of many estates and the repartition of land to poor peasants. During this stage policy concentrated on stimulating the formation and development of co-operatives (1964-1970). I have not found evidence of negative influences over the industry up to 1970, but a land reform that aims at confiscation of private property is per sé a threat over property rights.

Under the socialist government (1970-1973), the land reform became ideological and the reform process was deepened. The state of agriculture

[65] Ministerio de Agricultura & Corporación de Fomento (Corfo), *Plan de Desarrollo Agrícola y de Transporte,* 1954.

gradually deteriorated because the decision making process became politicized. During this period vineyards were seriously affected[66].

2.7.2 Neo-liberalism

A military government overthrew the socialist government and the policy implemented has been considered neo-liberal. A typical thought about a government applying a neo-liberal policy is that the state is not to have a role, "hands off" being the rule. Neo-liberal policy has not been hands off in the case of Chile.

In earlier periods the State had invested in research, education and land reforms. After 1973, the Pinochet government took three very important steps. The first one was to end land reform and sell most of the land in the reform program. The second was to invite multinational companies to buy land and invest in agriculture. What the government offered was cheap land and a "peaceful" investment climate (no strikes, no politics). Finally, agriculture became depoliticized.

These measures stimulated exports of fruit, but until 1982 there were no visible indicators of a spill over effect from agriculture to the rest of the economy. Most farmers complained loudly about their unfortunate situation and that government policy was farmer-hostile. The exchange rate was fixed against the dollar for several years, providing an instant promotion of imports at low prices, but playing against the export sector and home market production. After the economic crisis in 1982-83 economic policy changed. The important exception to hostile policy during the first period (1973-82) was the protection of property rights through the abolition of the land reform.[67].

The changes of economic policy after the crisis encompassed special support for the production of important foodstuffs through price bands, but for wine producers the most beneficial was probably the fact that the exchange rate was floated and Chilean exports became cheaper.

2.7.3 Diffusion of New Technologies

For the last 50 years at least there has been an intention to promote the diffusion of new technologies. The first research programs by INIA had a direct relation to grape growing and different vineyard technologies and

[66] This becomes clear through interviews and through Melin.

[67] Ministerio de Agricultura, *La agricultura Chilena durante el Gobierno de las Fuerzas Armadas y de Orden,* Division de Estudios y Presupuesto.

practices. INIA has collaborated with Universidad de Chile in the education of new agronomists since the beginning.

Moreover, as a direct result of the economic crisis in 1982, the government started a major technology transfer program called GTTs (Grupos de Transferencia Tecnológica = Technology Transfer groups). The mission of the GTTs was to create a link between organisations like INIA[68] and agricultural producers (valid for all kinds of production), and to facilitate implementation of new knowledge as well as new technologies within agriculture. GTTs were problem solving oriented and gathered the farmers in discussions to seek solutions to their production problems. The criterion for forming a GTT was geographical as well as production item oriented, and thus milk farmers met milk farmers and grape growers met grape growers. Some of the GTTs in the central valleys, like the ones in Calera de Tango and San Vicente de Tagua Tagua, have many members that produce grapes, either for vinification or as table grapes and a few have their own vinification plants. After turning to the international market, the industry itself provided new knowledge.

Fundación Chile has also played an important role in the diffusion of new technologies. In the 1980s it carried out a program in which 7 producers were used as a window for the promotion of new technologies. The enterprises were analyzed and entirely reshaped. These vineyards improved both quality and production dramatically[69] from top to bottom and were smaller but with their own vinification plants.

Since the 1990s the democratic governments have concentrated on promoting Centres of Entrepreneurial Development (CEGEs) financed for a couple of years by the Chilean Development Agency (CORFO= Coporación de Fomento de la Producción) through a financial device called PROFOS[70]. When finance ceases the organisation is supposed to be able to support itself.

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[68] Instituto de Investigación Agropecuaria was founded in 1964 with the mission of experimenting and developing better species, etc in order to increase agricultural output and efficiency. The INIA is a direct result of the Chile-California Program. This project made it possible for a lot of University teachers to get agronomy doctorates at UCLA during the 1960s.

[69] Ricardo Poblete, Chilean Wine Federation 2002.

[70] PROFOS (Proyectos Asociativos de Fomento) is the financial instrument to build and organize a group of agricultural producers that work together in order to improve their knowledge, entrepreneurial skills, etc. The government finances the organisation during the first year and gradually cuts down on its help until the organisation is self-financing. This instrument was introduced in 1994 as the first measure of agricultural policy of the government of Christian Democratic Eduardo Frei and his minister of agriculture Mr Emiliano Ortega

The purpose can be, as in the cases of ChileVid and the Chilean Wine Federation, to organise a special type of producer and take care of further education, administration assistance, co-operation in technology tours, and other activities. In addition, the Chilean Wine Federation also has the authority to grant government funds for development projects.

2.7.4 Promoting Exports

The Chilean Government has also been very active regarding the promotion of exports. In November, 1974 the government founded ProChile (Export Promotion Office) as a way to co-ordinate and support the export efforts. ProChile's support consisted in creating export opportunities and helping to finance (50%) the export promotion costs. ProChile started to intensify its work with the wine industry during the 1980s, and the main targets then were the United States and England. Other countries, like Sweden, did not import until 1989/90, after democracy was reinstated.

ProChile was founded during military rule, but its work has increased and deepened under the leadership of democratic governments. In the case of Scandinavia, and perhaps other countries, ProChile took advantage of the knowledge of foreign markets acquired by some Chileans in exile, recruiting some of them to work for ProChile in their Stockholm based office.

In the mid 1980s the government also subsidised exports with 1 US$ per exported case of 12 bottles[71].

2.7.5 Denomination of Origin

In 1995 a first legislation was adopted concerning the creation of a Denomination of Origin. Chile now has five Regions, with Sub-regions, Zones and Areas. According to both Victor Costa and Ricardo Poblete, this is just an embryo of an effort to copy the French AOC system[72]. Even now it is not certain that denomination of origin is followed with rigidity because there is no possibility of monitoring the system, but Chilean Appellations

[71] Ricardo Poblete, Chilean Wine Federation 2002.

[72] The French AOC system is a Quality-ladder that divides French wine production into Regions with a denomination of controlled origin. The division also implies a quality denomination with Grand Crus, Premiere Crus, Appellation Communales and table wines. The AOC system was established in 1935 and it regulates everything, from plants per hectare, how much can be extracted from every hectare, etc. This French geographic quality ladder has been the model followed by others, even though the first known denomination of origin in history was established in Portugal in the 18th century and regulated production of port wine.

seem to be a good start. Today, quality standards are mainly set by consumers "voting with their wallets".

2.8 The Political Influence of the Industry

In the late 19th century the engine of growth in the Chilean economy was provided by mining activities in the north, but the social structure was essentially agricultural. According to Bauer's description of Chilean society between the late 19th century and early 20th century, land-ownership was at the time concentrated in very few hands and landowners exercised great influence on Chilean political life[73]. In the case of wine producers, it would be fair to say that they belonged to the group that Bauer calls *agricultores progresistas* (progressive landowners).

Production of wine appears to have been a good business in the late 19th century. Del Pozo argued that the wine industry promoted the second alcohol legislation adopted in 1938, through their influence over government policy. The alleged reason was the shift in the economy towards economic development.

The second alcohol legislation prohibited new planting of vines. Such a prohibition is an entrance obstacle aimed to prevent new producers from entering the business, and to protect the existing producers from new competitors. No earlier analysis has been made considering the entire market situation [74]. Del Pozo found that producers were well represented in political office, but he did not consider the fact that many of the most prominent producers were also involved in the incipient process of early industrialization in Chile, which also strengthens this argument. ISI-policy cannot be the cause of a prohibitive legislation, it should instead be considered as its effect. The strongest reason for a prohibitive legislation was a failed export strategy due to economic nationalism in Europe (see "Foreign Markets").

2.9 Domestic Markets

At the end of the 19th century and beginning of the 20th, rural population was in domination. Agricultural production and mining attracted a large part of the labor force. New cities were emerging and growing at a fast rate. The state increased its revenues through a heavy taxation of exports, which

[73] Bauer Arnold, *Chilean Rural Society from the Spanish conquest to 1930,* Cambridge University Press 1975, chapter 7.
[74] See discussion about foreign markets.

contributed in an important way to speeding up the urbanization process and the emergence of a new urban middle class[75]. Larger cities meant increased domestic markets. However, the emerging urban markets did not increase the demand for the new wine industry. In Chile, urbanization was concentrated in the capital city of Santiago[76] and a large percentage of the population in Santiago lived under miserable conditions. Although urbanization speeded up from 1880 and onwards, a real market for expensive wines did not emerge until much later. With regard to the local market, a sound economic logic should be to produce at low cost without much investment, which is probably what gradually occurred after the 1930s and the reason behind decreasing investment rates. However, I believe that a large part of production for the domestic market was low quality/low-investment all along. This hypothesis is founded on the distribution of the vines, around half of which were of a kind that yield a low quality wine. Quality improvement in production for the domestic market was perhaps a side effect of export-production.

There is another side to quality and it is that the product can be a high quality product even if it is produced as a handicraft; in fact, even today, the best wines in the world are produced as a handicraft. The demand for high quality wines was probably very low and, at the risk of being too adventurous, I dare to speculate that there was no need to industrialise for the sake of the home market.

The Chilean population has steadily increased during the 20th century. Wine was traditionally a normal item on the lunch and dinner tables; hence any population increase should have led to market enlargement. The variation of consumption per capita was between 40 liters/capita and 68 liters/capita. In the early years, consumption was more stable, but in the period 1955-1975 there were dramatic swings. Wine for home market consumption was not considered a luxury and demand for it was highly inelastic. Supply was also considered inelastic in the short run due to the time lapse between the planting of new vine-stocks and the first actual harvest. Other very important aspects were legal punishment against new plantings and the government's tax policy.

Local prices varied with the size of the harvests. Big harvests gave lower prices and smaller harvests yielded higher prices. A comparison of prices of wine in relation to other products of daily consumption showed that

[75]Meller Patricio, *Un Siglo de Economía Política,* Editorial Andrés Bello 1997, chapter 1.
[76] Bauer Arnold, *Chilean Rural Society from the Spanish Conquest to 1930*, Cambridge University Press 1975, chapter 7.

most of the products became more expensive in relation to Semillón wines and less expensive if compared with the price development of Bordeaux wines.

Most of the internal production was transported by railway or boat at the beginning of the period. By the 1950s these transportation methods had already been displaced by trucks. The containers used were mainly barrels, closely followed by five, ten or fifteen-liter glass bottles [77].

A very important feature of the industry is the quality concept of the time. It was considered that quality was best in old wines and the quality ladder applied during the period was: Ordinary (wines aged at least one year or more); Special (wine more than two years of age; Reserva (wines at least four-year's old); Great Wine (wines of at least six years). Besides, the amount of alcohol was regulated: 12% for whites and 11.5% for reds. The acid had to be 1.2 grams per liter for the bulk wines and 1.4 grams per liter for bottled wines. This quality definition was the one legislated by the State and followed by the producers[78].

Among other factors influencing the branch negatively was the enormous drop in home market consumption. Most authors refer to this diminishing effect as a phenomenon of the 1980s, but diminishing per capita consumption was a trend at the start of the 20th century. As mentioned before, consumption per capita was 73 litres in 1930, in 1959 it was 48.6, in 1973 it was 48 liters/cap decreasing to 30 liters/cap in 1982, but after 1982 it dropped to 11 liters/cap in the course of a few years. Consumption is currently around 11 liters/cap. Changes in consumption may be explained by several factors.

2.9.1 Macro-economic Factors

Real wages increased by 8.5% in 1970 and 22.3 % in 1971[79], after which economic performance worsened and inflation reached 605% in 1973. The economic crisis was, according to Meller, the result of a populist economic policy that, on the one hand, increased wages and, on the other, implemented a strict control of prices, leading to a huge economic contraction.

To reinstate macro economic stability, the Military Government implemented a chock therapy program concerning privatisation, free prices, low import taxes, decreasing government deficit, and liberalisation of the

[77] Ministerio de Agricultura, *La Agricultura Chilena 1956-1960,* Dirección de Agronomia y Pesca, Departamento de Economía Agraria, 1963, pp 112 & Interview with Mr Ricardo Poblete, Corporación Chilena del Vino, April 1999.
[78] León Victor, *Uvas y Vinos de Chile,* Sindicato nacional Vitivinicola, 1947.
[79] Meller Patricio, *Un Siglo de Economia Politica,* Editorial Andres Bello 1996, pp 119.

financial market. This stabilization package was accompanied by the promotion of exports. The general result of the new economic policy was an economic contraction that created disadvantages for the productive sectors. The first period of the military regime from 1974 to 1982 ended in a financial crash in 1982.

Real wages dropped dramatically in 1974-75, recovered slightly until the crisis in 1982 and then decreased again from 1982 to 86[80]. Unemployment increased dramatically in 1975 and reached a peak of 30% between 1982 and 83[81]. Thereafter employment rates slowly recovered until 1998 when the Asian and Brazilian crises made an impact on the Chilean economy. Thus, macro economic instability, decreasing real wages and increasing real unemployment are the kind of indicators that may affect the consumption patterns of any country. All of them were present in the Chilean economy.

2.9.2 Effects of Substitution

Due to scarce economic resources, households started to substitute wine for other products, the substitution process being directly linked to the relative prices of wine and its substitutes.

Table 1. Average prices of Wine, Beer, Pisco and Soft drinks and their increase between 1971 and 1981

	Wine	Beer	Soft Drinks	Pisco
Price in US$ 1981 per bottle	1.86 (0.75 liter)	0.26 (1 liter)	0.71 (1.5 liter)	4.86 (0.75 liter)
Average price increase 1971-1981 (%)	358%	185%	394%	235%

Source: INE, Informativo Estadistico 1972-1982 (Consumer price averages for 1971-1981). Source Exchange rates: Banco Central de Chile, Boletin Mensual, 1988 pp 2050.

After 1990, as the price of wine started to increase rapidly, the prices of substitutes increased[82]. Furthermore, Coca-Cola increased its unit case sales in Chile by an average of 15% in the previous 10 years, a development that placed Chile far above the average world increase of Coca Cola

[80] Ibid, pp 256.
[81] Ibid.
[82] Bordeu Edmundo, *Exportaciones de Vino: La Importancia del Mejoramiento de la Calidad,* in El auge Exportador Chileno, Cieplan 1994.

consumption of 7%[83]. The important role that table wine occupied until 1970, as a lunch and dinner drink, was taken over by Coca-Cola.

2.9.3 Increase of Production and Price War

The replacement of vines and liberalisation of markets led to an over production of wine which reached a peak in 1982 of 610 million litres. The increase was not as dramatic as has been argued before, because a part of that increase was the result of improved control by the Chilean tax authorities[84]. Regardless of the size of the increase, it occurred simultaneously with the dramatic decrease of consumption (see above). Competition tightened, resulting in a price war with the big companies in the lead.

Ricardo Poblete, head of the Chilean Wine Federation, regarded the price war as a great strategic mistake. The industry tried to make up for losses by targeting the low-income market segments. Wine lost its original market and failed to gain a new position, while its substitutes moved to targeting middle and high-income segments.

2.10 Foreign Markets

Tim Unwin has described the late 19th century as the period when wine production changed. The most obvious difference in viticulture in 1900 and 1800 was the far higher levels of capital invested in both the production and storage of wine at the end of the century than at its beginning. The industrialisation of international wine production came after the sanitary crisis in Europe described below. The industrialisation process itself did not contain the mechanisation and the advance technology that, for instance, the steel industry or any other modern industry achieved. The most important feature of this process in the wine sector comprised a new organisation, new distribution channels, a new institutional setting and the introduction of mass production. Of course, there was new knowledge as a result of the sanitary crisis that ultimately resulted in heavily increased yields, but the work in the vineyards was and still is labour intensive. In the wineries, technology was much the same as in Chile, with pneumatic crushers and other state of the art technologies.

A window of opportunity for bottled, quality wines was opened during the outbreak of the phylloxera epidemic in Europe in the late 19th

[83] http://www.thecoca-colacompany.com/Investors/mktresult.html.
[84] Jarvis Lovell, *Chilean Agriculture under Military Rule, From REform to Reaction 1973-1980,* Institute of International Studies No 59, UCLA, pp 43.

century. Mildew (Oidium Tuckerii) was discovered in England just before 1850, and a few years later the disease had spread all over Europe, drastically reducing yields. As part of the cure for mildew, American vines were imported, since they seemed to have some natural resistance to the disease. In 1863-64 vineyard owners in southern France began to notice the death of their vines without any apparent cause. The new disease first appeared in the vineyards of Provence and the Rhöne, but spread rapidly, creating devastation in many places. It was not until 1869 that the aphid phylloxera was identified and it took almost two decades before a cure was developed. Phylloxera is a small organism that attacks the roots of the vine stocks; these organisms are originally from North America where vine stocks developed a natural protection against this insect. The insect did not exist in Europe until some stocks were imported to Europe in 1863[85].

The consequences of the sanitary crisis in Europe, and the collapse of French wine production between 1860 and 1880, resulted in a significant reduction in the area devoted to vineyards and also in the overall production of wine. Another important result was the increased differentiation in the structure of wine production. The large capital-intensive enterprises could withstand the increased costs associated with grafting and spraying, but small producers found it increasingly difficult and the result was a sharp increase in the proletarization of farmers and their families and a rise in emigration. A third consequence was the considerable expansion of fraud and chemical adulteration of wines especially in France. Finally, the events led to a dramatic crisis in wine production both in areas that were only affected at later stages of the phylloxera crisis or were completely unaffected[86].

One of the reasons why phylloxera had spread so easily at the time was that steam-power had its breakthrough and transportation was much faster, so the time it took to transport goods from America to Europe was not long enough to kill the phylloxera lice. Perhaps it was the isolation of Chile or perhaps Chilean major imports of vines took place just before steam-power had its breakthrough in the intercontinental transportation system, but the fact remains that Chile was not infected with phylloxera. This gave Chileans a golden opportunity to export their wine.

Ureta and Pszczolkowski observe that the outbreak of phylloxera in Europe was also one of the most important incentives for the emigration of European wine experts, not just to Chile, but also to Argentina, Brazil and

[85] Unwin Tim, *Wine and the Vine,* Routledge 1996, pp283-294
[86] Ibid, pp294-295.

Uruguay. The presence of experienced winemakers was not only positive for production quality, but it brought important knowledge about the European wine-markets. Because of the extent of this crisis, France and England promoted the start of, or increased, production of wine in some of their colonies.

The sanitary crisis in Europe would have meant nothing if the Chilean wine sector had not started to modernise just before it occurred, and a lucky coincidence was that modernisation and the emergence of the new wineries started during the initial part of the crisis, when mildew was the problem.

The effects of phylloxera presented a substantial challenge, turning the wine sector into an international business. This in turn provided a new framework of competition that re-shaped the wine industry with a momentum of the capitalistic mode of production that had come to embrace the whole world within its set of productive relations[87]. The capitalistic mode of production also embraced the Chilean wine sector. The only problem was that the export window offered during the crisis did not give Chile a permanent place in the lucrative European markets. It was, however, enough to increase production from 54 million liters in 1875 to 110 million in 1883[88]. Chile exported its first wine to Europe in 1869 and started to win prestigious awards shortly after[89].

The other existing market possibility was the United States, a country to which Chile already exported other products. Wine production was also emerging in the United States, where population increase gave rise to an unrequited demand, but the prohibition law of 1920 ended any legal possibility of exporting wine and spirits to the United States.

After World War I, Europe experienced a wind of economic nationalism, of which agriculture was the outstanding example. In no other part of the European economy was the protection policy carried so far. The measures to protect agriculture were mainly designed to maintain farm income above a minimum and, as a complementary motive, there was the need to overcome balance of payments difficulties by stimulating a domestic output which could replace earlier imports. The European countries obviously show different natural conditions suited to the growth of different products, applicable not only to grains but also true for wine. However, these differences were neutralised by agricultural policy aiming to preserve a diversified production due to strategic reasons. During the 1930s, exports of

[87] Ibid, pp 284-309.
[88] Thomas Gustafsson, *I Chile vilar inga halta löss*, Vin&Sprit 5/1998, pp6.
[89] Duijker Hubrecht, *Wines of Chile,* Mitchell Beaxley 2000, pp 14.

wines suffered much from import restrictions, and it was only in the period immediately preceding the Second World War that some change for the better occurred[90].

Portugal was the first country to practice a delimitation of origin in the Upper Douro Valley under Pombal. However, it was the French that first started a comprehensive system of demarcations of wine in 1935. During and after the phylloxera crisis, fraudulent wines became a problem. The other problem mentioned above was the sharp increase in the produced amount of wines. The AOC quality ladder system was designed to take care of both these problems. On the one hand, a delimitation of controlled origin gave the customer an assurance regarding the contents of the bottle, and, on the other, it ensured the possibility of monopoly prices for the producers within the system. The monopoly situation is created through two mechanisms: First, the delimitation of a boundary between vineyards can have a significant influence on the levels of profit obtained by farmers on either side of the boundary of demarcation, and second, control of the level of production of a particular demarcated wine for which demand outstrips supply[91].

The window of opportunity presented by the phylloxera crisis was finally shut down and the markets left for Chileans to serve after the 1930s, i.e., the internal Chilean market and the rest of Latin America, were not sufficient to justify an increased expansion.

The results presented by Keller suggest that Chilean wine became a substitute for moments of crisis in Europe. During periods of relative calm, exports were mainly represented by bulk wines, but during periods of crisis the export of bottled wines increased notably. Between 1940 and 1955 the composition of external demand stagnated for bottled reds but increased for bottled whites. For bulk-wines, the relationship was the inverse, quite large for reds and not so significant for whites with four exceptions. The Second World War did not have an enormous impact on exports. The best year for reds was 1949 and the best for whites 1954. However, the war did have an impact on finer liquor qualities. Exports of Champagne, Vermouth and Cognac increased by several hundred percent from 1941 to 1947[92].

Del Pozo argued that no serious attempt to export wines was made before the 1980s. For the reasons stated above I cannot agree with him. Instead, I think that there was a serious effort to launch Chilean wines

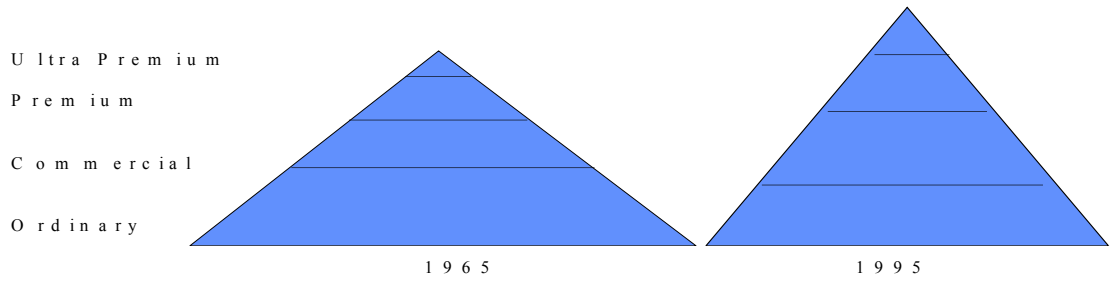
[90] Svennilson, *Growth and Stagnation in the European Economy,* United Nations Economic Commission for Europe 1954, Chapter 5.
[91] Unwin Tim*, Wine and the Vine,* Routledge 1996, chapter 10.
[92] Keller, Carlos, *Revolución en la Agricultura,* Zig-Zag 1956, pp 198.

abroad, especially in Europe during the late 19th century. The strategy failed because the sanitary crisis in Europe led to an increase in production of wine in Europe. The emergence of the AOC system abruptly limited competition not only in the French, but also in the European market. Until the 1930s, Chileans tried very actively to promote their products by actively participating in international events, fairs and competitions. The awards received during this period speak for themselves[93].

The wine market scenario offered a very pessimistic prospect for bottled, quality wines and a positive one for bulk wines. It was only during short episodes of crisis that there was an opportunity to export better wines. It is reasonable to assume that wine producers expected a pay-off on their investments. In order to continue to invest and keep up the good quality they needed a stable market. After the failed attempt to conquer the market for high quality wines the industry changed its scope and targeted market segments of lower qualities.

The composition of wine consumption has changed during the last 30 or 40 years. Slowly the consumption of table wines has dropped, followed by an increase in consumption of higher qualities. The increase in higher qualities does not compensate in litres for the drop of lower qualities, but the price level has increased and thus, profitability has not been affected.

Picture 1. Changes in Global Patterns of Wine Consumption 1965 - 1995.



* Ultra premium - more than 15 US$/liter
* Premium - 10 - 15 US$/liter
* Commercial - 3 - 10 US$/liter
* Ordinary - less than 3 US$/liter

Source: Australian Wine Industry, Strategy 2025, Wine Industry Journal 11:3, Aug 1996, pp 202.

[93] Ministerio de Agricultura, *La Agricultura Chilena en el Quinquenio de 1956-1960,* Dirección de Agricultura y Pesca, Departamento de Economía Agraria 1963, pp 112.

The consumption pattern seen internationally is that of a change in lifestyle with the emergence of a global stratum of relatively privileged, higher income, higher educated, well traveled middle class increasingly concerned with food safety, variety and quality[94]. The emerging new "white-collar"-groups consume a larger variety of products than before. Many of the products demanded by the new segments are not connected to what we know as fulfilling a basic need, but are more connected to value added products/experiences. Thus, for wine this has meant that larger groups of people are engaged in a wine-culture lifestyle, participating in wine tasting, in wine clubs, reading the wine press, wine books, making wine trips, etc. In addition, consumption among blue-collar workers has also changed, partly influenced by white-collar workers, but also and mainly because there is a greater and better variety of wines available. Consumption in general has increased in the three upper varieties of the quality pyramid, while it has decreased in the lowest.

Lower quality wines have been replaced by other products such as coolers, fruit juices, soft drinks, mineral water and beer. The international trend in general is towards drinking less but better wine, and less alcohol and more juices and soft drinks. The changes in consumption patterns are also related to the technological transformation of the industry, which has resulted in better wines at lower prices. The transformation of the wine sector has its particular features and cannot be compared with most other industries because there are some important bottlenecks in action. First, vines cannot be grown everywhere, so bottleneck number one is shortage of land. Second, the wine industry is relatively small in comparison to other industries and any investment requires the personal engagement of the owner, because the product itself is a living one. Third, much of the knowledge needed to lead a winery is based on experience, and this is acquired by working in different vineyards in different countries. For these reasons the wine industry has been forced to compete and co-operate at the same time[95].

Wine exports have boomed in Chile during the last 10-20 years. For the Chilean wine industry, the increase is quite significant in absolute terms. At the start of the recent export boom there was a temporary sanitary crisis in Europe that led to a shift in suppliers. Countries that earlier imported

[94] Friedland, William, *The New Globaslization Fresh Produce, in From Columbus to Conagro,* University Press of Kansas 1994, pp 219.
[95] Morel Paulina, *Utmaning från den Nya Världen, Vinglobalisering ur den Nya Världens Perspektiv,* Stockholms Universitet 1997.

mostly French wine started to look for less expensive alternatives. Both Spain and Australia suffered from prolonged droughts and, according to Ricardo Poblete, the most important cause was a sanitary crisis in the United States. During the 1980s a new clone was planted in California, which was supposed to be phylloxera resistant, but 5-6 years later they discovered that this plant was non-resistant and the demand for foreign wines increased enormously.

Other factors are that wine consumption per capita increased in non-traditional wine markets, for instance, Denmark went from 6 liters/cap in 1970 to 26 liters/cap in 1995, and England from 5 liters/cap 1970 to 13 liters/cap in 1995. The change in consumption pattern is directly linked to the process of globalization; on the one hand, the media brings new customs to our living rooms through films, books and TV. On the other hand, the emergence of effective distribution chains for food has increased the accessibility of products that we did not consume earlier. In this sense the aggressive marketing behavior of California and Australia has contributed to making new groups of consumers appreciate wine. In addition, there is a solidarity effect directly linked to the reinstating of democracy in Chile, because many countries limited imports of Chilean products during the military rule. In Sweden, for instance, Chilean wine was officially boycotted until 1989-90. Moreover, the large groups of former exiled Chileans are an excellent channel of promotion through their personal contacts with friends and colleagues.

The markets targeted by Chilean exports have also changed during the last decade, with the United States still the most important market for Chilean wine exports, but with England becoming an important second market. According to ProChile's office in Sweden, the economic crisis in Japan was beneficial for wine exports, because people substituted expensive French, Australian or American wine with high quality, but less expensive Chilean alternatives.

The main markets for Chile are England with 21.4%, USA (20.2%), Canada (7.3%), Japan (5.2%), Germany (4.5%), Denmark (4.5%), Argentina (4%), Norway (3.5%), Holland (3.3%), Sweden (2.6%) Ireland (2.6%), others (20.9%)[96]. Chilean wines entered the international market with a low price/liter relation and both Alejandro Hernandez[97] (Chilevid) and Ricardo Poblete (Federación de Vinos de Chile) agree that it is difficult to sell more

[96] www.chilevinos.cl

[97] Alejandro Hernandez, President of ChileVid (Organisation of 40 Chilean producers) in February 1999.

expensive wines and that higher up in the hierarchy competition gets harder. In spite of their comments, if one measures the average export-price/liter, it appears that Chilean producers are exporting more expensive wines, from an average of 1$/litre in 1989, the price more than doubled to 2.2$/litre in 1999. This can be compared to Germany's 1.41, France's 3.38, Italy's 1.06, and Argentina's 0.98[98].

One of the phenomena observed previously was that Chilean wines acted as substitutes during periods of crisis, which was the case at the turn of the 20th century. During the Asian crisis Chilean wines started to win market shares, especially in Japan. But sales also increased in England and other European markets. It is too early to draw any conclusions about the effects of the Asian crisis, but the short and long-term effects of the Asian crisis should present some important information about Chile's position.

Wine tourism is a novel way of promoting wine, not only as a drink, but also as a life style. Chile has only recently started to develop wine tourism and there are currently four or five "wine routes" in different regions. Some of these routes started out using the financial instruments of PROFOS (see Role of the State). It appears that there is an interest in combining tourism with wine as a long-term investment in consumer awareness.

3. Discussion and Conclusions

3.1 The Entrepreneurial Question

The development of the wine industry has occurred through two giant waves of technological innovation and modernisation, with small steps of adjustment in between.

The waves have both similarities and differences. Their most important feature is that they can be linked to similar movements internationally. The first wave was started as the result of opened market opportunities abroad, a previous increased rate of investment and the implementation of state of the art technologies. During this first wave there was a great vacuum in the institutional setting at the national level, which allowed a rapid growth without limitations. Legislation was developed along the way. Eventually, diminishing returns, due to the loss of the international window and the lack of a strong home market led to the emergence of an

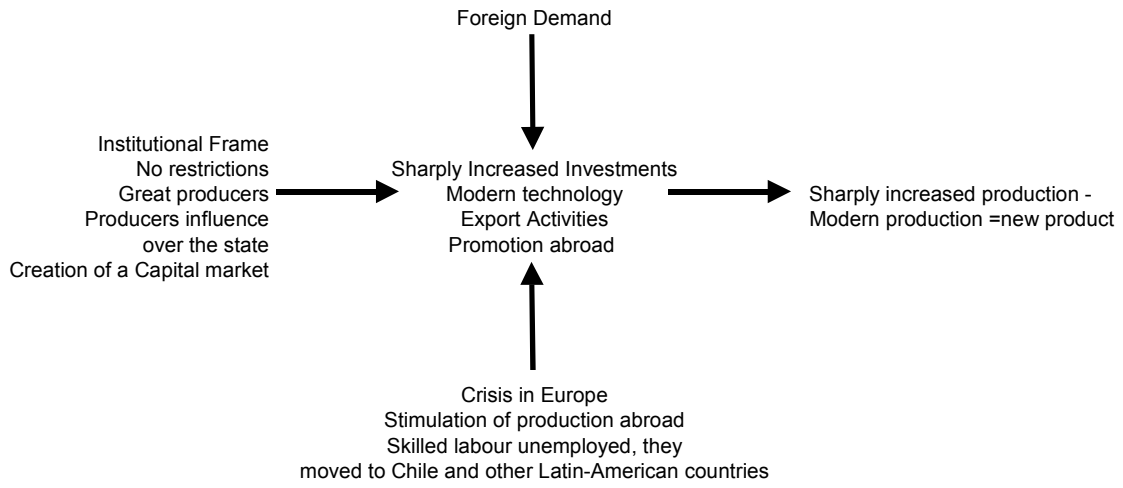
[98] FAO, *Commodity Review and Outlook 1989-1998,* These are average for the 10-year period.

oligopolistic structure and protection of market shares expressed in the new legislation of 1938. The same protectionist policies were implemented in Europe.

The people that started this wave in Chile were real pattern-breakers, investing their venture capital and creating modern production through the implementation of new technologies. For those that started producing wine for the first time the natural choice was to buy new technologies. The people that were already producing wine had the choice of not investing in new technologies. To the extent that they did, their actions were fuelled by the newly opened external markets in Europe. This wave could have created a small and high quality production for special market segments, but the timing of investments (just before the phylloxera outburst) was a "lucky strike", allowing for a fast modernization once the market opportunities became known. The time sequence of events supports such an explanation. 1850: Chile imported vines, some pattern breakers start modern production. Europe discovered Mildew. 1860: Vines in Europe started to die. 1869: Phylloxera was discovered in France. 1877: Chile started exports to Europe and Chilean wines won prestigious awards. 1889: Cure for phylloxera found. Chile won Grand Prix. 1935: Production in France recovered and the AOC system was created.

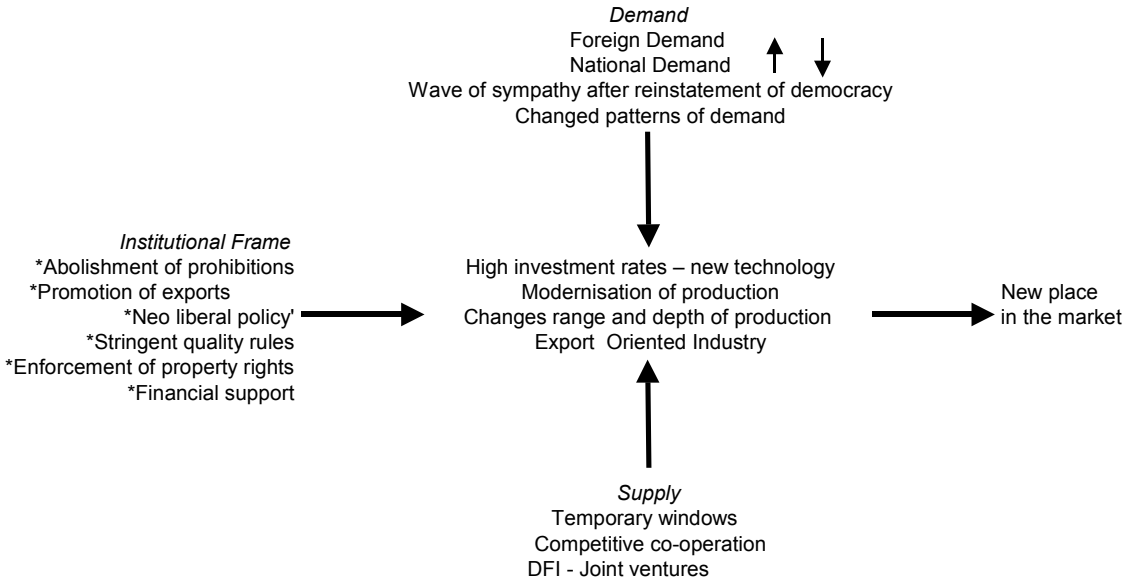
3.1.1 Development 1850-1930

The second wave started in California during the 1960s and then spread all over the world. Chilean producers only entered this wave in the late 1970s when a major crisis forced/ stimulated them to turn outwards again. Right now we are still looking at an expansive phase, and investments in new vineyards for high quality wines are still booming. This is not only the case for Chile, but also for other wine producing areas.



3.1.2 Development 1980+ to 2000

Patterns of entrepreneurship in the Chilean wine industry had the common denominators of the emergence of a new market abroad providing important pull factors to stimulate growth, and the availability of relatively new technology developed elsewhere. While the recognition of a new market opportunity was considered an innovation, the adoption of technologies developed elsewhere can be considered both an imitation and an adaptation. Joseph Schumpeter argued that the process of creative destruction was the force that pushed development forward. Chilean wine producers were, during two periods in history, involved in innovative activities and it is clear that old fixed capital was replaced by new fixed capital. This is the origin of the transformation of Chilean wine industry. In both periods it is possible to observe the actions of pattern breakers. In the first period Ochagavia, Urmeneta, Ossa and others, and, in the second, the actions of Miguel Torres stand out as pattern breaking.



Perhaps the most important difference between the first and the second period is that the opening of a new foreign market during the 19th century was a lucky coincidence. In the second period the market was there long before Chileans aimed to transform the industry. I interpret the delay as an initial lack of entrepreneurship in the industry. When the transformation eventually occurred, it seems that it was well planned and focused towards foreign markets.

The first period did not generate too many links with the rest of the economy, even though wine production made an important contribution to the sectoral GDP. Innovations in the wine sector during the second entrepreneurial period can be placed in a general picture of agricultural development in Chile.

3.2 Conclusions

The Chilean wine industry has developed mainly through two giant waves of innovation, the first between 1850-1930, and the second started in the late 1970s and is still going on. The time between the two waves (1930-1980) is typical of a branch experiencing diminishing returns, reflected by decreasing investments and oligopolistic organization. Schumpeter argued that the process of transformation and growth needs to include a well-balanced dose of liquidation of non-profitable production units, as well as the termination of obsolete technique. As a tentative conclusion (that needs further investigation), I argue that the lack of a sufficient market was the main obstacle to the liquidation and termination of obsolete production units and technique, and to entrepreneurship over a period of almost 50 years (1930-1980).

This study found that the engine behind entrepreneurship and innovations in Chilean wine was market opportunities in the international market and the imitation/adaptation of state of the art technologies developed somewhere else. The home market provided some support, but it was not enough to promote growth. The first growth period ended due to economic nationalism in Europe, prohibition policy in the United States and the failure to create a permanent position for Chilean wines in Europe. The second wave seems stronger because the market itself has created a niche for Chilean wines through the emergence of a strong economic consumer group of middle class, white-collar workers around the globe.

During the first innovation wave the lack of legislation and state interest in the wine industry allowed the possibility of fast growth without restrictions. In addition, important legislation opened the way for agricultural credit-facilitating investments. As the industry grew in importance, regulatory legislation was developed along the way. After 1930 the state promoted limitations to production and new planting. Pozo argued that limitations were the result of the branch's influence over the state. This study has found that the international scenario with economic nationalism in Europe, alcohol prohibition in the United States and over production of wine strengthens Del Pozo's argument.

Del Pozo also argued that no serious attempt was made to export wines before 1980. This study has found that Chilean producers made considerable efforts to export, and in fact the extent of investments during the late 19th and early 20th centuries suggests that it was the export market that fueled investments. Moreover, the size of the national market was not sufficient enough to carry the large investments, and it was probably the closure of external markets and limited size of the national market that ended the first entrepreneurial wave in Chilean wine industry.

The period of land reforms seriously endangered property rights and led to loss of maintenance between 1971-1973. On the positive side, during the same period the state promoted investments, especially in small vineyards through the creation of state credits and promotion of cooperative production.

During the second innovation wave, the state increased quality demands, invested in technological diffusion and supported exports. There is also a strong indication that consumption per capita started its dramatic decrease due to the economic shock policy implemented between 1973 and 1982. Thus the state provided both positive and negative inputs at the beginning of the period studied here, but it was not the driving force of entrepreneurship and innovation.

The patterns of entrepreneurship in the Chilean wine industry have been moulded by the process of creative destruction. The conditions needed to start such a process are unique in every case. This study has tried to offer some insights into the Chilean case.

Abbreviations

CORFO = Corporación de Fomento de la Producción (Corporation for promotion of production)
INDAP = Instituto de Desarrollo Agropecuario (Institute for Agricultural Development)
INE = Instituto Nacional de Estadísticas (National Statistics Institute)
PROFOS = Proyectos Asociativos de Fomento
SAG = Servicio Agricola y Ganadero (Service Authority for Agriculture and livestock breeding)

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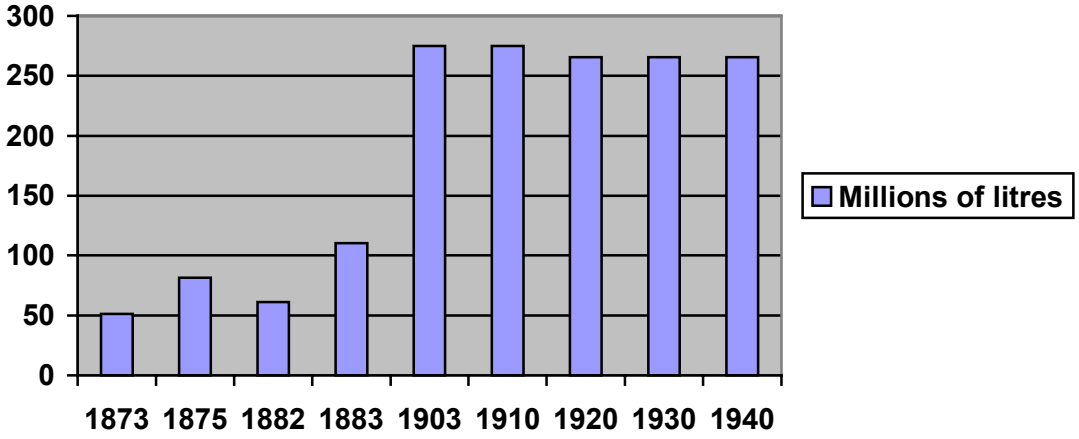
Appendix 1.

Graph 1. Development of Production 1873-1940



Sources, Keller Carlos, *Revolución en la Agricultura,* ZigZag 1956.
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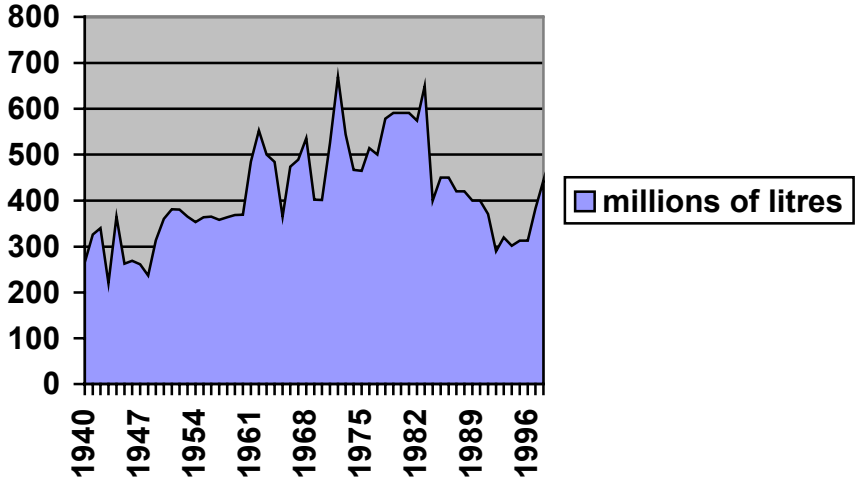
The intervals are not consistent because there is information regarding to some of the years before 1900. The years missing are 1874, 1876-81, 1884-1902 and 1904-1909. For the rest of the period the figures available are 10-year figures.

Graph 2. Production Development 1940-1998



Sources: Chile, Comercio Exterior, Estadisticas de Exportación 1940-1965.
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