SINER-GI

Task 2: WP5
GI Case Studies

Case Study Report :

Tequila

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NOTES

Tequila has been chosen as an additional case for the SINER-GI project. The description below is therefore based on already available information, and on unpublished research data gathered by Sarah Bowen (University of Wisconsin-Madison) in 2006, and Lucie Leclert (on behalf of Wageningen University) in 2007, both in collaboration with Ana Valenzuela (University Guadalajara-CUCBA) and Peter Gerritsen (University Guadalajara-CUCSUR).

Throughout this report, the word "Tequila" refers to the town tequila production originated, whereas "tequila" refers to the distilled product. The term "GI system" is defined as all of the actors, processes, resources involved in the production and distribution of tequila, including the (minor part of) "tequila" that is sold as such but without the proper label.

1. Executive summary

Tequila, protected as a "*denominación de origen*" in Mexico since 1974, is the oldest legally recognized GI outside of Europe. Mexico currently has 11 recognized GIs. Mexican GIs are property of the Mexican state and are regulated and certified by private organizations known as "Consejos Reguladores" (Regulatory Councils).

The tequila case provides an example in which supply chain actors have been very successful in expanding the market and improving the reputation of the product, generating economic growth in the central parts of the state of Jalisco. Between 1995 and 2006, total production more than doubled, from 104.3 million liters to 242.6 million liters (CNIT 2006). The share of exports as a percentage of total production has increased over this period (Ibid.). Significant improvements in the technical quality of tequila have been made since the creation of the Tequila Regulatory Council (CRT) in 1993, and the premium and ultra-premium tequila segments are the fastest growing segments. Thus, the GI for tequila and the Tequila Regulatory Council are viewed as a model by many Latin American countries that are trying to establish or have recently established GI protection schemes.

At the same time, the tequila industry is not evolving in a sustainable or an equitable manner. The large tequila companies (and the multinational liquor companies that own them) exert disproportionately strong control in negotiations over the quality standards and other norms that govern the industry, and the agave farmers are not well integrated into the supply chain and the CRT. In the last few years, the tequila companies have become more self-sufficient in their supply of agave, and are starting to push the small agave farmers out of the supply chain. The norms that regulate tequila production include virtually no specifications related to the traditional tequila production practices and agave cultivation techniques. Thus, the process is becoming more and more industrialized, and the traditional and artisanal methods that are central to tequila's identity and specificity are threatened.
The increased use of modern techniques in the production of agave, like monocropping, cloning, and the heavy use of chemicals, has negative consequences for the environment and the landscape. It also increases the risk of pest outbreaks, which add to the continuing structural vulnerability of the tequila industry: the strong fluctuations in agave supply over the years.

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2. National context analysis (Mexico)

2.1 Agriculture and rural development in the Mexican national economy

19% of the Mexican population is still employed in agriculture, down from 44% in 1970 (WRI 2004); however, over the last twenty years, it has become increasingly difficult for rural families to live off of small-scale agriculture in Mexico. Gravel (2007) notes that despite a certain interest in achieving food security by the end of the 1970s, these measures were brought to an end with the 1982 debt crisis and the ensuring adoption of "structure adjustment" policies as prescribed by the International Monetary Fund (see also Basok 2002). Since 1982, federal government ideology shifted away from agriculture as a development strategy and towards export-oriented industrialization (Gravel 2007). This shift in ideology contributed to the decrease in the relative contribution of agriculture to the GDP. The agricultural sector's contribution to the GDP was 3.5% in 2004, down from 11% in 1970 (INEGI 2004 and Lapointe 1997, as cited in Gravel 2007).

Key events that have shaped the Mexican rural economy since the early 1980s include the opening of the domestic market to foreign capital and goods (1982), substantial reductions in agricultural

subsidies (starting in 1982 and increasing in 1994 after NAFTA), the end of most guaranteed prices (including corn prices) in 1994, and the deregulation of the grain market under NAFTA (Gravel 2007, Otero 2004, Hamilton 2002, Appendini 1998). One of the primary effects that the NAFTA agreement had on the Mexican economy has been significant reductions in agricultural subsidies. Total support for agriculture as a percentage of GDP fell from 2.8% in 1991-1993 to less than 1% in 2004-2006 (OECD 2007). Agricultural subsidies declined by more than one-third between 1994 (the year that NAFTA took effect) and 2002 (Wise 2004). Prices received by farmers for agricultural goods fell significantly over this period; an OECD report (2007) calculated that prices received by Mexican farmers were just 8% higher than world market averages in 2004-2006, down from 34% above after in 1991-1993. Real corn prices in Mexico fell more than 70% during the same time period (Oxfam 2003).

These and other institutional and market changes that have taken place in Mexico over the last 25 years have combined to disadvantage small farmers. In the early 1990s, the public agricultural bank, BANRURAL, was restructured to address only the needs of "commercially viable farmers," which eliminated most of Mexico's *ejidos* (agrarian communities who received land in the land distribution program after the 1910 revolution) from its portfolios (Myrhe 1998, as cited in Eakin 2005)[1]. CONASUPO, the public grain marketing agency, closed down in 1999 in the midst of a corruption scandal, leaving small farmers with few marketing options (Appendini 2001, as cited in Eakin 2005). Perhaps most controversially, a 1992 amendment to Article 27 of the Mexican Constitution legalized the rental and sale of previous inalienable *ejido* land. Critics have stated that the underlying objective of the reform to "substantially cull inefficient production units from the [agricultural] sector" (Eakin 2005)—in other words, to eliminate "unproductive" small farmers. Overall, Gravel (2007) states that the "new rural economy" that has developed over the last twenty years has been accompanied by decline in subsistence agriculture accompanied by widespread rural poverty and food insecurity (Thompson 1992, Otero 2004) and increasing dependence on migration remittances (Migration Policy Institute 2006, as cited in Gravel 2007; Gravel and Patiño Hernández 2003). In 2005, a total of $21.4 billion (2.8% of the Mexican GDP) were sent to Mexico by immigrants in the United States (Migration Policy Institute 2006, as cited in Gravel 2007; Gravel and Patiño Hernández 2003). The rural population in Mexico finds itself in an increasingly precarious position, made worse by sharp increases in food prices over the last year. In January 2007, a reported 70,000 protestors took to the street in Mexico City to protest the fact that tortilla prices had more than doubled over the previous year (Peabody 2008).

2.2 GI policy in Mexico

In Mexico, GIs are protected as "*denominaciones de origen*" (DOs). The *dénominación de origen tequila* was the first granted in Mexico, officially published in the Federal Register in 1974. The legal definition of DOs in Mexico is based on that established in the Lisbon Agreement. "*Denominación de origen*" is defined as "the name of a geographical region of the country which serves to designate a product originating therein, the quality and characteristics of which are due exclusively to the geographical environment, including natural and human factors" (Article 156 of the Industrial Property Law, cited in Rodríguez Cisneros 2001). Mexican GIs are property of the Mexican state. However, the Mexican Institute of Industrial Property (IMPI), which was primarily established to protect and regulate patents and trademarks, is the body responsible for authorizing

[1] According to Assies (2008), there are 27,664 *ejidos* and 2,278 agrarian communities in Mexico. In total, these "agrarian nuclei" comprise 103.5 hectares of land in total. Under the amendment to Article 27 of the Constitution, these parcels are now eligible for sale. Assies (2008) states that 23 million hectares were certified as parcels, 53 million hectares were certified for common use, and 300,000 hectare were titled, presumably as housing plots, according to the provisions in the 1992 law (Ibid.).

their use (Rodríguez Cisneros 2001). The official norms that regulate production are defined by the federal government, in consultation with supply chain actors of the product in question. Mexican law requires that the quality, characteristics, production processes, and geographical origin of GIs be certified by an accredited organization (Monjarás Osario 2007). The organizations that monitor and certify compliance with production norms and quality standards—the regulatory councils (*consejos reguladores*) are private organizations[2].

The first reference to made to "*denominaciones de origen*" is found in the Industrial Property Law of 1942, which introduced the concept. However, it was not until the law was reformed in January 1973 that the procedure for protection of GIs was introduced. The 1991 Law on Industrial Property Promotion and Protection, which was renamed the Industrial Property Law with modifications made in 1994, represents the legal framework in Mexico for the protection of GIs (Rodríguez Cisneros 2001).

GI applications are submitted to the IMPI. Three different types of actors are legally eligible to submit an application for GI protection (Rodríguez Cisneros 2001):

1) natural or legal persons that devote themselves directly to the extraction, production or preparation of the product(s) for which coverage is provided by the GI;
2) the chambers or associations of manufacturers or producers; and
3) the bodies answerable to or within the Federal Government and the governments of Federation bodies.

Thus, unlike many GI regulations, Mexican law does not require that a *group* of actors submit the application for GI protection. The original application for recognition of the GI for tequila was submitted (in 1973) by Tequila Herradura, now the third largest tequila company, and the Regional Chamber of the Tequila Industry.

As stated above, the legal definition employed in Mexican is based on the definition outlined in the Lisbon Agreement. As such, GI applications must include not only a description of the official production standards (established by the federal government) and the delimitation of the GI region, but also evidence that the qualities and features of the product are due "exclusively to the geographical environment, including natural and human factors" (Rodríguez Cisneros 2001). More specifically, as outlined by Rodríguez Cisneros (2001), GI applications must contain:

1) the name, domicile, and nationality of the applicant;
2) the nature and activities undertaken in the case of a legal person;
3) the legal interest of the applicant;
4) the indication of the GI;
5) a detailed description of the product covered by the GI, including:
    a. the characteristics and components;
    b. forms of extraction and production and preparation process;
    c. the official standards established by the Secretary of the Economy, to which the product is subject;
    d. the packaging, packing, labeling, and wrapping standards;
    e. the place(s) of extraction, production, or preparation of the product; and
    f. the delimitation of the territory of origin, according to the geographical characteristics and divisions; and
6) an indication of the *links between the GI name, product, and territory* (italics added).

[2] The first of these regulatory councils, the Tequila Regulatory Council (CRT, according to its Spanish acronym), was created in 1994; however, in practice, many of the other 11 Mexican GIs still lack regulatory councils.

In practice, however, as will be discussed later in this report, the Mexican government has failed to ensure the maintenance of a link between the quality of GI products and the historical practices and environmental characteristics that contribute to their specificity. In addition, the norms that regulate GI production have evolved in a direction that undermines the quality and authenticity of tequila and threatens the traditional production practices, local farmer knowledge, and connection to *terroir* that have historically defined tequila.

After receiving the application, the IMPI examines the data and documents submitted. If the documents are insufficient, the applicant is granted a period of two months to make any necessary clarifications or additions; if the applicant does not comply with these requirements, the application is closed (Rodríguez Cisneros 2001). Once the application satisfies legal requirements, an extract of the application is published in the Federal Register (*Diario Oficial de la Federación*) and a two-month objection period is granted (Ibid.). After the objection period has ended and all testimonies and proofs have been heard, IMPI issues its decision. If the application is granted GI protection, an official declaration is published in the Federal Register (Ibid.).

2.3 Mexican GI products

Mexico currently has eleven protected GIs—five for spirits/liquors (*tequila* in 1977, *mezcal* in 1994, *bacanora* in 2000, *sotol* in 2002, and *charanda* in 2003), two for coffee (*café Veracruz* in 2000 and *café Chiapas* in 2003), two for craft products (*olinalá* in 1994 and *talavera* in 1995), one for fruit (*mango ataulfo del Sononusco de Chiapas* in 2003), and one for a semi-precious stone (*ambar de Chiapas* in 2000)[3]. Mexican GIs are fairly heterogeneous, although two categories, liquor and coffee, are clearly dominant in terms of market potential and recognition. Interestingly, in Mexico, GIs can be awarded to non-consumable products (craft products and stones).

2.4 Mexico's position in international debates over GI protection

Mexico's position in international negotiations over GI protection is inconsistent. Mexico became a party of the Lisbon Agreement on September 25, 1966. Mexico's GI system is the oldest and best-developed in Latin American. However, at the same time, in WTO negotiations, Mexico was a party to the counter-argument put forward by the United States and its allies. The counter-argument, a response to the European's Union's June 2005 proposal for a multilateral system of registration and enforcement for all GIs (WTO 2005a), proposed a voluntary system, where notified GIs for wines and spirits would be registered in a database (WTO 2005b). Mexico's position is complicated because although it has significant economic stakes in protecting its GIs, particularly tequila, Mexico is also tightly tied to the political and economic interests of the United States, which of course is largely opposed to increased levels of protection for GIs.

3. Product data card

Please see attached data card.

4. Specific working hypothesis for the case study, and relevancy with regards to the project

4.1 GI profile

The tequila case represents an important contribution to the SINER-GI study for several reasons:

[3] Three other products—*tehuacan*, *café Pluma*, and *vainilla de Papantla*—were listed as having submitted applications for GI protection to the IMPI, but were not listed by the IMPI as having been approved. Their status is unclear.

- Tequila, protected as a "*denominación de origen*" in Mexico since 1974, is the oldest legally recognized GI outside of Europe.
- The tequila case and the CRT, the collective organization that regulates the industry, are viewed as a model by many Latin American countries that are trying to establish or have recently established GI protection schemes.

As the oldest legally protected GI outside of Europe, the tequila case offers important insights into the potential barriers to the development of successful and sustainable GI systems in developing countries. Moreover, the long history of the tequila GI allows us to examine how these barriers (and the means by which supply chain actors have adapted to them) have changed over time. Finally, the large size (in terms of production volume and sales) of the tequila industry allows us to examine the substantial economic, social, and environmental impacts a GI system can account for.

4.2 Main stakes for the case study

The tequila case provides an example in which supply chain actors have been very successful in expanding the market and improving the reputation of the product, yet the benefits of GI protection have been largely co-opted by extralocal actors. The tequila industry has not developed in a sustainable or an equitable manner. More specifically, the following stakes, or issues, are present in the tequila case:

- Economic stakes. Sales of tequila have expanded substantially over the last 10-15 years. Between 1995 and 2006, total production more than doubled, from 104.3 million liters to 242.6 million liters (CNIT 2006). The share of exports as a percentage of total production has increased over this period. In 2000, the United States surpassed Mexico as the biggest market for tequila, and one study estimated that by 2010, the United States is expected to account for 54.5% of total tequila sales (Pace University 2006). Overall, the tequila industry has been very successful at expanding the market and reputation for tequila, in Mexico and abroad, but there is a significant concern that the benefits associated with the industry are not being equitably distributed.
- Social and cultural stakes. The norms that regulate tequila production include virtually no specifications related to the traditional tequila production practices. Thus, the process is becoming more and more industrialized, and the traditional and/or artisanal methods (i.e., use of wood-burning ovens) are in danger of being lost. In addition, in the last few years, the tequila companies have become more self-sufficient in their supply of agave, and are starting to push the small agave farmers out of the supply chain together. This poses a threat to the farm families that depend on agave cultivation to maintain their livelihoods and traditional agave cultivation practices.
- Ecological stakes. The agave cultivation methods adopted by the tequila companies (and imitated by the small farmers working under contract with the distilleries) substitute more traditional, labor-intensive practices with more chemical-intensive but labor-efficient practices. Despite (or because of) high applications of pesticides and insecticides, and due to the fact that agave is generally cultivated in monoculture, incidences of pest and disease have increased in the last twenty years. In addition, applications of fertilizers (both organic and chemical) have fluctuated with the price of agave, and have decreased over the last twenty years, which has negatively impacted soil fertility.

4.3 Methodology

This report is based mainly on fieldwork conducted by Sarah Bowen (University of Wisconsin-Madison) for a Ph.D. dissertation, and by Lucie Leclert (Wageningen University), in 2006 and 2007, respectively, as well as on secondary data and documents. In total, 93 semi-structured interviews

were conducted with key supply chain actors, including owners and managers of tequila distilleries, representatives of the Tequila Regulatory Council and the National Chamber of the Tequila Industry, governmental officials, agave farmers, and leaders of farmers' associations. The tequila industry is characterized by a culture of mistrust, and owners and managers of the tequila distilleries were generally unwilling to share specific information about their target market, annual sales figures, volume of production, etc. Therefore, it was difficult to access information that would allow us to characterize the tequila industry in terms of firm size or economic capacity. In addition, there is very little comprehensive information about the average size of the agave farms, the type of purchase agreement or contract that the *agaveros* have with the tequila companies, etc. Therefore, we are unable to provide an industry-wide characterization of the production relations between the agave farmers and the tequila companies.

5. The GI system today: definition and delimitation

5.1 History of the product

Production of "agave liquor" originated in the Amatitán-Tequila valley in the mid-1500s, but agave has grown in the valley (and throughout many parts of Mexico) for 10,000 years, and the domestication of agave for human use began 3,500 years ago (Gómez Arriola 2004). Indigenous populations used agave for food, textiles, and fermented alcoholic drinks (Ibid.). The Spanish conquistadores who invaded Jalisco in the early 16th century did not like the original fermented agave drinks, and began experimenting with new grains, seeds, and plants in order to make wine from New World plants. In the late 16th century, the first copper stills were introduced to Jalisco, and the techniques used to produce rum (from sugar cane) adapted to the production of "mezcal wine" (Ibid.). Modern-day tequila is thus a fusion of European and American cultures; while the agave cultivation and harvesting processes were linked to ancient indigenous practices, the liquor production process was more rooted in European traditions and knowledge (Ibid.). The first documented reference to the production of mezcal wine, essentially modern-day tequila, in Jalisco dates from 1608 (Muría 1996). The largest and most powerful tequila companies (Cuervo, Sauza, Herradura) were established by large hacienda owners in the 18th and 19th centuries (Limón 2000). Before the land reform that took place in Mexico between 1917 and 1940 (see Warman 2001), the tequila companies produced their own agave (Luna 1991). However, after the land redistribution, the tequila companies became dependent on the new *ejidatarios* for the supply of agave.

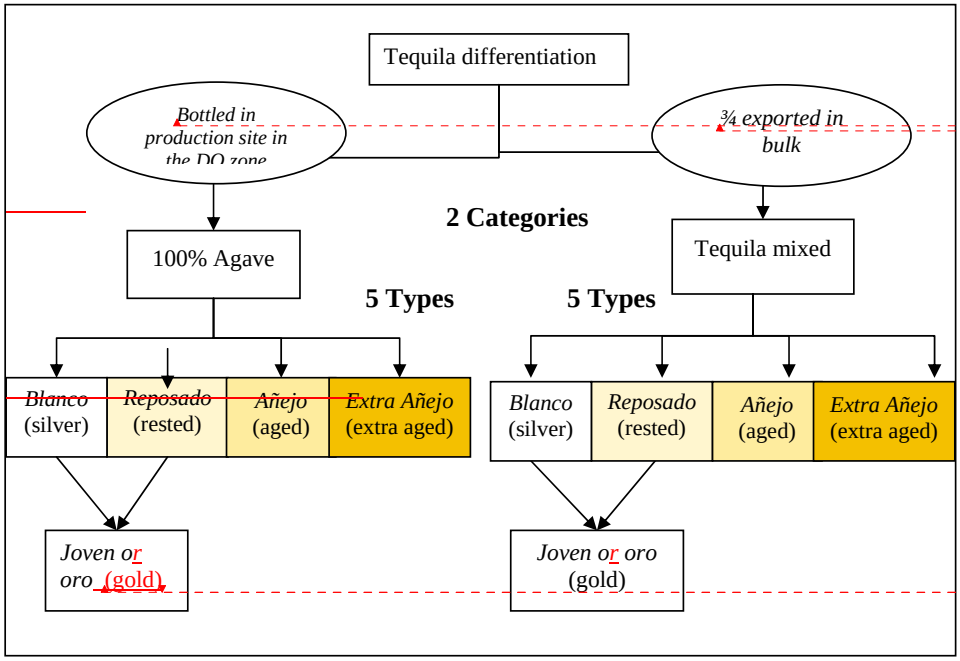
5.2 Definition of the GI product

The first official norm for tequila was established in 1949; it stated that tequila had to be made with 100% Weber blue agave (*Agave tequilana Weber*). The official "*denominación de origin*," or GI, for tequila was established by the Mexican federal government in 1974. The GI stated that in order for a product to be marketed as "tequila," it had to be made from at least that least 51% *Agave tequilana Weber*[4], grown within the boundaries delimited by the federal government. The GI protects two basic types of tequila: tequila that is made from 100% blue agave, and tequila that is made from 51% blue agave alcohol and 49% alcohol from other sugars (generally sugar cane), known as *tequila mixto*. Tequila made from 100% blue agave, which is of higher quality and sells for a higher price, must by law be bottled within the GI region. However, *tequila mixto*, which comprises the bulk of tequila exports to the US, is often sold in bulk and bottled outside of Mexico, to save on transportation costs (see table 6 and 7).

[4] The minimum proportion of agave required to produce tequila has decreased over the last fifty years, from 100% blue agave in 1949 (when the first official norm for tequila was established), to 70% blue agave in 1964 and finally to 51% blue agave in 1970.

Although the tequila GI is more than 30 years old, it was not until the early 1990s that quality control began to be taken more seriously within the GI agreement. The agave-tequila supply chain is managed by the Tequila Regulatory Council (CRT, according to its Spanish acronym), a private organization created in 1993. The primary functions of the CRT are to protect the GI for tequila in Mexico and internationally, and to verify and certify compliance with the norm for tequila production (see section 7.1). The official norm that governs the tequila production process is created by the federal government, in consultation with supply chain actors.

Figure 1 Categories and types of tequila that can officially be indicated on bottle labels



Mis en forme : Police :9 pt
Mis en forme : Police :10 pt
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Mis en forme : Police :Non Italique

Source: Leclert 2007, p. 28

Production volumes

In the last 15 years, due to a number of reasons-- including higher quality standards associated with the creation of the CRT; the international endorsement (by the United States and Canada in 1994 and by the European Union in 1997) of the tequila GI; and the expansion of high-end, niche-market tequilas—demand for tequila has significantly increased. Total production of tequila increased from 104.3 million liters in 1995 to 242.6 million liters in 2006 (CNIT 2006). However, this growth has not been consistent (as shown in Figure 1), due to a severe agave shortage that occurred between 1999 and 2003. The tequila industry has been characterized by cycles of abundance and shortage of agave throughout its history, due to several reasons: the long cultivation cycle of agave (six to ten years), bad relationships between the tequila companies and small farmers, and tequila companies' lack of planning and vision (González 2002). In mid-1999, after the abundance cycle of the mid-1990s (in which agave prices were so low that some producers chose to let their agave rot in the fields), the agave industry experienced a particularly devastating shortage. Due to a fungal infection

that struck in the mid-1990s and an early winter frost in 1997, as well as to the cycles of surplus and shortage that normally accompany agave production, from 1997 to 2000 the blue agave population in Jalisco decreased by 50.7% (González 2002). With the shortage, the average price of agave skyrocketed, shooting from $0.77 pesos per kilogram in 1998 to more than $14.00 pesos per kilogram in 2002 (SAGARPA 2006a). Farmers with existing agave plantations "became rich overnight," but many tequila companies were pushed out of business, because they could not afford to pay such high prices for the agave (Bowen and Valenzuela 2006). Production volumes did not begin to rebound until 2003. Now, the agave market has again entered a period of surplus. In 2006, 1.2 million tons of agave were harvested, but the tequila industry was only able to consume 769,000 tons of agave. Many producers were forced to let their agave rot in their field, and even for those lucky *agaveros* who were able to find a buyer for their agave, the price had dropped to $2.07 pesos per kilogram, near or below the estimated costs of production[5]. The price dropped further in 2007, to $1.70 pesos per kilogram ((Macías and Valenzuela 2007), and the CRT estimates that the surplus will continue through at least 2009 (Bowen 2008). Overall, the cycles of surplus and shortage threaten the socioeconomic and ecological sustainability of the industry, and contribute to inequality and concentration among the agave farmers and the tequila companies (Bowen and Valenzuela 2006).

Supprimé : Bowen 2008,

Supprimé : (Macías and Valenzuela 2007)

Supprimé : Ibid.

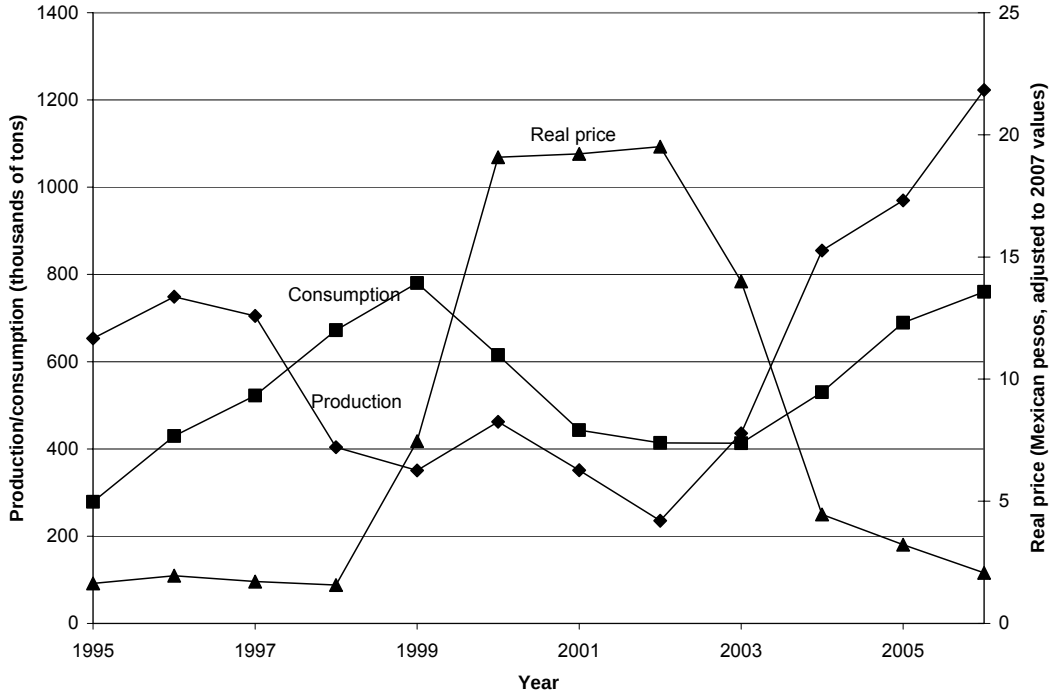

Figure 2: Cycles of surplus and shortage of agave, and associated changes in price
Source: Macías and Valenzuela 2007

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[5] There is no clear consensus on how much it costs to produce a kilogram of agave. In 2005, a committee comprised of representatives from the CRT, the major associations of *agaveros*, and the federal government (SAGARPA, SEDER) estimated the average costs of agave (over the entire cultivation cycle) to be $2.55 pesos per kilogram (Author interviews 2006). A survey by SAGARPA, in 2006, and a study by Alejandro Macías Macías and Ana Valenzuela Zapata in 2007, estimated the costs of production more modestly, at $1.05 pesos per kilogram, and $1.49 pesos per kilogram, respectively.

Product specifications and norms

The norms that regulate tequila production, outlined in Table 1, are defined by the federal government, in consultation with supply chain actors. However, there is no formal structure or system of checks and balances to ensure that Mexican GI schemes maintain and protect product quality, producer livelihoods, and local environment. The norm that defines production of tequila is published by the *Dirección General de Normas* of the Ministry of Economic Affairs.

Table 1: Tequila codes of practice

Description of each element in the code of practices	**Specific (to the locality) or generic?**	**On whose knowledge does this item rely?**
Physiochemical specifications (alcohol content, methanol, aldehydes, etc.)	G	Tequila distilleries
Agave-- *Agave tequilana Weber*, cultivated within the GI territory and registered with the CRT	L	Farmers
Use of other sugars (up to 49% of total sugars, expressed by mass)	G	Tequila distilleries
Additional flavors-- can be added as long as they are approved by the Secretary of Health	G	Tequila distilleries
Aging (defined according to category-- *reposado*, *añejo*, extra *añejo*)	G	Tequila distilleries
Production of other alcoholic products in a distillery that produces tequila is not permitted.	G	Tequila distilleries
Bottling-- 100% agave tequila must be bottled at the distillery, bulk tequila must be supervised by an approved organization, bottlers are only allowed to filter and/or dilute the tequila with water in order to adjust the alcohol content.	G	Tequila distilleries or independent bottlers (usually outside of Mexico)
Labeling-- must include the category (tequila or 100% agave tequila); additional flavors that have been added; the volume; the alcohol content; the name, location, and NOM of the distillery; if applicable, name and location of the bottler; the phrase "made in Mexico"; a code identifying the lot	G	Tequila distilleries or independent bottlers

As described by Bowen (2008), although the tequila production norms include very specific parameters for measuring the quality of the *final product* (i.e., maximum levels of ethanol and aldehyde, alcohol content, specific ingredients that can be added), the norms that regulate the tequila production *process* are surprisingly open. Certain broad categories are defined; for example, a "*reposado*" tequila must be aged for at least two months, while an "*añejo*" must be aged for a minimum of 12 months. However, other areas, including the way in which the agave is cooked, the method for mashing the agave, the agents used to ferment the agave juice, and the type of still, remain undefined. Therefore, the tequila production process is becoming more and more industrialized. For example, the agave is increasingly cooked in steel autoclave ovens, because they are faster and more efficient, even though many supply chain actors believe that cooking the agave in the traditional wood-burning ovens had a positive effect on the taste. This openness in the norms represents a fundamental weakness in the tequila GI. Because these traditional practices are not defined in the norms, it is up to each individual tequila company to decide which production processes they are going to use and where they want to potentially sacrifice taste and aromatic complexity for efficiency. As the market becomes more saturated and economies of scale become more important, tequila companies will face increasing pressure to harmonize production practices

and reduce costs (Casas 2006), and traditional practices like the use of slow-cooking ovens are endangered.

The quality of the agave used to produce tequila also remains undefined by the norms. Only one sentence in the official specifications pertains to the quality of the agave:

> "The Agave used as the raw material for Tequila production shall be of the species *Agave tequilana weber* blue variety, grown in the territory specified in the Declaration and registered with the registry indicated in point 6.5.1.1 of this NOM" (NOM-006-SCFI-2005).

Blue agave was chosen based on its high yield per hectare, and because it was easier to work with in the distilleries; now it is viewed as typical of the tequila industry, as opposed to other agave liquor industries (e.g., *mezcal*, which permits 5 species of agave) (Leclert 2007). However, the specification of the agave species is the only rule that defines agave quality. In the absence of concrete rules to bound agave production, a more input-intensive agave cultivation system has emerged as the dominant system in the industry today (Valenzuela 2005, Bowen and Valenzuela 2006), and the traditional cultivation methods that have been practiced in the Amatitán-Tequila valley for generations are threatened. Furthermore, tequila companies have been working to shorten the growing period for agave, and have reduced it from 7-10 years to 5-6 years, which also undermines the quality of agave.

In general, the agave farmers' lack of power and representation vis-à-vis other supply chain actors means that, ever since the first official norm for tequila was established in 1949, the norms and quality control mechanisms adopted in the tequila industry have almost always favored the tequila companies, and as such, have been used to exclude the (small) agave farmers from the supply chain and to consolidate the economic and political power of the tequila companies (Bowen 2008). Furthermore, revisions made to the norms that regulate tequila production have predominantly gone in the direction of lowering quality standards and reducing costs.

Four key weaknesses in the norms that regulate tequila illustrate this loosening of standards (Bowen 2008, Leclert 2007): reductions in the minimum required proportion of blue agave sugars, the continued exportation of tequila in bulk, the recent inclusion of flavored tequilas, and recent controversies over the definition of "mature" agave.

First, although the first official norm for tequila production (1949) required that tequila be made with 100% Weber blue agave, since then, however, during agave shortages, the tequila companies have successfully appealed to the Mexican government to change the norms regulating the production of tequila. Currently, the minimum proportion of agave sugars required to produce tequila is 51%. Second, although all 100% blue agave tequila must be bottled in Mexico, *tequila mixto* can be exported in bulk and bottled in other countries. This not only negatively affects economic development within the GI region, by reducing the number of jobs that stay within the region, it also negatively affects the quality of tequila being produced, since the Mexican government and the Tequila Regulatory Council have limited ability to monitor or regulate the foreign bottling companies. Third, the 2006 revisions to the norms allow for the production of flavored tequila (i.e., lemon-flavored tequila, mango-flavored tequila), in order to better compete with flavored vodkas and other specialty liquors. By allowing artificial flavors to be added to tequila, the new norm violates the primary premise of a GI—that it protect the integrity, quality, and more traditional methods used to produce an agricultural product. Finally, another controversy that emerged with the new norms concerns the fact that the norm no longer requires that the agave used to produce tequila be fully mature[6]. The 2006 norm simply requires that tequila be made from blue agave, and no longer

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[6] The 1994 norm for tequila production defined tequila as being derived from "the grinding of mature heads of agave" (NOM-006-SCFI-1994); the 2006 norm defines tequila as "derived from the heads of *Agave tequilana Weber* (NOM-

stipulates that the agave be mature. Among the agave farmers, the leaders of the farmers' associations, and officials in the governmental agencies that work with the farmers (SEDER, SAGARPA), there is widespread consensus that this change was made primarily in order to allow the tequila companies to use their own immature agave, instead of forcing them to buy mature agave from the independent farmers if they did not have adequate supplies of their own. In conclusion, the tequila norms fail to protect the quality and authenticity of tequila; the norms do not define the quality of agave or seek to maintain the traditional practices that are central to the history of the industry and the specificity of the final product (Bowen 2008).

5.3 Delimitation and description of GI region

As shown in Figure 2, the GI region is very large (11,194,600 hectares) and includes 181 municipalities in 5 states (all of the state of Jalisco, plus parts of Guanajuato, Michoacán, Nayarit, and Tamaulipas).

Figure 3: Area protected by the GI for tequila
Source: Consejo Regulador del Tequila, 2008

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The definition of the GI boundaries has been a persistent point of conflict within the tequila industry. First, the GI region includes places without appropriate biophysical conditions or a cultural/historical tradition of cultivating agave. Second, the inclusion of Tamaulipas, on the eastern coast of Mexico, has been particularly controversial. As Figure 2 shows, the vast majority of the GI region is contiguous to the historic center of tequila production, the Amatitán-Tequila valley. However, the region also includes several municipalities in the state of Tamaulipas. When the GI for tequila was originally established in December 1974, it did not include the state of Tamaulipas; however, plantations of agave had been established in Tamaulipas in the late 1960s, and in 1977, the GI was modified to include several municipalities in Tamaulipas (Valenzuela 2003). It is widely agreed that

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006-SCFI-2005). The key difference between the 1994 and 2006 versions, and a major point of contention, is the removal of the word "mature."

the decision to include Tamaulipas was largely political[7]. In general, the size of the DO region and the political struggles inherent in the definition of its boundaries threaten the tequila industry's legal claim to GI protection, since Mexican GI legislation explicitly requires that "the delimitation of the territory of origin" be based on "geographical characteristics and divisions," not political motivations (Rodriguez Cisneros 2001, as discussed in Bowen 2008). Even within the originally delimitated production area, there are considerable variations in geographical conditions (Leclert 2007).

5.4 Description of production process and key supply chain actors

Table 2 shows that the production of tequila involves a considerable number of steps and actors.

Table 2: Primary steps involved in the tequila supply chain process
Note: Unnumbered stages (in brackets) may or may not apply, depending on the type of tequila produced and the particular actors involved.

Step	Mode
1. Agave planting	In monoculture and large fields, predominantly
2. Agave cultivation: fertilizing, weeding, pest treatment	Either by farmers or hired laborers
3. Agave harvest: cutting leaves off, collecting hearts, six to ten years after planting	By professional harvesters (*jimadores*), manually
(If distillery does not own the plantation/crop: direct sale of agave to the distillery or through intermediaries known as *coyotes*)	
4. Transportation of agave hearts to the factory	In open truck
5. Baking, milling and pressing of the hearts	Baking in brick oven or in autoclave, milling by stone mill (*tahona*) or modern cutter
(For *tequila mixto*, addition of sugar to the agave juice)	
6. Fermentation and distilling of the agave juice	Use of natural or artificial/chemical yeasts, distillation in copper or modern stills
(Addition of caramel, and/or natural oak extract, and/or glycerin, sugar syrup.....)	According to the limits prescribed in the norms
7. Aging	In steel tanks and/or wooden barrels
8. Bottling	100% blue agave tequila must be bottled at the site of production; *tequila mixto* often sold bulk and bottled abroad.
9. Labeling (if not sold un-labeled on the local market)	Label mentioning the name "tequila" or "tequila 100% agave", and additions like "añejo," "reposado," etc.
10. Selling/distribution: to local/regional stores, retail chains (supermarkets) or importers	Through wholesalers or directly
11. Consumption: by local/regional/national consumers, or by consumers abroad	Either as part of regular eating culture, or on special occasions (.e., parties); pure or in cocktails

[7] One account states that wealthy agroindustrialists from the state lobbied to have Tamaulipas included in the GI region (Valenzuela 2003). Another account states that several large tequila companies from Jalisco encouraged planting of agave in Tamaulipas because they planned to build distilleries there for export to the US border, and then had to lobby the Mexican government to include these agave producers in the GI region (Bowen 2008). Leclert (2007) states that Francisco Javier Sauza, who had plantations in Tamaulipas and started the "La Gonzaleña distillery, convinced the influential politician Jose López Portillo to lobby for the inclusion.

The costs of producing a liter of tequila vary with the scale of the distillery and the quality of the agave used. Furthermore, it is difficult to obtain this type of data, given that supply chain actors remain fairly secretive and private about economic data. However, we can provide some rough estimates of the production costs and final price of *tequila mixto* (51% agave alcohol). Based on interviews conducted in 2006 (Bowen 2006), the total costs of a labeled bottle of *tequila mixto,* at factory gate, can be estimated at $27 Mexican pesos, or about $2.50 (CONFIDENTIAL DATA—SINER-GI ONLY). The average final price per liter of *tequila mixto* in the USA can be estimated at $22.65 (http://www.hitimewine.net).

The price of the raw material (agave) varies considerably with the cycles of surplus and shortage that characterize the industry. Since the industry entered a period of surplus in 2004, the price of agave has fluctuated between $.50 and $2.00 pesos per kilogram, below the costs of production. Taking the average of three estimates, the costs of growing and harvesting one kilogram of agave are assumed to be, on average, $1.70 pesos[8]. Based on an average selling price of agave of $1.93 pesos per kilogram and assuming that it takes approximately 7 kilograms of agave to produce one liter of tequila (Chadwick 2008), in recent years, the costs of the raw material have averaged $13.50 pesos per liter, which is half of the total costs of tequila production .

Based on interview data (Bowen 2006), bottling and labeling constitute about 18% of total production costs (CONFIDENTIAL DATA—SINER-GI ONLY.) The CRT fee per liter for tequila with 35% alcohol content is $0.22 pesos ($0.34 pesos per liter of 55%). Tequila is highly taxed; the tax on turnover (IEPS) tax is 50% and the value-added tax (IVA) is 50%.

5.4.1 Key supply chain actors

Table 3 and Figure 2 describe the main actors that are involved in the production of tequila. To summarize, the tequila industry is comprised of three main groups of actors: the agave farmers, the tequila distilleries, and the bottlers and distributors. The last several generations of agave farmers cultivated the agave and then sold it to the tequila companies, often through intermediaries known as *coyotes*. The fact that blue agave takes six to ten years to mature after being planted has historically complicated supply and demand patterns. As a result, the tequila companies now increasingly rely on contract arrangements with the large agave farmers to ensure their supply of agave, and some firms have started to rent the smallholders' land and grow the agave themselves.

In 2005, an estimated 12,000 farmers and 11,200 agricultural day laborers (many working directly for the tequila companies) were responsible for the production of agave (CNIT 2005). After being harvested and delivered to the tequila distilleries, the heart of the agave plant is roasted and pressed to obtain the juices, which are fermented and distilled to produce tequila. 124 firms are currently registered to produce tequila (CRT 2008a, 2008b). The third group of actors, the tequila bottlers and distributors, is comprised of companies primarily in Mexico and the United States, which accounted for 74% of tequila exports in 2005 (CNIT 2005).

[8] In 2005, a committee comprised of representatives from the CRT, the major associations of agaveros, and the federal government (SAGARPA, SEDER) estimated the average costs of agave (over the entire cultivation cycle) to be $2.55 pesos per kilogram (Bowen 2008). A survey by SAGARPA, in 2006 (SAGARPA 2006b), and a study by Alejandro Macías Macías and Ana Valenzuela Zapata in 2007, estimated the costs of production more modestly, at $1.05 pesos per kilogram, and $1.49 pesos per kilogram, respectively.

Table 3: Description of key actors in the tequila supply chain

Type / name of actor	**Function (s)**	**Which place-based resource (s) do they manage?**
1. Agave farmers	Cultivation of agave on their own land (planting, fertilizing, weeding, etc.)	Agave, land
2. Agricultural day laborers	Cultivation of agave on land controlled by the tequila companies (rented and/or owned)	Agave
3. *Jimadores*	Harvesting of agave	
4. Tequila distilleries	Distillation, aging, and sometimes bottling of tequila	Decisions related to the particular tequila production process employed (i.e., artisanal vs. modernized)
5. Tequila bottlers and distributors	Bottling and/or distribution of tequila	
6. Tequila Regulatory Council	Governance of supply chain and quality control	

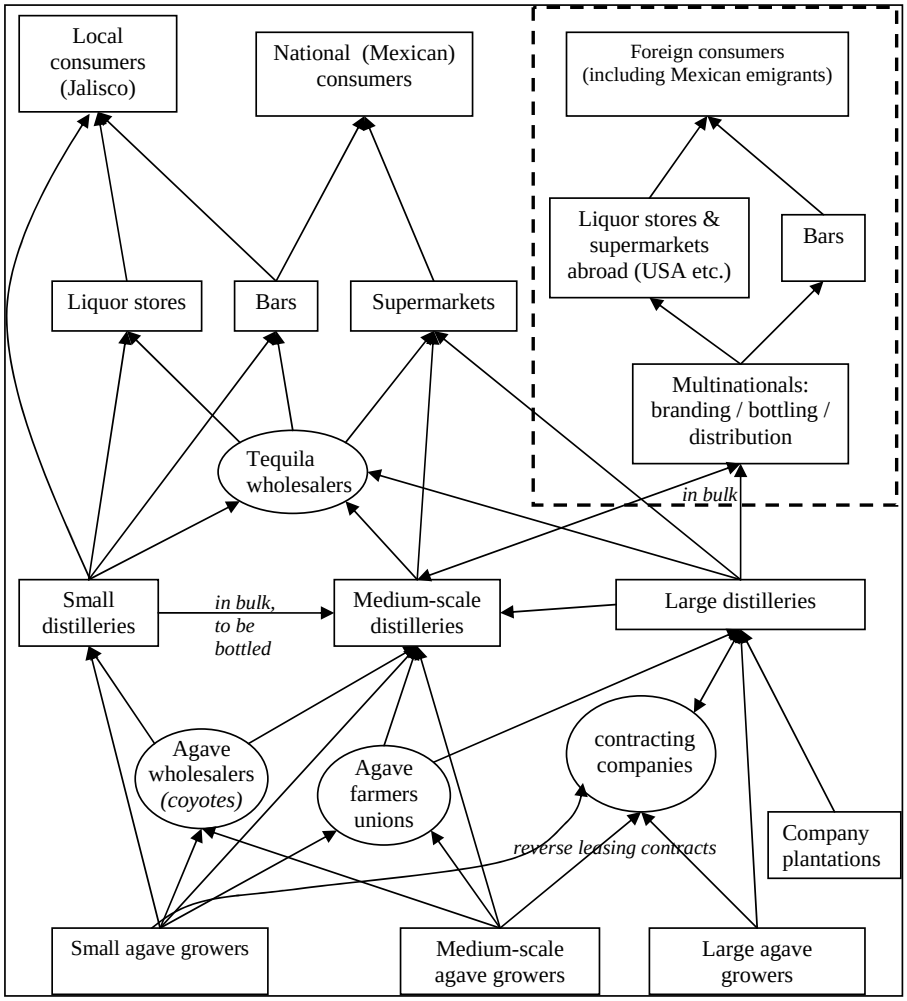

Figure 4: Actors and organizations relevant to the Tequila GI system

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Notes regarding Figure 2:

- The dashed line indicates the Mexican national border.
- Data on the quantities of agave and tequila flowing through the different channels of the supply chain are not available.
- It is assumed that smaller distilleries acquire relatively more of their agave from smaller growers, and that the larger distilleries relatively more from the larger growers, for logistical reasons.
- For the same reason, small producers are supposed to sell relatively more through intermediaries.
- The larger players are more vertically integrated. However, large multinational also have bought up or taken shares in medium-scale distilleries. These integrations are not shown in the diagram.
- It is assumed that relatively more of the tequila of small distillers ends up on the local or regional market, and that the largest firms have greater access in the international market, although some of the small distillers sell their produce in international, high-quality niche markets.

5.4.1.1 Tequila distilleries

The tequila distilleries, most of which most are located in central Jalisco, are responsible for the production of tequila[9]. The largest tequila companies (i.e., Cuervo, Sauza, Herradura) were established by large hacienda (landed estate) owners in the 18th and 19th centuries (Limón 2000). The majority of distilleries are concentrated in the Amatitán-Tequila valley, where tequila production originated, or in the highlands of Jalisco, referred to as Los Altos. Table 4 lists the top 10 tequila-producing municipalities.

Table 4: Top 10 tequila-producing municipalities
Source: CNIT 2006

Municipality	Region	Millions of liters	Percentage
Zapotlanejo	Zapotlanejo	70,166	28.9%
Tequila	Amatitán-Tequila Valley	68,006	28.0%
Arandas	Los Altos	17,831	7.3%
Amatitán	Amatitán-Tequila Valley	17,733	7.3%
Guadalajara	Guadalajara	17,210	7.1%
Tototlán	Los Altos	7,321	3.0%
Atotonilco	Los Altos	6,238	2.6%
Tepatitlán	Los Altos	5,234	2.2%
Magdalena	Amatitán-Tequila Valley	1,488	0.6%
Others	Others	31,443	13.0%
TOTAL		**242,670**	**100.0%**

The tequila market is highly concentrated, as shown in Figure 3.

[9] Three distilleries are located outside Jalisco: Tequilera Corralejo in Penjamo, State of Guanajuato (1996), and La Gonzaleña in the State of Tamaulipas (legalized since 1997).

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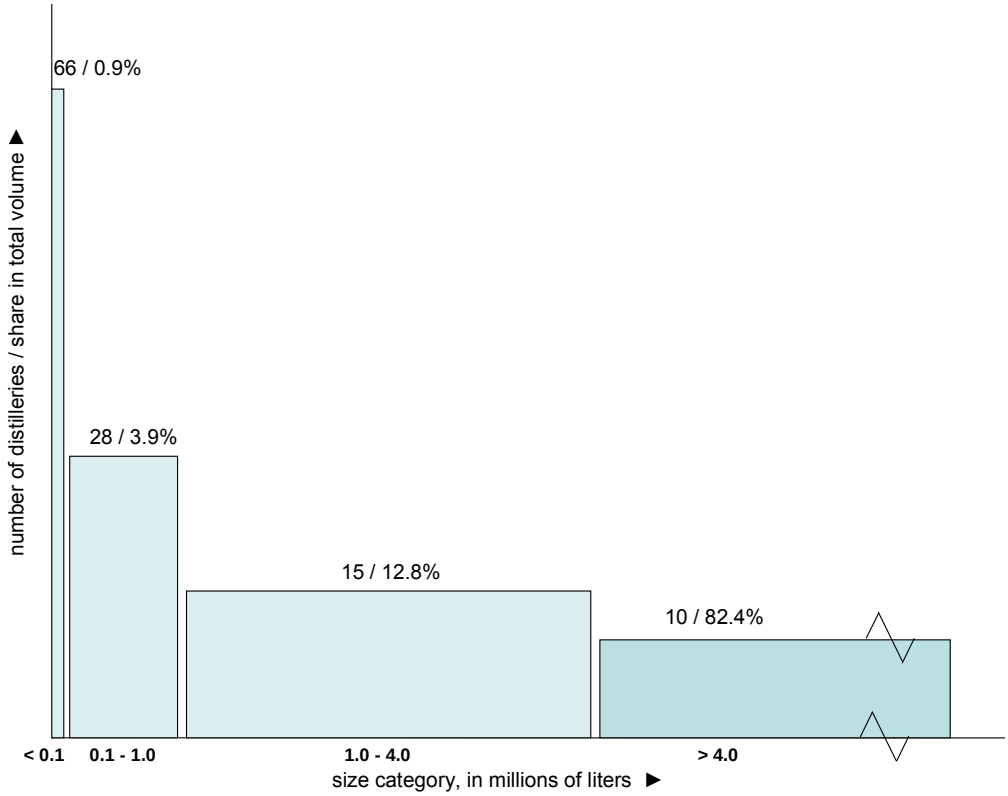

Figure 3: Numbers of tequila distilleries by size category[10]
Source: CRT 2006, as elaborated by Leclert 2007

At the beginning of 2005, four firms (Cuervo, Sauza, Herradura, and Cazadores) controlled approximately 67% of the total tequila market (*El Financiero*, February 9, 2005). Jose Cuervo is the largest distillery, producing approximately 6.6 million nine-liter cases of tequila in 2006, which represented about 30% of total volume (growing from 22% in 1999). In 2005, Cuervo covered 18% of the domestic market and 38% of the US export market. Sauza is the second largest producer; in 2006, it had a share of 17% of the domestic market, and 14% of the US export market. Finally, Herradura, the third largest company, is strong within Mexico, representing 19% of the domestic market in 2006, but has not been able to penetrate the export market as successfully. Herradura had an estimated share of 8% of the US export market in 2006.

Importantly, most of the large tequila companies, as well as many medium-sized and small distilleries, are owned or partially owned by multinational liquor companies (e.g., Fortune Brands, Brown-Forman, Diageo). In addition, Mexican-owned tequila companies often contract with multinational corporations to distribute their tequila in foreign markets. Table 5 summarizes national and foreign capital participation in some of the major tequila firms.

[10] The relative share of each size category in total tequila production (241.3 millions liters in 2006) has been estimated by supposing that production capacity is reversely proportional to the number of distilleries. Thus the distilleries in the first size category would produce about 35,000 liters on average, in the second size category about 350,000, and in the third size category about 2.2 million liters. The category of largest distilleries accounts for the remaining volume.

Table 5. Evolution of foreign capital participation in the tequila industry (as of April 2008)
Source: Macías and Valenzuela 2007, Casas 2006

Company	Alliances and mergers
Cuervo	1970s: Distribution contract with Hubelin 1980s: Guiness (45%) 1990s: Diageo 2002: Returned to Beckman family, distribution contracts with Diageo (US) and Pernod Ricard (Europe)
Sauza	1977: Pedro Domecq (first partial, then total) 2005: Fortune Brands/Beam Global (100%) 2006: Distribution contract with Bacardi
Herradura:	2002: Osbourne (25%) 2004: Returned to Romo family 2006: Brown Forman (100%)
Cazadores	2002: Bacardi (100%)
Tequila Orendain	1999: Brown Forman (33%) 2000: Distribution contract with William Grant and Sons 2007: Returned to the Orendain family
Viuda de Romero	1980s: Pedro Domecq 2005: Pernod Ricard (100%)
La Martineña, Azteca, and Sin Rival	1970s and 1980s: Seagram's
El Tequileño	1984: Bacardi 1990s: Returned to the Sallles Cuervo family
Don Julio	1980s: Distribution contract with Barton 1990s: Seagram's (100%) 2000: Diageo (100%) 2002: Diego (50%) and Cuervo (50%)

Luna (2001) has argued that the consolidation and foreign capital incursion that began in the tequila industry in the 1990s has ushered in a new generation of tequila entrepreneurs. The tequila industry is now largely managed and controlled by university-trained managers with links to national and foreign capital groups, instead of by the traditional families that dominated the industry and local politics for so many years (Casas 2006, Luna 2002). Thus, international interests increasingly influence the politics and production norms of the tequila industry, despite its reputation as being uniquely representative of Mexican history and culture (Bowen 2008).

Differing strategies of tequila distilleries

Different strategies can be identified in the tequila sector, depending largely, although not entirely, on company size. Below some tentative typologies are presented (based on Bowen and Valenzuela 2006, Leclert 2007, Coelho 2007). Further research on these strategies is needed.

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A. Bulk exporter (example: Cuervo)
Foreign-owned; 80-90% self-sufficient in supply of agave, mainly through plantations on reverse leased land; emphasis on export in bulk to the USA; active in developing new markets (e.g., flavored tequilas)
B. Domestic producer (example: Herradura)

Family- or foreign-owned[11]; 80-90% self-sufficient in supply of agave, through share-cropping arrangements and some contracting; reputation based mainly on production of higher quality (100% agave) tequilas and respecting farmer contracts; consolidation in the national market, but increased emphasis on exports

C. Basic distiller (example: San Matias)
Family-owned; assures supply of agave through contracts, through intermediaries, and some through own plantations; strategy varies per company (export vs. domestic focus, number of brands, higher vs. lower quality); often produces tequila for *maquilas* and/or foreign distributors (investor) in order to maximize use of distilling capacity

D. Ultra-premium distiller (example: Los Abuelos)
Entrepreneurial firm; characterized by artisanal production practices and attention to quality in the tequila production process; may use high quality agave, bought on specified contracts; aimed at attracting tequila connoisseurs in the US or other countries; sometimes financed by foreign venture capitalist or distributing company

E. Opportunist distiller
Large farmer trying to valorize his agave when prices are low; sometimes starting off illegally; focus on local market and low price segment

In reality, all kinds of intermediate strategies and mixes occur. Large companies are increasingly seeking to enter niche markets of premium tequilas, and differentiate the supply of their agave and production process accordingly, for instance, by buying smaller distilleries (Leclert 2007).

Trends among distilleries

It is difficult to establish clear long-term trends because of the extreme fluctuations agave and tequila volumes that characterize the tequila supply chain. However, some general patterns can be observed. Tables 6 and 7 illustrate some of the recent trends that have taken place in tequila production and sales.

Table 6: Production volumes of tequila mixto and 100% blue agave tequila (in millions of liters), share of 100% blue agave tequila in total volume, share of 100% blue agave tequila in the use of total blue agave harvested
Source: CRT 2008c

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Tequila mixto	88.7	105.3	113.5	111.8	129.1	156.5	120.1	112	104.3	133	139.6	160.8
100% blue agave tequila	15.6 (15%)	29.4 (22%)	43.0 (27.5%)	58.0 (34%)	61.5 (32%)	25.1 (14%)	26.5 (18%)	29.0 (21%)	36.0 (26%)	43.0 (25%)	70.1 (34%)	81.8 (34%)
% of agave plants used in 100% tequila	27%	39%	47%	56%	53%	30%	34%	35%	41%	42%	52%	53%
Total volume	**104.3**	**134.7**	**156.5**	**169.8**	**190.6**	**181.6**	**146.6**	**141**	**140.3**	**176**	**209.7**	**242.6**

[11] Herradura was the largest tequila distillery to remain family-owned up until 2006, when it was bought out by Brown-Forman.

Table 7: Exports of bottled and bulk tequila (in millions of liters), shares of tequila 100% agave and bottled tequila, share of exports volume in total tequila production, total volumes exported to the USA, relative shares of the various export destinations
Source: CNIT 2006

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Share of 100% agave tequila in exports	2.0 (2.7%)	3.3 (3.9%)	5.0 (5.8%)	7.2 (7.3%)	8.1 (8.2%)	7.0 (9.3%)	8.0 (9.0%)	11.8 (11.6%)	15.6 (14.3%)	21.0 (18.0%)	26.9 (19.2%)
Volume and share of bottled	6.9 (9.2%)	10.6 (12.6%)	12.9 (14.9%)	14.5 (17.5%)	17.5 (17.7%)	19.2 (25.4%)	22.0 (29%)	29.5 (29%)	33.3 (30.6%)	40.5 (34.6%)	49.5 (35.4%)
Total volume of exports	75.2	84.3	86.5	97.3	98.8	75.6	88	101.6	109	117	140
Exports as % of total tequila production	56%	54%	51%	51%	54%	52%	62%	72%	62%	56%	58%
Volume, and % to US	61 (81%)	69 (82%)	69 (80%)	80 (82%)	82 (83%)	58.6 (78%)	69.2 (79%)	79.3 (78%)	84.6 (78.%)	87 (74%)	106.9 (76%)
Volume, and % to EU	10 (7%)	10 (6%)	11 (7%)	12 (6%)	11 (6%)	11.6 (8%)	12.2 (9%)	12.1 (9%)	14.3 (9%)	15 (7%)	15.5 (6%)
Volume, and % to Japan	4.2 (6%)	5.3 (6%)	6.5 (8%)	5.3 (5%)	5.8 (6%)	5.4 (7%)	6.6 (8%)	10.2 (10%)	10.1 (9%)	15 (13%)	17.6 (13%)

The following characteristics, furthermore, are inherent in the evolution of the tequila supply chain:

1. Increased vertical integration

The supply chain is becoming increasingly vertically integrated. As discussed above, many tequila companies have been bought out by or established distribution arrangements with multinational liquor companies. In addition, to reduce their vulnerability to persistent fluctuations in the supply and price of agave, the tequila companies are becoming more self-sufficient in their supply of agave. The largest tequila companies now obtain 80-90% of their agave needs through their own plantations or through contract arrangements (Bowen and Valenzuela 2006, Leclert 2007).

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2. Increased use of modern technology

In terms of tequila production, the modernization of the industry has resulted in the increased use of autoclaves instead of brick ovens, the increased use of stainless steel stills instead of cupper stills, and increased mechanization and automation of the entire production process. In terms of the agave cultivation process, it has resulted in increased mechanization, the elimination of some labor-intensive practices, and the increased use of agrochemicals (see below) (Bowen and Valenzuela 2006).

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3. Increased number of distilleries
When the price of agave is low, such as during the current agave surplus that characterizes the tequila industry, new distilleries are established. Some of these distilleries, however, are short-lived and disappear when prices rise again.

4. Increased differentiation of the final product
There are no hard data on this issue, but in a maturing industry and an expanding, international market this can be expected. The 2006 modifications to the norm for the production of tequila added a new category of tequila, extra-añejo, which must be matured for a minimum of three years. The new norm also allows for the production of flavored tequilas. Today, ultra-premium tequilas (longer aged, artisanal production methods, indication of place of origin) are sold next to very cheap cocktail tequilas. Tequila companies increasingly offer a wide portfolio of products that are marketed to a range of consumers.

5. Overall increase in tequila production volume
There has been a significant increase in the total volume and sales of tequila—from 134.7 to 242.6 million liters between 1996 and 2006-- though extreme fluctuations obscure the trend. Exports of tequila have steadily increased over time, and are less subject to the fluctuations in the agave supply cycle than total tequila production.

6. Increased share of 100% blue agave tequila
The share of pure agave tequila relative to *tequila mixto* (with a minimum agave content of 51%) is about 1:2 now. Although it rose in the past 6 years, it may drop over coming few years when predicted agave shortages set is. However, part of the long-term increase in demand for 100% blue agave tequila comes from foreign consumers who are increasingly educated and demanding higher-quality tequila. About half of the exported bottled tequila is 100% blue agave tequila, which by law must be bottled in Mexico. Therefore, more of the value-added associated with the industry is staying in the GI region.

7. Increased share of Asian and other countries in exports
The United States is still by far the primary importer of tequila, with 76% of total exports in 2006 (CNIT 2006). This is explained by the United States' proximity to Mexico and the large numbers of Mexican immigrants in the United States. However, tequila is becoming increasingly popular in European and Asian countries as well, and the CRT recently opened an office in Brussels (along with an office in Madrid and in Washington, D.C.) to protect its interests in Europe.

5.4.1.2 Agave farmers

The Mexican Secretary for Agriculture, Livestock, Rural Development, Fisheries, and Food (SAGARPA) estimates that in 2006, 153,935 hectares were planted with agave. As shown in Table 8, the state of Jalisco accounted for 80% of all land planted with agave in 2006.

Table 8: Distribution of agave plantations
Source: SAGARPA 2006c

	Land planted with agave (hectares)	Percentage of total
Jalisco	123,148	80.0%
Guanajuato	4,282	2.8%
Michoacán	7,511	4.9%
Nayarit	9,778	6.4%
Tamaulipas	9,216	6.0%
TOTAL	**153,935**	**100.0%**

The area in which agave is cultivated has actually expanded and widened, especially in recent years. The vast majority of agave production has been historically concentrated in the traditional regions of Tequila and Los Altos (Macías 2001); for example, in 2000, 97% of agave was grown in the state of Jalisco (SAGARPA 2006c). However, especially since the agave shortage that took place between 2000 and 2003, agave production has rapidly moved into new areas, and even *within* Jalisco, land use changes have proceeded quickly. Southeastern Jalisco has emerged as a growing center of agave cultivation. In the two districts in southeastern Jalisco[12], land cultivated with agave increased from 490 hectares (2.3% of total agave production in the state) in 1999 to 22,775 hectares (18.5% of total agave production in the state) in 2006 (SAGARPA 2006c).

Precise data on the numbers of blue agave farmers are not available. The CNIT (2006) estimates that in 2006, 12,000 agave farmers, 11,200 day laborers, and about 3,400 field workers were associated with the production of agave. However, this is only a rough estimate. All farmers are required to register their parcels and total number of agave plants with the CRT. According to the CRT, a total of 503,837,319 agave plants are planted in the GI region. However, this is not a very accurate estimate; even though registration is mandatory, it seems likely that a substantial proportion of farmers, particularly small farmers in remote rural regions, have not registered their parcels (Coehlo and Castillo Girón 2007, Leclert 2007). Some farmers may be concerned that registering their parcels would increase their taxes (Leclert 2007).

Agave production arrangements

Several basic types of arrangements are employed in the production of agave. There are no precise data on the relative proportion of land and growers involved in these different arrangements. In general, however, traditional small agave farmers are less likely to be directly involved with the cultivation of agave. It is increasingly difficult for independent farmers to sell their agave to the tequila companies, and the tequila companies are now less likely to establish sharecropping or advance purchase contracts, which historically allowed smallholders to retain control over management of their land (Bowen 2008). The trend in the industry is toward more reverse leasing arrangements, so distillers can assure a more stable supply of agave (Bowen and Gerritsen 2007, González 2002).

Supprimé : (Bowen 2008)

[12] As part of the decentralization of agricultural and rural policy in Mexico, Mexico is divided into 140 Rural Development Districts (DDRs) (De Janvry and Sadoulet 2007). Jalisco has 8 Rural Development Districts. In quantifying the expansion of agave cultivation into southern Jalisco, I included the two districts in southeastern Jalisco, El Grullo and Ciudad Guzmán.

Four types of production arrangements exist in the industry:

1. Sharecropping arrangements

After the land reform that took place in Mexico between 1917 and 1940, the tequila companies became dependent on the *ejidatarios* for the supply of agave. Agave was often more profitable than basic crops such as corn, but in order to begin producing agave the ejidatarios needed financial support to subsist during the period between planting and harvest, as well as credit to cover the costs of planting and maintaining the agave (Torres 1998). The *ejidatarios*' need for credit and production inputs led to various types of contractual and financing agreements between the tequila companies and the agave producers, some of which persist today. The tequila company provides the necessary inputs (agave plants, fertilizers, pesticides, etc.) and the harvest is shared between the smallholder and the agaveros. These arrangements are less common now, as the tequila companies increasingly prefer to do the work themselves.

2. Cultivation by independent farmers

A second type of arrangement that historically characterized the tequila industry is that independent farmers cultivate their agave, often employing traditional production methods that were passed down from generation to generation (Valenzuela 2005, Bowen and Valenzuela 2006). They would then sell their agave to the tequila companies, either directly or through intermediaries known as coyotes. As the tequila companies have become more self-sufficient in their supplies of agave, however, it has become increasingly difficult for independent farmers to find a buyer for their agave.

3. Reverse leasing

Under these arrangements, smallholders rent their parcels (either for cash or a percentage of the harvest) to the tequila companies, who bring in capital, machinery, labor, and other inputs needed for agricultural production (Bowen and Gerritsen 2007). Smallholders do not have access to their land, nor do they make any of the management decisions. González (2002), discussing the specific case of blue agave cultivation in western Mexico, argues that because reverse leasing arrangements exclude smallholders from the productive process, they have very little positive impact on household incomes and fail to stimulate agricultural productivity. Many tequila companies prefer these arrangements because they give the tequila companies increased security and a higher level of quality control/standardization of their agave supply.

4. Advance purchase arrangements

Under these arrangements, the agave farmer has a contract with one of the tequila companies in which the farmer agrees to sell a set quantity of agave to the tequila company once it reaches maturity, and the tequila company, in turn, agrees to buy it. The price is generally defined as the "market price" at the time. These purchase agreements are by far the most preferential arrangement for agave farmers, since they give the farmer the security that he or she will be able to find a buyer for his/her agave, but allow him or her the managing his or her own land; yet, they are becoming almost impossible for smallholders to obtain. They are generally only available to very large agave growers, and even then, are very rare.

5.4.1.3 Distributors, retailers, and consumers

There are not many details available about the distribution channels of tequila. Most tequila (both exported tequila and that sold in Mexico) is sold through wholesalers and/or distributors to large retail stores. Some large distilleries sell their tequila directly to large retail chains. Many small distilleries also sell tequila directly to small stores in Mexico. Small distilleries are more likely to engage in direct sales of tequila and rely more on the local market; it can be very difficult for small distilleries to access the markets large retail stores (.e.g., Walmart), even in nearby Guadalajara, the capital of Jalisco.

The size of the illegal tequila market is unknown. The counterfeit production of liquor that is marketed as "tequila," but does not adhere to the norms that regulate tequila production is a concern for many supply chain actors. In the tequila industry, quality control is carried out by the Tequila Regulatory Council, although Mexico's Consumer Protection Agency (PROFECO) is responsible for sanctioning producers who do not comply with the norms. In addition, instead of using the name tequila, distilleries have the legal alternative of producing generic "*destillados de agave*" or "*licores de agave*," which are not subject to the tequila norms and CRT regulations. Some small distilleries, particularly in peripheral areas, are not registered, either because they do not want to pay taxes or because the CRT fees are too high. In interviews conducted in Mexico, Leclert (2007) found that many people, both consumers and producers, did not know the official (legal) distinction between tequila and other agave distillates. This confirms that the GI law is very much a product of the distilleries and multinational liquor corporations, and not as well understood by actors at both ends of the supply chain. Mezcal is used as the common denominator for all agave distillates, even though "mezcal" (produced in Oaxaca and a number of states in southern Mexico) has been protected as an official "*denominación de origen*" in Mexico since 1994.

Tequila can be found in many price categories. Foreign consumers often drink tequila in cocktails. The bar owners will use a cheap *mixto tequila* for this. We should note that this is also one of the major places where illegally-produced "tequila" is used: in cocktails produced by bars in foreign countries. On the other extreme, there is an emerging market of tequila connoisseurs who are prepared to pay a lot for an ultra-premium tequila; in the United States, tequila can sell for as much as $400 a bottle and $100 a shot. In between are Mexican citizens and emigrants, who tend to consume tequila as part of everyday life, and who have varying preferences and sometimes strong brand loyalty; consumers who became familiar with tequila while traveling in Mexico as tourists, for instance on tours of the large distilleries; and young consumers who follow changing trends and hype.

6.1 GI system trajectory

As noted above, the "*denominación de origen del tequila*" was established in 1974, making it the oldest legally recognized GI outside of Europe. The GI was established primarily to protect Mexican tequila distilleries from competition from firms in countries like Spain and South Africa, who had started to market their own agave-based liquors as tequila with names that suggested Mexica roots (e.g., Taxco, Cuate, Pachuca; Blomberg 2000, p. 127). However, the Mexican GI law lacked international recognition for a long time and was therefore not effective abroad. The endorsement of the GI standard by the United States and Canada in 1994, and by the European Union in 1997, gave it the aspired international standing and protected Mexican tequila producers. Bilateral negotiations with other countries are underway.

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Also as described above, the norms that govern the tequila production process are created by the Mexican government, in consultation with supply chain actors. However, ever since the first official norm for tequila was established in 1949, the norms and quality control mechanisms adopted in the tequila industry have almost been under the control of (and used to benefit) the large tequila companies. Furthermore, revisions made to the norms that regulate tequila production have predominantly gone in the direction of lowering quality standards and reducing costs. These revisions threaten the overall quality and authenticity of tequila, and privilege the large tequila companies (and the multinational liquor companies that own them) over other supply chain actors (e.g., the agave farmers).

Prior to the creation of the CRT, the federal government was responsible for quality control and verification within the tequila industry; with the passing of the Federal Law on Norms and Standards in 1992 and the creation of the CRT in 1993, these functions were transferred entirely to private actors[13] (Bowen 2008). Overall, within the tequila industry and especially among the tequila distilleries, the CRT has a reputation as having played a key role in developing a culture of quality within the industry, although these positive changes have come at the expense of the diversity and specificity of tequila.

The norms governing the tequila industria are published by the Dirección General de Normas of the Ministry of Economic Affairs. As of 1997, it is agreed upon by different parties: government, tequila companies, CRT, IMPI, as well as the Distilled Spirits Council of the United States. The requirements relate to production, bottling, labelling and selling of tequila, as well as specifications and procedures for the authorised firms and organisations.

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7. GI system governance

7.1 Supply chain organization

The agave-tequila supply chain is managed by the Tequila Regulatory Council (CRT, according to its Spanish acronym), a private organization created in 1993. The primary functions of the CRT are to protect the GI for tequila in Mexico and internationally, and to verify and certify compliance with the norm for tequila production.

Prior to the creation of the CRT, there had been only two inspectors who were responsible for covering the entire tequila industry. Now, the CRT assigns one inspector to each distillery. The inspectors rotate every few months, to discourage corruption and biases in their decision-making processes. Every month, each distillery is required to submit substantial records detailing the amount and type of tequila produced, the length of time and location of the bottling process, and the location and quantity of the agave harvested, among other things. In addition, in order to prevent the use of agave from outside the DO region, and to permit the CRT to conduct an inventory of all of the agave planted within the region, all agave producers are required to register their agave plantations with the CRT. The CRT maintains a database that includes the number of plants and acres of land on which agave was cultivated each year, as well as a GIS map showing the distribution of agave across the region.

Although significant improvements in the technical quality of tequila have been made since the CRT's creation, overall, the CRT has failed to make decisions in the collective interest of all supply

[13] Although it is a private organization, the CRT is accredited as a "unit of verification" and a "certification body" by the Mexican Accreditation Entity (EMA, according to its Spanish acronym), and was certified by the International Organization for Standardization (ISO 9002) in 1999.

chain actors. The organizational structure of the CRT theoretically integrates all of the different groups that comprise the tequila supply chain. The CRT's directive council is comprised of four sectors: (1) the tequila distilleries, (2) the agave producers, (3) the bottlers and retailers, and (4) a group of honorary representatives (primarily officials from relevant governmental agencies). In terms of voting power, the tequila distilleries have a total of eight votes, the agave producers have a total of eight votes, and the bottlers and distributors have two votes. However, in practice, the agave farmers are largely excluded from the CRT's objectives and organizational structure. Within each of the sectors[14] and the nine special committees[15] that make up the CRT's directive council, the largest tequila companies are disproportionately represented. Including both the official voting representatives of the directive council and the presidents of the committees, in total, out of the 27 representatives (not including the honorary members, who are public officials), 13, or 48%, are associated with one of the three dominant companies: Cuervo, Sauza, or Herradura (Bowen 2008).

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The influence that the large tequila companies exert on the CRT presents an important barrier to the CRT's ability to make decisions for the collective good of the supply chain. The CRT has done little to ensure the sustainability of the industry, the integration of the agave farmers into the supply chain, or the preservation of traditional production methods and agricultural practices. For example, although the CRT has compiled an inventory of all of the agave planted in the GI regions, it has not provided the agaveros with accessible information about projected cycles of surplus or shortage or recommendations related to planting. Without a voice in the CRT, the agave farmers, who lack formal education, social capital, and financial resources, are in danger of being pushed out of supply chain altogether. Moreover, because of the widespread perception among the agave farmers and the smaller tequila companies that the CRT is little more than a tool of the multinational liquor companies, the CRT itself is a barrier to improved relations and cooperation between all of the actors in the tequila supply chain (Bowen 2008).

8. Impact assessment of GI system

8.1 Economic impact

Tequila is the product with the greatest impact on the gross domestic product of Jalisco, the state where the vast majority of agave and tequila are produced. The industry provides employment to about 35,000 people (CNIT 2006). Table 9 shows the relative importance of the different categories of employment.

[14] For example, within "Sector B," which represents the agave producers, for example, there are four groups (each of which has two representatives): large associations of agave farmers (more than 30 million plants), medium-sized associations (between 10 and 30 million plants), large private producers (more than 30 million plants), and small and medium-sized private producers (between 1 and 15 million plants). Small associations of agave farmers are not represented at all, and the large private producers are represented by agave production companies that are owned and operated by Cuervo and Herradura. "Sector C," the bottlers and retailers, has two representatives, one from Cuervo and one from Pedro Domecq, a subsidiary of the multinational liquor company Pernod Ricard. "Sector A," the tequila companies, does a little better—it includes four subgroups (for micro, small, medium, and large tequila companies), with two representatives for each subgroup. This is effective in insuring that tequila companies of different sizes are represented; however, it is interesting to note that only 2 of the 8 companies represented are from Los Altos (even though almost half of all tequila production takes place in Los Altos), and some of the representatives of smaller companies have ties to the largest firms (i.e., Don Julio, a medium-sized company, which is 50% owned by Cuervo). The final group, "Sector D," is comprised of representatives from relevant governmental associations, and does not have voting rights.

[15] The following committees are included: the certification committee, the verification committee, the committee on norms and regulations, the committee on external affairs, the finance committee, the committee on agronomic techniques, the committee of honor and justice, the committee for planning strategies, and the mixed committee for the defence of tequila (see Bowen 2008). Unlike the four sectors, which are clearly defined in terms of membership, I could not find any information on how the presidents of the committees are selected. Six of the nine committee presidents are directly associated with one of the three largest tequila firms (Cuervo, Sauza, Herradura).

Table 9: Numbers of persons employed in the tequila sector in 2005 and 2006

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Source: CNIT 2006

	2005	2006
Farmers	12,000	12,000
Day laborers	11,200	11,200
Administrators	3,843	4,035
Field personnel	3,793	3,963
Manufacturing workers	2,636	2,788
Technical personnel	919	965
Total	**34,391**	**34,951**

The economic impact is concentrated in two regions of Jalisco: the Amatitán-Tequila valley in central Jalisco, and "Los Altos," in the highlands east of Guadalajara. The effect of the tequila industry on the rural economies of the regions is significant. In the municipalities that comprise these two primary tequila and agave production areas (Amatitán, El Arenal, and Tequila in the Amatitán-Tequila valley; and Arandas, Atotonilco, Jesus Mária, and Tepatitán de Morelos in Los Altos), the labor force employed in agriculture averages 26.0%, whereas for the state of Jalisco as a whole the average is at 10.0% (INEGI 2000a)[16]. In Amatitán and Tequila, the two main municipalities that comprise the valley, 78% of agricultural land in the valley is planted with blue agave (SAGARPA 2006d). The tequila industry is seen by the local population as bringing job opportunities, value-added agriculture, and tourism to a depressed area that would have a hard time surviving without it (Bowen and Valenzuela 2006).

Research carried out in the municipality of Amatitán illustrates the very strong local impact of the tequila industry, in economic and also in social terms (Bowen and Valenzuela 2006). This municipality is located in the middle of the Tequila valley. It has 13,435 inhabitants of which one quarter live in the rural areas. Two major distilleries are located in Amatitán: Herradura and La Regional. In 2006, 7.3% of all tequila was produced in Amatitán (CNIT 2006). 33% of the population is employed in agriculture and 36% in industry, of which 85% is tequila distilling (INEGI 2000b). Many other economic activities in the municipality are also linked to tequila, like barrel making. Interviews among 27 local farmers in 2006 confirmed that for most of them, blue agave was their principal crop (and often the only one), and that some earned incomes as agricultural day laborers or *jimadores* (agave harvesters). Poorer smallholders rented out their land to one of the large agave growers or tequila companies, or sold their standing agave crop to a company. 18 out of 27 farmers were *agaveros libres*, i.e. landowning farmers without any contracts with tequila companies. Most of the inhabitants in Amatitán (and throughout the Amatitán-Tequila valley), then, are directly or indirectly involved in the agave-tequila sector.

We can speak of the existence of a real Porterian "cluster" (Macías 2001) in these regions, in which many different firms compete, but also reinforce each other through (inevitable) exchanges of information. Around these tequila firms and the farms that supply their agave, a variety of specialized supply and trading firms have developed, as well as regulating and supporting bodies.

[16] The Mexican average of agricultural employment is 19.2% (World Resources Institute 2007). The relatively low average for Jalisco can be explained the fact that Guadalajara is the second largest city in Mexico, and employs many people in the industrial sectors, service sectors and public administration.

Together they reinforce the specialization of the local economy on tequila, particularly in the Amatitán-Tequila valley. However, the continuing reinforcement of the cluster makes it increasingly difficult for other areas (within boundaries of the GI) to fully participate in and profit from the tequila cluster. Areas peripheral to the tequila cluster will remain or become suppliers of blue agave, or else they must try to develop a niche market for their local specialty distillate (e.g., the traditional liquor made from green agave in southern Jalisco).

The tourist sector is a clear example of the economic spin-off generated by the tequila industry. The large distilleries have set up museums and tours. One prominent project is the Tequila Express, a train that goes from Guadalajara to Tequila. Passengers are offered a meal accompanied by traditional *mariachi* music and a tequila tasting during the tour of the Cuervo distillery in Tequila. In 2006, the Inter-American Development Bank announced a grant of $1.5 million, funded through its Multilateral Investment Fund, to support the development of the "Tequila Trail" in Jalisco. The Bank is quoted as saying that the Tequila Trail will highlight "the natural and cultural attractions of this region known not only for the world-famous Mexican liquor, but also for its traditional horsemen, the *charros*, as well as for its *mariachi* music". The Tequila Regulatory Council will be the executing agency of the project, with support from the Cuervo Foundation and other distillers in the region (IDB 2006).

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Sustainability of economic impact

The tequila sector has demonstrated its economic viability, but also has some weaknesses. The primary strengths of the industry are: (1) growing demand for tequila, especially in international markets; (2) international endorsement of the tequila GI; and (3) particularly strong growth in high-end market segments (Pace University 2006, Distilled Spirits Council 2007).

One major weakness, however, is that the entire history of the tequila industry has been characterized by cycles of shortage and surplus of agave. During a period of surplus, agave prices fall so low that farmers do not have the necessary capital or the incentive to begin planting another crop of agave. In addition, when the price of agave is low, farmers neglect to monitor their agave plantations closely for pests and/or disease, which often leads to an outbreak. The combination of increased incidences of disease and pest infestation and decreased planting of new crops leads to a shortage cycle six to ten years later. During a period of shortage, agave prices become artificially high, which incites new producers to enter the agave market and encourages existing producers to expand their agave plantations, leading to another surplus a few years later.

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The lack of regulation of the agave supply, and the continued cycles of surplus and shortage, most negatively affect the agave farmers, by contributing to economic differentiation and threatening the economic basis of the region. The effects of the cycles of surplus and shortage are compounded by extreme dependence of areas like the Amatitán-Tequila valley, in particular, and Los Altos, to a lesser extent, on the agave-tequila industry. The cycles of surplus and shortage have also served to increase concentration among the tequila firms. Although all firms were negatively affected by the most recent crisis, the smaller firms were less likely to have sufficient capital, and had less leverage with the agave growers to be able to buy the agave that they needed. Many of the smaller tequila firms, particularly the recently established firms, went bankrupt during the crisis. The CRT was quoted as saying that 30% of the tequila distilleries in Mexico were forced to shut down operations during the shortage (*Reforma*, September 25, 2000). As the largest tequila companies become more self-sufficient in their supply of agave, future shortages (such as that predicted in 2010 or 2011) will further consolidate the market power of the biggest tequila companies, because the smaller companies will be the only ones exposed to the risk of the cycles (Bowen 2008).

The instability and unsustainablity of the tequila sector also manifests itself at the macro-economic level. In 2001, because of the scarcity of agave and the high price at which it was being sold, the Mexican government began providing the tequila companies with a subsidy of $3.00 pesos per kilogram, which rose to $9.00 pesos per kilogram in 2002 (González 2002). In 2006, the Ministry of Agriculture allocated $59 million pesos for agave growers, and the Mexican government allocated another $200 million for agave growers in 2007.

In light of the negative impact that these cycles of surplus and shortage have had on the industry and the region, and rather than considering how collective strategies could be employed to stabilize the price for agave, the most powerful actors within the tequila supply chain (tequila companies, CRT officials, governmental officials, and even leaders of farmer associations) have focused on the need for planning and organization among the agave producers, while ignoring the fact that the tequila companies have begun producing their own agave, eliminating the *agaveros* from the supply chain altogether. This is a major weakness of the industry. The CRT and the state and federal government have failed to offer concrete solutions to the problem or to provide information or resources to facilitate planning and organization among the agave farmers (Bowen 2008, Leclert 2007).

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Second, the tequila GI legislation constitutes another major economic weakness for the sector (Bowen 2008, Leclert 2007, Luna 2002), for several reasons:

1) The GI production area is very large (11,194,600 hectares and 181 municipalities in 5 states), and does not correspond with particular biophysical properties (i.e., soil or climate conditions) or cultural/historical traditions of agave/tequila production. The large size of the GI region increases the variability of the quality of agave and in doing so, undermines the link to *terroir*. The distances between farmers in different regions makes it difficult for the farmers to organize, and the surplus of available land allows the tequila firms to adopt a "frontier" production strategy, externalizing ecological and social costs and moving on to another area after resources have been exhausted.
2) Although all 100% blue agave tequila must be bottled in Mexico, *tequila mixto* can be exported in bulk and bottled in other countries. In 2004, 70% of total tequila exports were sold in bulk and bottled outside of Mexico, largely in the United States (CNIT 2005). On January 1, 2004, the Mexican government approved a law stating that tequila should be bottled only in the DOT territory, but the law did not go into effect (Coelho and Castillo-Giron 2005. Some distilleries, like Herradura, as well as the IMPI, which regulates Mexican GIs, and major farmers associations, argued in favor of bottling all tequila within the GI region (Leclert 2007). However, the Distilled Spirits Council in the United States objected to the proposal, saying that it would raise costs for consumers and threaten jobs in bottling plants in the United States (Coehlo and Castillo-Giron 2005)[17]. The United States also argued that the law was a violation of NAFTA, since it would create a barrier to market exchanges between the United States, Canada, and Mexico. The Mexican government's proposal failed. In January 2006, the US and Mexican governments signed an agreement in which Mexico dropped the proposed ban on exportation of bulk tequila, in exchange for increased transparency of the quality control process in the United States (Bowen 2008).
3) Only 51% blue agave is required to produce tequila. The first official norm for tequila production (1949) stated that tequila must be made with 100% Weber blue agave. Since then, however, during agave shortages, the tequila companies have successfully appealed to

[17] As the council's president Peter Cressy stated, "This proposal could have a severe effect on consumers worldwide through higher prices, fewer choices and the significant potential for serious product shortages. It would also violate the rules of the World Trade Organisation and commitments made by Mexico when it joined the United States and Canada in the NAFTA in 1994" (quote taken from Crutsinger 2004).

the Mexican government to change the norms regulating the production of tequila. In 1964, a new norm was established which stated that tequila had to be made out of a minimum of 70% blue agave sugars, and in 1970, the minimum proportion of agave sugars required to produce tequila was reduced to 51%. These modifications have been justified as cost-savings mechanisms for the tequila companies, but they have undermined the quality of tequila and the theoretical definition of the GI.

4) The 2006 revisions to the norm for tequila allow for the production of flavored tequila (i.e., lemon-flavored tequila, mango-flavored tequila), in order to better compete with flavored vodkas and other specialty liquors. The inclusion of flavored tequilas—and the lowered quality standards in general—have the potential to damage overall reputation of tequila.

Overall, although the market for tequila has expanded considerably in the last 15 years, inconsistencies in the norms that regulate tequila production threaten the quality and authenticity of tequila, and marginalize the agave farmers (Bowen 2008).

8.2 Social impact

Economic wealth created by tequila production has contributed to the general welfare of the population in Jalisco, but not for all social categories, and not for the entire GI production area.

Small farmers have difficulty participating in and profiting from blue agave production. This is largely due to the characteristics of the crop, notably the long agave growth cycle, which makes prediction of returns difficult and requires high initial investments. Smallholders who decide to plant agave must have sufficient capital to be able to cover the costs of maintaining their agave plantations during the long period that it takes the agave to mature. This is particularly difficult for small and/or poor farmers given that credit can be very difficult to obtain, and extremely expensive, in Mexico (Bowen and Valenzuela 2006). In addition, as the largest tequila companies become increasingly self-sufficient in their supply of agave, small independent farmers are being eliminated from the supply chain altogether.

Furthermore, as discussed above, neither the CRT nor the Mexican government offer support to the farmers, either in terms of credit or in terms of resources to better plan and control the supply of agave. The CRT and the government tend to present the current agave surplus as primarily the responsibility of the agave farmers (Leclert 2007, Bowen 2008). They blame the independent farmers for not having established a contract with one of the distilleries. At the same time, traditional contract arrangements that give the farmer control over his or her land yet guarantee the sale of agave are becoming almost impossible to find (Bowen & Valenzuela 2006). Individual agave farmers do not have much bargaining power vis-à-vis the tequila companies when discussing the conditions of contracts, such as the price, quality standards, and production techniques. The CRT could help improve the weak position of common farmers by better regulation agave supply (at least through provision of correct information), and add requirements to the GI law, in particular specifying cultivation methods in such a way that more labor-intensive practices are favored, and favoring the creation of local "*crus*" within the GI area.

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Agave farmers in general are poorly organized, which reduces their ability to negotiate with the tequila companies and/or within the CRT or the National Chamber of the Tequila Industry. Thus, much of the value-added in the tequila supply chain goes to the 124 distillers, and to foreign bottling and distributing companies. The agave farmers' associations are highly fragmented and the composition of these organizations is always in flux, as members shift from one to another, organizations are created and disbanded, and leaders frequently leave and are re-appointed. This

lack of organization is likely due to a combination of many factors: the large size of the GI region, which pits different sub-regions against each other and makes it difficult for farmers to organize; the lack of education of most of the agave farmers; a tradition of corruption within the agave producers' associations (in which the leaders of the associations guarantee sales primarily for their friends and relatives); and a lack of collective vision or traditions within broader Mexican culture (Leclert 2007, Bowen 2008, Bowen and Valenzuela 2006). The despair of agave farmers in times of low prices may lead again to distillery blocks or even larger-scale uprisings. In 1976 desperate agave farmers blocked tequila plants for many days in order to get higher prices (Leclert 2007).

Mis en forme : Couleur de police : Automatique, Anglais (États-Unis)

Mis en forme : Anglais (Royaume-Uni)

Small distilleries, often larger agave farmers or ex-agave farmers, face high entry barriers, due to several reasons (Leclert 2007):

- The cost of the compulsory chemical analysis of the final distillate is $15,000 pesos per batch. Since small distillers make many small batches, costs per liter may become excessive.
- Buildings used in the production of tequila must be closed, and equipment must comply with modern hygiene norms.
- The registration fee for the CRT is $20,000 pesos. Without this fee, verification costs are $2,000 pesos per visit, plus costs of transport and lodging for CRT officials. Label review costs $500 pesos.
- Members pay $0.34 pesos per liter of tequila, with a minimum fee of 8,000 pesos per month (requiring a production of 23,530 liters per month to break even, or 282,000 liters per year). This is a disadvantage for small distilleries, which may not produce tequila year-round.

According to a CRT representative: "The priority is not to make it easier for everyone to start producing their own distillate, but to make sure that what arrives at the consumers respects certain quality standards" (Leclert 2007). Furthermore, a trend towards standardization in the tequila industry threatens the diversity and specificity of tequila and favors the largest tequila companies (Bowen 2008).

8.3 Cultural impact

Tequila has a very long history, particularly in the Amatitán-Tequila valley, where tequila production originated, although the industry also has long historical and cultural ties to the "Los Altos" region, which has been producing tequila for more than 100 years. In 2006, the "agave landscape" of the Amatitán-Tequila valley, including blue agave plantations, current and former distilleries, and archaeological ruins, was awarded UNESCO World Heritage status. As we mentioned above, also in 2006, the tequila region received funding to develop a "Tequila Route," similar to the wine routes that exist in wine-producing regions. Thus, cultural heritage and pride can be linked to economic opportunities (Ray 2000).

However, at the same time, the intensification and industrialization of agave cultivation is altering the traditional rural landscape. This can be considered a loss of cultural heritage and will have negative effects for the local population. Moreover, the 'industrialization' of the landscape can have adverse affects on the region's attractiveness for tourists and to the reputation of tequila as a quality product.

Related to this process is the gradual disappearance of the traditional cultivation practices (for example, intercropping agave with corn or beans, manual pruning of the agave to prevent pest infestation, organic fertilization), and know-how of agave farmers (Valenzuela 2005, Bowen and Valenzuela 2006). These are not (yet) are not valued by the rest of the tequila supply chain or public administration involved in the definition of tequila GI law. This knowledge base is in danger of

disappearing as the tequila firms increasingly obtain their agave through their own plantations and through contract arrangements that specify the practices that farmers are required to use (Bowen and Valenzuela 2006). Agave cultivation practices are increasingly dictated by the tequila companies. Traditional agave farmers are forced to imitate the methods required by the tequila companies, by contract, and in many cases are pushed out of the supply chain altogether (Bowen and Valenzuela 2006). Because supply chain actors do not attribute the specificity of tequila to the traditional agave cultivation practices, they are largely unconcerned by shift in control from the local smallholders to the tequila companies. The tequila firms' primary concern is to guarantee a more stable supply of agave, not to guarantee the authenticity of the agave production process or the quality of the agave (Bowen 2007).

At the same time, there is a loss of mezcalera traditions of green agave distillates in areas outside the tequila valley. The methods are more artisanal, and the distillates are usually based on different varieties of agave than the *Agave tequilana Weber* (Leclert 2007). However, as producers in southern Jalisco and other places within the GI region substitute diverse local varieties of agave (i.e., green agave) with *Agave tequilana Weber*, and as local distilleries modify production techniques according to the norms for tequila production, cultural heritage and biodiversity are threatened (Ibid.). The following two cases (from Leclert 2007) illustrate the potential for and barriers to preservation of local distillates.

Case 1 : Amula

Amula is a region in the southern part of Jalisco, which does not have a strong distilling tradition. Over the years, during periods of low prices of agave, distilleries have been formed: the number of distilleries in the region jumped from 3 to 10 between 1955 and 1972, and from 10 to 17 between 1998 and 2005. By developing their own local markets, most of them manage to persist. Distillers in the region produce low quality tequila compete on price. Amula has a high poverty rate, high illiteracy, high intra-family violence, and low education. When blue agave is cheap, distillers use less green agave (which has a rather constant price, at 3 pesos per kg). Blue agave may be bought from other areas.

In the 1990s large distilleries came to area to set up agave plantations, looking for virgin lands (not depleted, and pest-free). They rented the land at fair annual prices. Around 2000, many *agaveros libres* stepped in to profit from high agave prices, but from 2002 onwards less and less agave has been planted because prices dropped again. The acreage of blue agave increased from almost zero in 1995 to 2,000 ha in 1998 and 6,000 ha in 2004, mainly in the municipalities of Autlán and Tonaya. Maize cultivation is still important, though it decreased by 50% drop between 1994 and 2002. A few new distillers have started to make 100% blue agave liquor in order to find a niche next to the market of cheap tequilas. They promote it as tequila, but do not use the GI on the label in order to keep the price within limits. Although they feel the mention tequila favors sales, in general.

The mezcalera tradition of Amula, based on green agave, is gradually lost, in favor of blue agave for tequila production. People are hardly proud of their tradition and mistrust the distilling methods of local producers, who would "use urea to start fermentation" or "add mezcalina (agave extract)".

Case 2: Raicilla

This drink is produced in the Sierra Madre Occidental, in the towns of San Sebastian del Oeste, Hostotipaquillo, Talpa, Mascota, Atenguillo, Guachinango, and Etzatlan.
The raw material is from the *Sylvester* agave (*Agave Lechuguilla)*, which is a bit smaller than the one used for tequila. Raicilla has a high alcohol content (60-80%) and one liter of final product requires about 7.5 kg of raw material (5 kg for tequila).

In the area, every agave farmer has its own home distillery *(taberna)*. Local people are quite proud of their traditional drink and they like it "better than tequila". In 2006 producers founded a *Consejo Regulador* and are now working together with a research center to define the norms that each producer will have to respect. Because of its remoteness, the area is not interesting for the large tequila companies to grow blue agave or set up distilling plants.

8.4 Ecological impact

Despite, and most likely because of the shift from traditional, labor-intensive cultivation practices to more chemical-intensive practices, incidences of disease and pest infestation have actually increased over the last twenty years (Valenzuela 2005, Bowen and Valenzuela 2006). Especially after the massive pest infestation between 1993 and 1999 that killed 25% of the agave population in Jalisco (Ramírez 2002), the application of pesticides, herbicides, and fungicides has continually increased. However, because most farmers did not have access to information about appropriate rates of pesticide and herbicide application, they based their application rates on the recommendations of the agrochemical vendors, who had an interest in encouraging farmers to apply high rates of their company's product even when it was not the best product for the particular problem. Agave growers increasingly substitute more traditional, labor-intensive practices with more chemical-intensive but labor-efficient practices (Valenzuela 2005, Bowen and Valenzuela 2006). This is due to several factors:

- First, smallholders imitate the "technological packet" (Landeros 2005) required by the tequila companies (Valenzuela 2003).
- Second, labor shortages arise as household members migrate to Guadalajara or to the United States (Herrera 2004).
- Finally, there is a growing trend within the agave-tequila industry to value the application of chemical inputs as prescribed by trained engineers over the expertise of experienced but uneducated agave farmers.

There is a long-term risk of soil depletion and erosion. Farmers' rate of application of fertilizers vary significantly according to the price of agave, and in the last twenty years, application rates have declined overall (Valenzuela 2005). In general, applications of fertilizers and lime increase when the price of agave is high, and decrease with the falling price of agave. During periods in which the price of agave is very low, farmers are also likely to be less vigilant in monitoring pest and disease infestation and in attempting to prevent diseases from spreading (Valenzuela, 2003, 2005).

As it becomes increasingly difficult for independent farmers to sell their agave and as the cycles of surplus and shortage continue, it is likely that average rates of fertilizer application will suffer an overall decline. As discussed above, one way in which poorer farmers lower their expenses during difficult periods is by reducing the inputs that they apply to their agave fields (and in some extreme cases, abandoning their crops in the fields). During periods in which the price of agave is low, farmers are particularly likely to stop or significantly reduce the amount of fertilizer applied to their

agave fields. Farmers may also choose to hire fewer workers to help them with pruning the leaves of the agave plant, removing weeds, spraying for weeds and pests, and the other activities that are necessary to maintain their crop. Therefore, the social and economic sustainability of the agave-tequila industry is intimately tied to the ecological conditions under which the agave is cultivated, and, moreover, that the two are likely mutually reinforcing (Bowen and Valenzuela 2006).

Finally, the norms that define tequila production have also contributed to a reduction in biodiversity in the GI region. Of the nine varieties of agave used in the production of tequila at the end of the 19th century (Pérez 1887), only one (*Agave tequila Weber*, also known as blue agave) is currently permitted by the official norms regulating tequila production. The blue agave variety was privileged over other varieties because of its high productivity and because it was easier to work with in the distilleries (Valenzuela 2005, Leclert 2007). However, no comprehensive tests were conducted to evaluate the different varieties of agave historically used to produce tequila according to criteria such as resistance to disease, sugar content, or taste characteristics. The genetic homogeneity of the blue agave plant, cultivated in monoculture and propagated asexually, increases the region's susceptibility to a large-scale outbreak of disease or pest infestation (Bowen and Valenzuela 2006). The use of modern cloning techniques has further increased the risk of diseases and plagues in blue agave. A higher biodiversity within the variety of blue agave would reduce the risk, and allows for the adaptation of the cultivars (sub-varieties) to the strongly differing physical and climatic conditions within the tequila GI area.

8.5 External factors

The single most important external factor for the tequila supply chain is probably the North American Free Trade Agreement (NAFTA), implemented in 1994. Mexico opened up its markets to imports from the United States, including corn. As noted above, agricultural subsidies declined by more than 1/3 between 1994 and 2002 (Wise 2004), and real corn prices in Mexico fell more than 70 percent during the same time period (Oxfam 2003). In this context, non-traditional crops such as agave seem an increasingly appealing option for farmers who are struggling with the neo-liberal reforms in the agricultural sector; in some areas, such as southern Jalisco, there has been a shift from cultivation of corn to cultivation of agave, which has contributed to the current oversupply of agave. At the same time, agricultural subsidies of all kinds have largely disappeared since the implementation of NAFTA. In interviews conducted with 27 agave farmers in Amatitán in 2006, Bowen (2008) found that most farmers received little or no assistance from the government. It is difficult to say whether this is true across the GI region; however, overall, subsidies have declined considerably in Mexico over the last 10-15 years. Many Mexican farmers receive little help from the government.

8.6 Comparison with the *mezcal* sector

A potential threat for producers of tequila and blue agave is competition from producers of mezcal, which was recognized by a *denominación de origen* in 1994 (NOM -070-SCFI-1994). Although many people in Mexico still refer to any agave distillate as *mezcal*, the law now states that the name can only be used for liquor that is produced bottled within the one of the following states: Durango, Guerrero, Oaxaca, San Luis Potosi, or Zacatecas. The *Cámara Nacional de la Industria del Mezcal* was established in 1995, and the *Consejo Regulador de la Qualidad del Mezcal* (COMERCAM) was established in 1997. The norms that regulate production of *mezcal* incorporate the use of five named agave species, with an additional allowance for other (native) agave species that grow in the region (as long as they are not protected by another GI) (Illsley 2008). The use of blue agave is prohibited in

the production of *mezcal*, which is a strategic choice[18]. In general, the production of *mezcal* is much less industrialized and standardized than the production of tequila. In Oaxaca in particular, traditional distilling methods are still widely used, constituting many potential niche market products. The following quote illustrates the still largely traditional character of the *mezcal* sector in Oaxaca, the main *mezca*l producing state:

> "Normally, people buy *mezcal* for large celebrations, such as *fiestas de pueblos*, in which the organizers buy not bottles but big containers (about 40 liters) directly from producers. Mezcal quality refers to distilling methods; traditional methods are more accepted and *mezcales* produced in a "chemical" way are rejected. Quality also refers to the place where *mezcal* is produced, rather than brands. For example, everyone regards the mezcal from Albarradas as being a higher-quality mescal than the *mezcal* from Matatlán, since the latter is produced large-scale. As long as consumers have close contacts with communities of producers, these criteria are valid. Consumers don't care about labeling. And for tourists, *mezcal* is only an occasional drink, so the DO regulation is not really important. Today, Oaxaca has important fairs that bring *mezcal* producers together. Unfortunately, these fairs have become exhibitions for brands, and leave little room for traditional family business. On the other hand, there are group of farmers who have created cooperatives to increase their sales and incomes, but these groups are not really present in the market yet. Their niches are very specific and oriented around local fairs, some bars, and people in Oaxaca City looking for "alternative" products (i.e., artists, environmentalists, activists, artists) (Mendoza 2007).

The production volume of *mezcal* is about 10 times less than that of tequila. The volume tripled in the period 1994-2000 (with the export share increasing from 25% to 50%), but declined substantially afterwards, due to increased demand for agave from tequila distilleries, who illegally imported agave from *mezcal*-producing areas during the agave shortage (1999-2003). The decline has been less sharp than official figures suggest, because many growers and distillers probably withdrew from the official registers once the *mezcal* DO legislation required doing so. Even though there has been an increase in the number of brands of *mezcal* on the market, it is still relatively difficult to find *mezcal* in national supermarkets or liquor stores, which may offer 2-5 *mezcales* compared to 20-50 tequilas, according to a recent survey. COMERCAM is actively supporting a series of events to promote *mezcal* in the domestic and global markets; however, marketing costs are considerable and the time frame for success is expected to be a long one (Illsley 2008).

The GI for *mezcal* seems to have had a positive impact on the price of particularly for exported *mezcales*. Some bottles now sell at US $100, competing with high-end tequilas. However, tequila still enjoys much greater name recognition than *mezca*l, which will protect the tequila industry in the years to come. In many respects, however, the *mezcal* sector seems to follow a growth pattern similar to that of the tequila sector, with all of its positive and negative implications. The main differences between the *mezcal* and tequila industries are that a) the internal diversity (of *mezcal* producers and the finished product) is greater, (b) the mezcal sector is more fragmented and less organized, and (3) the norms that regulate *mezcal* are marginally better (i.e., all *mezcal* must be made from 100% agave).

One threat to the longevity and sustainability of the *mezcal* industry is that it suffers from the same cycles of surplus and shortage of agave as the tequila industry does. In fact, the agave supplies for the two industries are linked. Illsley (2008) explains,

> "A shortage in the tequila regions during the 1990s led to over planting in nearby states. It has been reported that in the period of 1999-2003 roughly 300,000 tons of *espadín* agave

[18] This prevents competition for blue agave between tequila and mezcal producers, and allows for better differentiation of the product according to the local ecology and traditions.

> were trucked from Oaxaca to the tequila industries in Jalisco (Chagoya 2004). With the tequila shortage now over, Oaxaca's excess capacity has dramatically reduced the local prices paid to producers; Oaxaca expects to enter the boom-bust cycles Jalisco has known for decades."

Although the mescal industry is less concentrated than the tequila industry, one threat to the viability of small producers is the fact that the fees required by the COMERCAM can amount to many times the annual incomes of small-scale *mezcaleros*. Furthermore, the federal subsidies for developing the maguey-mezcal chain are captured by a few well-organized distillers and producer groups, which increases economic differentiation and inequality in the *mezcal* industry. Finally, concentration of agave production and the consequent exclusion of small growers are caused by increases in reverse leasing arrangements, as has occurred in the tequila sector (Illsley 2008).

9. Conclusions and recommendations

9.1 General lessons

General lessons to be learned from the tequila case for the study or the improvement of GI systems outside of Europe:

- The initiative for legal GI protection (and for modifications to the GI scheme) has come from the supply chain actors themselves, during periods of crisis (i.e., in response to illegal production of "tequila" in Spain and South Africa). These initiatives emerge only when the economic stakes are high. Although supply chain actors' direct involvement in the creation of GI legislation can be seen as a positive sign, at the same time, these actors may influence and alter the legislation system in corrupt ways. This is demonstrated by the way in which large tequila companies have continually pressed for modifications to the norms that would benefit them economically, but which have not maintained the quality or specificity of tequila. Supply chain actors have tended to take an opportunistic stance in their negotiations of GI policy in Mexico.
- Standardization in the tequila industry has led to a loss of specificity and local knowledge, as well as negative social and ecological effects. The most powerful stakeholders in the industry, the large tequila companies, have defined quality in a very standardized and homogenized manner, in order to improve tequila's reputation among consumers and distinguish "tequila" as a category. The technical quality of tequila (measured in terms of absence of defects) has improved since the CRT was created in 1994, but the diversity of flavors and traditional methods that have historically defined the industry are being loss.
- The lack of governmental involvement in Mexican GI policy in general and in the tequila industry more specifically, combined with the inequalities that characterize relations between the agave growers and the tequila producers, have resulted in the increased social exclusion and marginalization of the (smaller) agave farmers, and eventually agave farmers may be pushed out of the supply chain altogether. We can hypothesize that, in a context of consolidation and rationalization within the tequila industry, the gains of increased economies of scale are falling into the hands of an ever smaller group of firms and farms. Moreover, as the tequila companies are bought out by multinational liquor companies, the benefits of the tequila industry are increasingly attributed to extralocal (non-Mexican) actors. On the other hand, there are some political and market pressures to claw back some of the "lost" value added by insisting on the bottling of tequila within the GI production area.

9.2 Policy recommendations

Policy recommendations, specific to the GI case:

- The Mexican legislation on GIs needs to be revised, if the Mexican GIs are to have any broad effects on rural development. The inclusion of broader social and environmental goals of GI protection in the Mexican legislation on GIs would be an important first step to improving the sustainability of Mexican GI protection schemes.
- The agave farmers need to be better incorporated into the governance of the tequila industry and the norms that dictate production practices. The CRT, the collective organization that governs production and theoretically integrates all of the supply chain actors, has failed to do this. State involvement is needed to provide some guarantee that the benefits associated with GI production are not co-opted by one powerful group of actors. The almost complete withdrawal of the Mexican state from the agave sector has been crippling for the small agave farmers. Especially given the extreme inequality between the *agaveros* and tequila companies and the weak organization that characterizes rural civil society in Mexico, some type of state

intervention is required to level the playing field, in order to, first of all, ensure that the agave farmers are permitted to continue producing agave, and, second, to help manage production volumes in a more stable, equitable manner.

- The cycles of surplus and shortage of agave threaten the sustainability of the industry and the livelihoods of the actors involved (agave farmers, distilleries). The CRT and the Mexican government need to work together to educate the agave farmers on when to plant agave and to make the projected future supplies of agave publicly available, broadly disseminated, and easy to understand.
- Producers and policy makers should seriously consider a transition to 100% agave in order to maintain the reputation of tequila on the market. Tequila producers should be allowed sufficient time to adjust their marketing channels. An indirect positive effect of a 100% agave transition is that it would make crop planning easier, since it would reduce the distilleries' flexibility in the proportion of agave used.
- The connection between the terroir of the region and the quality of tequila need to be emphasized and valorized, both in order to maintain tequila's reputation and to preserve the cultural and ecological resources that have contributed to the specificity of tequila. Overall, quality standards and production relations in the tequila industry have evolved in a way that threatens the connection to *terroir*, which has had negative effects on the traditional agave farmers and the local region and landscape. Although many supply chains actors express a belief in the basic idea of terroir, the major tequila companies have blocked initiatives to better protect the *terroir* because they feel that it is not in their economic interest to do so (Bowen 2008). By emphasizing other quality attributes (i.e., the type of barrels used, the method for cooking the agave, and the amount of time that the tequila is aged), the tequila companies are able to remain very flexible in their agave supply arrangements and minimize costs. Since the legal definition of "*denominación de origin*" in Mexico explicitly incorporates the concept of terroir, the Mexican state should require that GIs and quality norms do a better job of maintaining the link to terroir.
- Consumers need to be integrated into the definition of the norms for tequila production. On one hand, since initiatives for legal protection come from large-scale distilleries and distributors, the norms that govern tequila production have evolved according to the demands of the biggest tequila companies (and the multinational liquor companies that own them), and have favored increased standardization, delocalization, and industrialization of tequila production. In addition, tequila labels are deliberately made confusing and obscure. For example, tequila companies are only allowed to list the category of tequila (reposado, añejo, etc.), not the amount of time tequila is produced. A company is therefore unable to differentiate between an añejo that is aged for the minimum required time of one year, and an añejo that is aged for 2 ½ years. On the other hand, tequila consumers are increasingly attuned not just to the proportion of agave in their tequila, but to the way that the agave is cooked (autoclave oven vs. wood-burning stove) and pressed (mechanized vs. manual), and the duration and process by which the tequila is aged (steel tanks vs. wooden barrels). In addition, the agave farmers' struggles and the current agave surplus have attracted international attention. As consumers become more aware of the complexities surrounding tequila production, a substantial number of small companies are emerging to fill this growing niche market. However, it is important to recognize that the emergence of tequila distilleries that rely on artisanal methods and an expressed connection to *terroir* has been in spite of, not because of, the CRT, and these types of distilleries exist only at the margins of the tequila industry (Bowen 2008). Still, the emerging diversity within the tequila GI industry should be a signal to policy makers to anticipate the development of specific sub-GIs in those cases where new versions are linked to specific geographic places and areas; the same holds true for the *mezcal* sector.

Supprimé : (Bowen 2008)

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