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Designation of Origin Distillates in Mexico: Value Chains and Territorial Development

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Abstract: Geographical Indications (GI) have been used in several countries, mainly in Europe, as tools to promote territorial development. These tools have been adopted in Latin American countries without serious reflection on their scope, limits, and advantages. One of the most relevant elements therein corresponds to the way in which these assets participate in value chains, whether short or long, which has important implications for governance, benefit distribution, geographic organization of value accumulation processes, among others. With that in mind, we identify the two most relevant Mexican GIs—namely Designation of Origin Tequila (DOT) and Designation of Origin Mezcal (DOM)—to analyze how their value chains have been constructed and their impact on territorial development. We conclude that GIs tend to adopt large value chains to satisfy long-distance demand, but they can have negative territorial effects if institutions are not strong enough to appropriately incorporate territorial stakeholders' demands.

Keywords: designation of origin; Mexico; global value chains; territorial development

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1. Introduction

A Designation of Origin (DO) is a special type of Geographical Indication (GI) that has the potential to generate positive territorial effects in the producing areas [1], thus it is considered a tool for promoting territorial development through the provision of public goods. Yet, the DO paradigm has been adopted in Latin American countries without serious questioning of its scope, limitations and advantages when participating in local valuation strategies.

Such is the case of Mexico, which recognizes three figures, namely Designations of Origin, Geographical Indications and Collective Trademarks. There are 18 approved DOs and 174 records related to agrifood products, handicrafts, hats, clothing, furniture, among other things [2,3]. However, the chief DOs are Designation of Origin Tequila (DOT) and Designation of Origin Mezcal (DOM), which stand out due to their longevity as DOs (Tequila with 46 years and Mezcal with 26 years), as well as to their large production and export volumes.

To question the scope, limitations and advantages of a DO, we must examine how it participates in the different value chains, which has significant implications for governance, benefit distribution, the geographic organization of value accumulation processes, among other dimensions.

Recently, debate has emerged around long and short value chains and their implications for territorial development, especially when it comes to agrifood products, the sector to which many DOs around the globe belong [4–8].

Employing the Value Chains (VC) methodology as used in [9], this article analyzes how the value chains associated with two Mexican DO goods, namely Tequila and Mezcal, have evolved over time and the implications thereof for territorial development.

We begin by discussing the scope, limitations, and links associated with a DO in terms of territorial development, to later delve into the concepts, advantages, and disadvantages of commercialization of both short and long chains and the methodology used for Value Chains analysis. Later, this methodology is applied to DOT and DOM marketing chains and finalizes with conclusions.

2. Designations of Origin: Scope, Limitations and Links with Territorial Development

The 1958 Lisbon Agreement defines a DO as a special type of GI that requires a qualitative link between the product to which it refers and its place of origin; its quality or characteristics must be exclusive to or essentially a consequence of a given geographical origin, which implies that the product's raw materials must come from the place of origin and it must be produced and/or processed locally [10,11]. This definition emphasizes the existence of a close qualitative link between the product and its place of origin, recognizing it as a piece of heritage in the territory where it is produced.

The 1994 adoption of the Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS) included a special section on GIs, defined as " ... those that identify a product as originating of the territory of a Member [of the World Trade Organization (WTO)] or of a region or locality of that territory, when a certain quality, reputation, or other characteristic of the product is fundamentally attributable to its geographical origin ... " [11]. Likewise, these agreements set out WTO members' general obligation to protect GIs against misleading uses and acts of unfair competition.

At this point, [12] discuss when a GI is justified and when the authorities are over-protecting this goods. They identified GI increasing relevance in Europe as the answer of three worldwide discussions: international trade, intellectual property and agricultural policy. However, instead of reducing consumer confusion, GI can increase it, because they are boosted by political interests, rather than philosophical ones.

The significance of a GI is found in different elements, including as follows [13,14]:

(a) The unique organoleptic properties found in the territory (terroir) and its traditional production and processing methods, which may be difficult or impossible to reproduce in other regions or countries, thus providing a valuable and lasting competitive advantage.
(b) The institutional structures or agreements inherent in many GIs with their capacity to enhance competitiveness when they can improve collective action and reduce transaction costs along the value chain.
(c) The supply of enough information to reduce asymmetry between producers and consumers, creating a public benefit through improved market transparency and reduced information costs.
(d) The construction of conceptual frameworks to promote an integrated and multi-functional model for rural development that is capable of promoting economic and social interests, as well as local values such as environmental management, culture and tradition.

This last point (d) indicates that a GI can generate positive effects in the economic, social and environmental spheres. In the economic sense, the product's volume and added value increase, and there is more equitable distribution among participants in the value chain; on the social scene, traditions and cultural heritage are preserved, ties between people and local businesses are strengthened, and employment opportunities for different groups are promoted. The environment benefits from sustainable use of natural resources, protecting them from depletion and boosting preservation of agrobiodiversity [14]. Thus, GIs can generate a virtuous circle linked to positive territorial impacts in the producing areas with the following components [1]:

- Identification: Awareness at the local level and evaluation of productive potential
- Qualification: Establishment of the rules related to the creation of value and the preservation of local resources
- Remuneration through the local system and marketing
- Reproduction of local resources in a way that reinforces sustainability
- Public policy on territorial matters that provides an institutional framework appropriate to the related initiatives, as well as a set of strategies that encourage all phases of the virtuous circle
- Actors that are both local to and outside of the territory (production and marketing, public actors, non-governmental organizations, research and development centers) play a fundamental role throughout. Likewise, the institutional framework (i.e., public policy and regulation) plays an important role in the promotion and regulation of quality linked to geographic schemes. Figure 1 summarizes the virtuous circle:

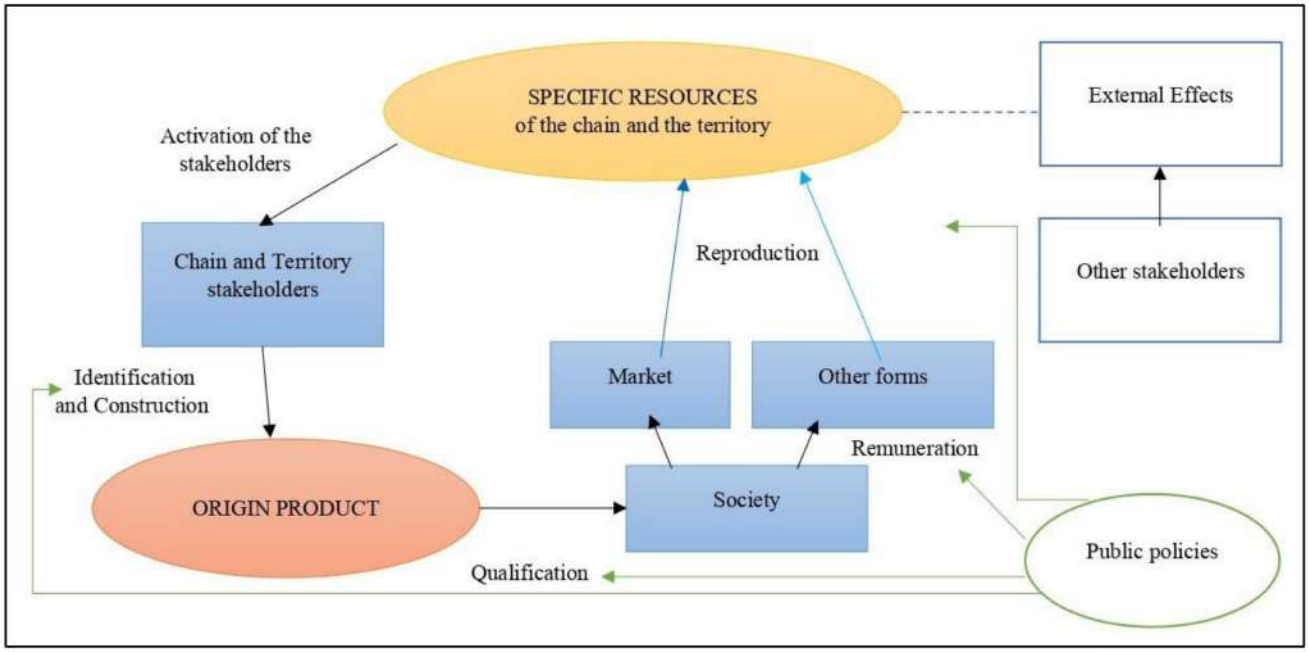

Figure 1. Virtuous circle of product of origin valorization. Source: Authors' elaboration based on [1,14].

According to [1], GIs can lead more broadly to income and quality of life increases for producers; they can also improve rural economy dynamics as a whole by allowing local actors to participate in dynamic productivity and in decision-making related to quality labels, and by driving equitable distribution of benefits among stakeholders. They are necessary as they represent a way to lessen the information asymmetries that characterize the commercial transactions, since it labels a product and build a reputation on it that allows it to differentiate itself in the market [15]. Products with a GI offer a cultural link, economic, social and environmental with the territories where they were produced, because they create a medium that distinguishes from anonymous bulk products and opens the possibility of increased site liability [16].

On the other hand, a GI recognized as a distinctive territorial element can drive innovation because it opens up a path for actors to adapt the product and production practices to consumers' needs. It can also drive cohesion by promoting a unified strategy among relevant actors in the productive chain and territory [17].

It is important to keep in mind that producer groups and governments that decide to establish a GI must consider the costs, some of which are presented in Table 1.

Table 1. Costs of a GI for producer groups and governments. Source: Authors' elaboration based on [13].

Costs
• Establish a national legal structure
• Define exact physical limits
• Establish criteria and norms
• Provide local or national information and education
• Control certification fees
• Marketing and promotion
• Assessment and application for protection abroad
• Investments in infrastructure and production
• Adaptation to standards, methods and specifications
• In a GI cluster, expenses may be incurred when adapting, working collaboratively, and sustaining collective action
• Business or technological limitations
• Increased cost of raw materials
• Monitoring and maintaining protection
• Administrative and bureaucratic costs

The degree to which a GI benefits society depends on various factors, as outlined below [14,18]:

- Organizational structures and strong institutions to maintain, market and monitor the GI. This includes processes associated with virtuous circle identification and appropriate demarcation, organization of practices and existing standards, an adequate protection plan and commercialization of appropriate tools, which always require the creation of local level institutions and management structures that are willing to make a long-term commitment to participatory cooperation methods.
- Equitable sharing between producers and companies in the GI's protected region. Equity is achieved when local stakeholders who benefit from the GI not only share the costs and benefits, but also control and decision-making over their public goods.
- Solvent commercial partners may commit to promoting and marketing the GI in the long-term. Many commercial successes with GIs are the result of consistent, long-term marketing and promotion efforts by creditworthy business partners.
- Effective legal protection including a strong national protection system for the GI. Carefully chosen protection options will ensure effective monitoring and enforcement in the relevant markets to reduce the chances of fraud threatening its reputation and even its legal validity.

In 2009, there were some 10,300 GIs worldwide, of which 86% are in the Organization for Economic Co-operation and Development (OECD) industrialized countries and 14% in developing countries. [14].

In the case of Latin America, interest in registering assets with GIs mainly started in 2000 and began to grow. By 2013, there were more than 100 products recognized—37 in Brazil, 20 in Colombia, 13 in Mexico, 8 in Peru, 3 in Venezuela, Costa Rica and Argentina, 2 in Chile, Guatemala, Nicaragua and Ecuador, and 1 in El Salvador [18]. This list increases year by year; for example, Mexico had 18 protected goods registered with the DO by mid-2020.

Reference [18] highlights various similarities and divergences among Latin American countries regarding the application of GIs:

In most of them, GIs are used solely as market and intellectual property protection tools.

The introduction of these tools mainly responds to the adaptation of commercial, national and regional regulations to international trade regulations, rather than to the needs of local populations. Their introduction is not subject to a process of debate or appropriation by local actors.

Significant discrepancies exist when it comes to the definition of quality seals (quality seals refer to the printing of a logo on packaging that indicates the accreditation of a certification, in this case, compliance with the quality standards set by the GI) the type of product to be protected, the names to be used, the names that cannot be registered, the information to be submitted in applications for recognition, the people who can request recognition (private or public actors, individuals or organizations), who owns the GI, promotes it and manages the level of protection and support for each new quality seal project.

3. Value Chains for Boosting GIs

The value chains methodology allows the analysis of the chain through each of its components and the relationships between the agents that comprise it. Analysis of DOs with the VC methodology includes four dimensions [9,19]: the institutional framework, input-output, geographic scale and governance. Given their evolution and contributions, GVCs can be analyzed from three approaches: governance as driving, governance as coordination and governance as normalization. These approaches are complementary rather than mutually exclusive. The analysis proper to this article uses the first approach, governance as driving [9,19]. The first three are taken from the first Gereffi study and the institutional framework from the 2005 version. The approach is made from the conception of governance as a domain, which is why a complete vision of the chain is analyzed and the relationships through each of their links are analyzed. That is why this approach is called Value Chains (VC) and not Global Value Chains (GVC), because the approach is not taken from a business microeconomic vision, although they do have a scope outside the territory.

The study of the DOT and the DOM focuses on governance and the institutional framework because they are the two key dimensions to explain the dynamics of power and the way in which the chains of tequila and mezcal are organized, as well as the scale of production.

Institutional framework is the set of organizations or institutions, public and private, that exist to regulate, support or rule production chains. Governance refers to the authority and power relations that determine how financial, material and human resources are placed in the flows within the chain [9].

Value Chains (VCs) is a methodology for analyzing the total variety of activities required to bring a product from conception to delivery, including various intermediate production phases or chains that involve transformation of inputs and services [9]. Currently, VCs are widely used within socioeconomic and international analysis; for example, the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), the World Trade Organization (WTO), the International Monetary Fund (IMF), the Organization for Economic Cooperation and Development (OECD) and the World Bank all have research programs that use VCs [20].

VCs, as proposed by [9] (page 2), are understood as "a set of networks organized among themselves, grouped around a product, connecting family units, companies and States within the global economy." [21] note that the study of VCs started from convention theory and that of ideal worlds. In this approach, chains are characterized through definition of product quality in terms of prices, trust between the parties, the set of parameters measured by third parties, collective commitment and the evaluator's reputation. It should be noted that VCs do not just represent organism-state relationships, but can also

be adapted to a more socially complex body that includes diverse actors and organizations, such as non-governmental organizations, families, producers, etc. [22].

VC analysis underscores chains' structure, actors and dynamics. On the one hand, this involves organizational structure, division of labor along the chain, the distribution of added value and the role of standards in facilitating or hindering participation of the various actors. On the other hand, that of actors, the types, locations, links, and inclusion and exclusion dynamics are considered [23,24].

VCs allow for the analysis of goods with designation of origin using Gereffi's approach, thus studying the relationships that exist between the actors that participate in the chain [25]. First of all, producers engage in joint activities, including purchase, sale and common use of infrastructure, in order to reduce costs through organizational mechanisms among the actors. One of those mechanisms includes commitment on the part of actors to the organization to which they belong, which brings the following benefits: (i) facilitating the commercialization of their product, (ii) reducing transaction costs, and (iii) improving efficiency, sharing resources [26]. Second, this includes the relationships established between producers, and their organization with buyers and with the rest of the actors involved in production and marketing processes.

In addition, a DO product's commercialization chain includes interactions among actors that go beyond a simple exchange of raw materials or products. The actors have various agreements that oblige them to comply with the quality standards in place to protect the work of the next link in the chain [27]. Goods that aspire to be recognized with a GI or DO label engage in activities or processes that are locally based and often lead to the regional or international level. In order to participate in international trade, they must interact with several actors, including public actors and institutions that intervene through policies and programs within a context of sustainable development [28,29].

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However, VC methodology contains one obvious weakness given its lack of an explicit perspective on space or territory. The author of [20] explains this perspective as "the specific way in which territories are integrated into these chains and the specific form of systematic competitiveness that they achieve," which he calls territorial endogeneity. In this sense, territories are the first unit of socioeconomic analysis due to their potential for collective efficiency, that is, the segments of chains to which they are integrated from a local perspective [30,31].

Given the weaknesses of the theoretical methodological framework of value chains, the analysis is complemented by two other approaches that include the territory and the biocultural and social forms in which tequila and mezcal are produced. The first is the virtuous circle and the second is the short chain approach.

The link between the logical framework of value chains and geographical indications is established through the virtuous circle, which, unlike VCs, is based on the importance of the territory and the biocultural context.

One of the most important elements in the virtuous circle model presented in Figure 1 relates to the remuneration and reproduction processes, which include choosing marketing channels, strategies for the generation and distribution of the value obtained from product sales, as well as the relationships between actors that participate in the different marketing chains (short and long). Given all of this, we will now orient discussion towards the alternatives available to these commercial processes and present an analytical exercise on each's benefits and costs.

Even historically, some GIs were created due to problems in international trade Food making unpostponable protection due to illegal production and trade, some others, such as those studied in the paper, emerged in short chains, achieving a local and then regional reputation, later reaching global scales.

These short chains, also called short circuits or proximity agrifood systems, are defined as the flows directed to local and regional markets; they are principally identified by their origin and small scale based on direct selling, making the territorial appropriation of benefits possible based on spatial concentration of functions or local management of superior quality assets [32]. On the other hand, [33] point out that proximity agrifood systems include street markets, local markets, community baskets and traditional points of sale.

In recent years, a group of researchers has highlighted the importance of the construction of short chains as a strategy for rural, local and territorial development based on consumer demand for local food items that are traditional, healthy, organic, fresh and seasonal [33]. Relevant work on this topic can be found in [4–8] among others. Therefore, these chains can promote production and consumption alternatives in the face of hegemonic proposals through direct forms of monetary and non-monetary exchanges that go beyond the exchange of merchandise [34]. These chains deliver and sustain economic surpluses in towns, thus contributing to sustainability and food self-sufficiency [32].

Some of the economic benefits associated with this form of commercialization include productive diversification in local spaces, control over pricing systems of the goods produced and the development of entrepreneurial skills [35]. They have also been shown to produce greater multiplier effects in local economies, as well as higher levels of employment [36].

Associated environmental benefits include lower pollutant emissions, accidents, and traffic due to shorter journeys, and the adoption of production techniques that are more respectful of both organic and agroecological ecosystems [35]. The latter represent different forms of interaction with ecosystems that do not necessarily respond to a productivist logic of chains that privileges volume over local welfare.

Social benefits include increased local employment, the creation of local markets that strengthen social cohesion through interaction among local actors, and enhanced life opportunities in rural areas [35]. Likewise, short chains are able to connect different sectors of society through relationships based on principles of reciprocity, solidarity and equality [37]. Finally, they contain a range of social innovations that allow for different circulation of goods and relevant information related to production and consumption [38] (A recent study measured sustainability indicators in 486 short and long chains in 7 European and Asian countries and found that the economic benefits of short chains are higher for producers. In environmental terms, however, long chains are more efficient when it comes to measurements by unit of commercialized volume, although results around social aspects vary widely [39]).

Although short chains are understood in a variety of ways–the geographical distance the goods travel, the number of intermediaries between producers and consumers, the level of social capital built between these same actors [5,36–38,40]–the best-known cases involve geographical proximity. Given that GI goods are part of marketing chains on a global scale, with regional, national and international demand, short chains here are most appropriately related to the social capital definition and then to middleman reduction.

Reference [41] point out the advantages of long marketing chains in terms of incorporation into dynamic sectors, technology transfer, and international and domestic direct investment. It should be noted that long chains are associated with the process of economic globalization and the internationalization of companies, seeking international diversification of work. In addition, these chains are linked to the concepts of foreign investment, productivity, efficiency, specialization, economies of scale and scope, economic spillovers, innovation, upgrading, among others.

However, these chains have disadvantages, including the fact that their main accumulation spaces favor certain leading companies [42], the market system in which they are embedded dissolves ties of dependency among members of a community, and the promotion of individualism [43]. In addition, they are criticized for labor and social exclusion, and environmental degradation [44]. Supporters of short chains make efforts to build and strengthen them in order to empower local producers since they see long chains as having failed to achieve predicted development results.

4. Materials and Methods

The present work was carried out following the methodology of Value Chains in a mixed research: A quantitative component consists of an analysis of descriptive statistical data and geographic information systems with Excel and ArcGis. The sources of information are official databases of the National Institute of Statistics and Geography (INEGI), the Agrifood and Fisheries Information Service (SIAP), the National Statistical Directory of Economic Units (DENUE), the Tequila Regulatory Council (CRT), the Mezcal Regulatory Council (CRM), the Internet Tariff Information System (SIAVI) and the United Nations Development Program (UNDP).

The qualitative component that follows is made up of various data production procedures. First, an exploratory field visit was made to six municipalities in the state of Oaxaca in February 2015, among which the City of Oaxaca de Juárez stands out for being the capital of the state and concentrating government and private institutions related with mezcal. Additionally, the municipality of Santiago Matatlán was visited, a famous place for the production of mezcal and that closes the Caminos del Mezcal Tourist Route with a flourish, and San Lorenzo Albarradas for its petrified waterfalls, one of the most important tourist attractions in the center of Oaxaca.

With this visit, three in-depth interviews were obtained under the snowball technique with their transcription, audio and an official document, the "Maguey Mezcal Product System Master Plan", the actors were included according to their participation in the chain and their relationship with other actors, including a mezcal producer and two civil associations, the Mezcal Regulatory Council and the Maguey Mezcal Product System. A price measurement was also carried out with the visit to ten commercial establishments and five palenques where the process of making mezcal was known, all with written notes and audiovisual data in photographs. Finally, two government institutions were visited, where only audiovisual data on programs related to the maguey were obtained.

Secondly, there are written sources obtained from historical archives of the Mexican Institute of Intellectual Property obtained in May 2015, Official Declarations and Official Mexican Standards published in the Official Gazette of the Federation, and press archives.

5. Results and Discussion of Mexican Designations of Origin and Marketing Chains

The Mexican experience with DOs has not lacked controversy. When it comes to Tequila, for example, the economic side has been exemplary, however, questions about territorial impacts in agave territories are worrying. Mezcal has followed a similar path in the last 15 years, although that path has become more complex given the experience of its predecessor.

In terms of volume, the Tequila and Mezcal trade has grown at a dizzying rate (starting in 1995 and 2010 respectively) and can be described as a resounding commercial success. However, organization of their chains leaves important questions open, especially regarding the possibility of bringing down related commercialization chains. For this reason, an analysis of both distillates will be carried out from the VC approach, discussing their main characteristics.

5.1. Institutional Framework

Analysis of these chains begins with examining the institutional framework's evolution to better understand the regulatory framework that governs geographical indications and designations of origin in Mexico, which has undergone significant transformation since the first designation's approval.

When Designation of Origin Tequila (DOT) was approved in 1974, its administration corresponded to the Ministry of Industry and Commerce (SIC) through the General Directorate of Industrial Property, which was protected by the Industrial Property Law of 1942 as published in the Official Gazette of the Federation (DOF by its acronym in Spanish) [45]. It was amended by a decree published in the DOF on January 4, 1973 that created Chapter X to refer to these instruments, defining a designation of origin as " ... the geographical designation of a region or a locality that serves to designate a product originating from it and whose quality or characteristics are exclusively attributable to the geographical environment" (Art. 208-A). Tequila Herradura and the Tequila Industry's Regional Chamber in Guadalajara, Jalisco filed the DOT application [46].

In 1976 DOs were declared assets of the state and the Secretariat's tasks included "Possessing, monitoring, conserving and managing the assets of original property which constitute non-renewable natural resources and public domain for common use ... " and "promoting and organizing the economic production of popular arts, crafts and family industries" (LOAP, Art. 33). A year later, along with this regulatory framework, an amendment to the DOT was published at the request of a Tamaulipas distiller (La Gonzaleña) that was ultimately included. The resolution expanded the designation to eleven municipalities [47–49].

The Regulatory Council of Tequila (CRT) became the first of its kind in 1994 and currently administers the reception, evaluation and authorization of DOs, which, after the 2018 LPI reform, now includes GOs. (The Secretary of Commerce and Industrial Development became the Secretary of the Economy in 2000.) This organism has approved 17 more DOs, including designation of origin Mezcal (DOM).

Many articles question Tequila's results in terms of territorial development, the wide distance between links in the marketing chain, the fact that industrial participants took over the regulatory council's spaces of control, which are now mainly internationally owned [50,51], and the main industrial leaders' appropriation of the historical spaces related to this distillate [52,53]. Tequila has undergone a large number of legal transformations, both in DOT enactment and in the definitions of quality expressed in the corresponding Official Mexican Standard (NOM by its Spanish initials), seeking to best adapt to the markets, as well as to the needs of consumers and distillers. Figure 2 expresses the series of historical transformations that both the DO and the NOM have undergone with both distillates.

Figure 2 shows similarities in the case of Mezcal, whose regulation follows the precedent established by Tequila. Although it has undergone fewer transformations, given that it has less time as a DO, it has faced greater resistance in recent years in light of agaveros and small industrialists' prior (agaveros are the agricultural producers of agave, the plant that represents raw material used for Tequila and Mezcal.), discouraging experiences with Tequila, seeing the latter not as a model, but as a threat to the sustainability of their territories.

Official quality Standard for Tequila DGN R9-1949	1949	Official quality Standard for Mezcal DGN R10-1949
Official quality Standard for Tequila DGN R-9-1964	1964	
Official quality Standard for Tequila DGN R-9-1968	1968	
Official quality Standard for Tequila DGN V-7-1970	1970	
Declaration of protection to the Designation of Origin Tequila 1974	1974	
Official quality Standard for Tequila DGN V-7-1976	1976	
Declaration of protection to the Designation of Origin Tequila 1977	1977	
Official quality Standard for Tequila DGN V-7-1978	1978	
Mexican Official Standard NOM-006-SCFI-1993	1993	Official quality Standard for Mezcal NMX-V-8-1993-SCFI
Creation of the Tequila Regulatory Council		
Mexican Official Standard NOM-006-SCFI-1994	1994	Declaration of protection to the Designation of Origin Mezcal 1994
		Official quality Standard for Mezcal NOM-070-SCFI-1994
	1997	Creation of the Mezcal Regulatory Council (COMERCAM – CRM)
Declaration of protection to the Designation of Origin Tequila 2000	2000	
	2001	Modification to the Declaration of protection of the Designation of Origin Mezcal 2001
	2003	Modification to the Declaration of protection of the Designation of Origin Mezcal 2003
Mexican Official Standard NOM-006-SCFI-2005	2005	
Mexican Official Standard NOM-006-SCFI-2012	2012	Modification to the Declaration of protection of the Designation of Origin Mezcal 2012
	2015	Draft Official Mexican Standard Proy-NOM-199-SCFI-2015
		Modification to the Declaration of protection of the Designation of Origin Mezcal 2015
	2016	Mexican Official Standard NOM-070-SCFI-2016
	2018	Modification to the Declaration of protection of the Designation of Origin Mezcal 2018

Figure 2. Regulatory transformations in Tequila and Mezcal. Source: Authors' elaboration based on the Official Gazette of the Federation [54–56].

In this latest official standard, Mezcal is defined as " . . . a 100% maguey or agave Mexican distilled alcoholic beverage obtained through the distillation of fermented juices with spontaneous or cultivated microorganisms, extracted from mature heads of cooked maguey or agaves, harvested in the territory covered by the Resolution published on November 28, 1994 and subsequent modifications. It is a liquid with an aroma and flavor derived from the species of maguey or agave used in the production process; its qualities are diversified by the type of soil, topography, climate, water, authorized producer, mezcal master, alcoholic graduation, microorganisms, among other factors that define the character and the organoleptic sensations produced by each Mezcal" [57].

This new definition recognizes three distillate categories—Mezcal, Mezcal Artesanal and Mezcal Ancestral—based on the type of equipment (tools and machinery) used in the cooking, grinding, fermentation and distillation processes. Table 2 presents a comparison of each of the categories.

Table 2. Mezcal categories NOM-070-SFCI-2016. Source: Authors' elaboration based on [57].

Category	Characteristics	
	Stages	**Equipment**
Mezcal	Cooking	Pit, masonry or autoclave furnaces
	Grinding	Tahona, Chilean or Egyptian mill, trapiche, harrowing machine, mill train or diffuser
	Fermentation	Wooden containers, masonry sinks or stainless-steel tanks
	Distillation	Alembics, continuous stills or columns of copper or stainless steel
Artisan Mezcal	Cooking	Masonry raised or pit furnaces
	Grinding	Mallet, tahona, Chilean or Egyptian mill, trapiche or harrowing
	Fermentation	Holes in stone, ground or trunks, masonry basins, wooden or clay containers, animal skins; the process includes the fiber of maguey or agave (bagasse)
	Distillation	With direct fire in copper boiler stills or clay pot and clay, wood, copper or stainless steel montera; this process can include the fiber of maguey or agave (bagasse)
Ancestral Mezcal	Cooking	Well furnaces
	Grinding	Mazo, tahona, Chilean or Egyptian mill
	Fermentation	Holes in stone, ground or trunk, masonry sinks, wooden or clay containers, animal leather; this process can include the fiber of maguey or agave (bagasse)
	Distillation	With direct fire in a clay pot and clay or wood hat; this process may include the fiber of maguey or agave (bagasse).

Of note, previous regulation did not categorize Mezcal depending on the type of equipment used in the production process. However, in its current state, this categorization is confusing and does not totally exclude certain elements from one category to another. For example, pit ovens are present in all three categories when one would think they are exclusive to Artisan or Ancestral Mezcal. Industrial-style Mezcal is characterized by using autoclaves.

In addition, this new norm only mentions the "maestro mezcalero" once in the entire document, which reduces the importance of this actor and leaves open the job of producing Mezcal to anyone capable of making the investment. Yet, a maestro mezcalero possesses multigenerational, empirical knowledge about Mezcal production.

It is worth asking whether or not including maximum agave production yields per hectare might be necessary, as well as more specifically indicating the geographical link, exact processing practices and restrictions imposed, as in the case of the Qualified Designation of Origin "Rioja" [58] and many others in Europe. It would also be worth verifying that no unpermitted equipment is used in the elaboration processes that differ among the protected territories; otherwise, exclusion conflicts may arise.

Of the processes indicated above in Table 2, distillates can also be classified into different categories, including white, matured in glass, rested, aged, "abocado con . . . " and "distilled with . . . ". "Abocado con . . . " is defined as Mezcal to which ingredients are directly incorporated to add flavors, such as maguey worm, damiana, lemon, honey, orange, mango, among others. It is important to note that, in the current standard, the term abocado does not refer to adding other sugars for distillation; these ingredients are added to the finished product, and particularly relate to Mezcal's use as a remedy in traditional medicine. For its part, "distilled with" refers to Mezcal that is distilled with ingredients to incorporate flavors, such as turkey or chicken breast, rabbit, mole, plums, among others [56].

The standard highlights several aspects that are a result of pressure from small and medium traditional producers, reflecting the interest in transforming Mezcal from a "poor" man's drink to an "elite" product, thus consolidating it in niche, more expensive markets where consumers look for certified and quality products. First, adding sugars is no longer permitted, which reflects the sector's interest in protecting the drink from adulterations. Second, various qualities have been added to the labeling, taking back up nineteenth-century practice, for example, using the maestro mezcalero's name, which, like Tequila, seeks to differentiate from competitors.

On the packaging and marketing side, the new NOM-070-SFCI-2016 leaves certain things unsaid, for example, in the case of bulk marketing, which is key to the development of asymmetries in both information and profit distribution between links in the Mezcal marketing chain. The word Mezcal is only mentioned to indicate its origin within the log that is provided to the Conformity Assessment Body (OEC in Spanish) and is still allowed on packaging outside of the production region. The OEC is presented as the accredited and approved certification body, verification unit and testing laboratory for evaluating that Mezcal, authorized producers, packers and marketers comply with NOM-070-SFCI-2016 in terms of the Federal Law on Metrology and Standardization.

NOM-070-SFCI-2016 does not specifically name an OEC, leaving open the possibility for different bodies to carry out these tasks. At this time, the most well-known and oldest OEC is the Regulatory Council of Mezcal (CRM), which, in July 2020, received two administrative sanctions from the Ministry of Economy for engaging in monopolistic practices. This agency subcontracts its services with three laboratories to carry out the conformity assessment required by NOM-070-SFCI-1994. The laboratories include Centro de Control Total de las Calidades SA de CV (CENCON) in Mexico City, Laboratory of the Tequila Regulatory Council, AC in Jalisco and the Consultancy and Research in Chemical Sciences Nisa Nabani SC in Oaxaca. These services generate an average cost of MXN 3,156.52 (almost USD 150), (prices established by each laboratory including VAT are as follows: CENCON, MXN 3285.12 (USD 156) (methanol and higher alcohols by chemical method) and MXN 3,009.04 MXN (USD 143) (methanol and higher alcohols by chromatographic method); Laboratory of the Tequila Regulatory Council, AC, MXN 4,672.48 MXN (USD 222); and Consultancy for Research in Chemical Sciences NISA NABANI, SC, MXN 1,650.00 (USD 78).) which mezcal producers, packers and marketers must consider as part of the costs of analysis for each batch, in addition to the fees they must pay to obtain certification (registration, annuity, feasibility opinion, management before the IMPI, issuance of certificate and per diem) [59].

Finally, it is important to mention that, on February 29, 2016, the Ministry of the Economy, companies and institutions within the alcoholic beverages industry and the Regulatory Councils of Tequila (CRT) and Mezcal (CRM) proposed a draft of the Mexican Official Standard, Proy-NOM-199-SCFI-2015 "Bebidas alcohólicas-Denominación, especificaciones, fisicoquímicas, información comercial y métodos de prueba," which was published in the DOF. It recommends using the name Komil for all alcoholic beverages produced outside the DO space that use agave as raw material (with the agave content set at no less than 51% and the added sugar content at no more than 49%, while the alcoholic content is set at between 32% and 55%) [60]. This draft was criticized from different positions, based mainly on discriminatory treatment of small artisan producers, which caused several political and social figures to request its cancellation. At the beginning of 2017, it was still detained.

Regarding territorial expansion of DOM, in 1994, the year in which the declaration was published, a protected territory including 806 municipalities in five Mexican states (Guerrero, Durango, San Luis Potosí, Zacatecas and Oaxaca) was established. The Region of Mezcal is found in Oaxaca with the municipalities Sola de Vega, Miahuatlán, Yautepec, Santiago Matatlán Tlacolula, Ocotlán, Ejutla and Zimatlán.

Since 1994, the protected territory has had nine additions: in 2001, one municipality in Guanajuato, San Felipe; in 2003, eleven municipalities in Tamaulipas; in 2012, twenty-nine

municipalities in Michoacán; in 2015, a municipality in Guanajuato, San Luis de la Paz and 115 municipalities in Puebla; in 2018, fifteen municipalities in the State of Mexico, seven municipalities in Aguascalientes, one more from Puebla and 23 from Morelos. With the modifications to date, the protected territory includes 1009 municipalities in twelve Mexican states, covering 41% of Mexico.

At international level, GI's acceptance is the center of dispute between countries. According to [61], EU's international trade agreements have been signed in a bilateral way, but always including GIs on them, specifically including at least one of the main five countries in the Mediterranean (France, Spain, Italy, Portugal and Greece). In the case of Mexico, Tequila and Mezcal have been recognized since 1997 in a specific and asymmetric treaty for mutual recognition of GI (two Mexican distillates against almost 200 wines and spirits from the EU). Recently, in the 2019, after 7 years of negotiations, Tequila was finally registered as GI in the EU (EUR-Lex-52016XC0714(01)) as a result of a new version of Mexico EU Global Agreement with mutual recognition of GI, signed in 2018.

5.2. The Input–Output Dimension

The input–output dimension is similar in both cases because Tequila is a distillate of blue agave and Mezcal is most often a distillate of espadín. This does not rule out that, in certain regions of the country, other agave species have greater presence.

The process of making these distillates begins with cutting the agave. Here, the emblematic figure of the jimador takes center stage; he is responsible for cutting the stalks and leaving only the piña. The *jimador* is a specialist who uses knowledge inherited from his ancestors to take care of agave. He knows exactly the right time to cut for distillation and is then responsible for cutting the agave down to the heart, known as the *piña* (pineapple). Blue agave and espadín are the most used because they mature the fastest (over approximately 6 years) and have better yields. For comparison, some varieties take up to 20 years to mature.

Second, the piñas are fired. Modern processes do so in autoclaves, while the most traditional practices use stone ovens buried in the ground. These methods are different in terms of efficiency, as well as of the flavors that the distillate later presents.

The third process involves grinding, which can also be carried out in various ways, either in very fast industrial presses or in canoes, with hammer blows, which requires enormous physical effort. At an intermediate level, this is done with the help of a pack animal, which drags a wheel on a circular route, grinding the pineapples into bagasse.

It is then time for fermentation, which can take several days, and also develops in different ways depending on the type of process followed: industrial outfits use large stainless-steel tanks, which guarantees faster fermentation. The traditional method uses clay or wooden containers, which can take several days, in addition to requiring greater care. Again, these differences affect the taste of the final product; in the case of clay or wood, the product acquires other sensory properties that are absent from stainless steel.

The next step includes the distillation process, which is traditionally done in copper stills, although more modern methods use columns, which implies a cleaner, more selective process. Several companies even do more than one distillation, which further purifies the distillate by separating the sugars to better classify them. In some cases, up to 3 distillations are done.

While this process provides a beverage ready for consumption, various producers like to age it in barrels for some time, thus producing reposado versions and aged distillates. Aged in wooden barrels, this can take from months to years.

The packaging process is the last link before distribution to consumer markets. As a designation of origin products, they are supposed to be packaged where they are processed. This has become a controversial point in recent years and will be taken up again in the governance section.

This general process has been innovated upon over time to achieve greater efficiency, such as tearing piñas before cooking, filtering after distillation, recycling of certain waste products and wastewater, among others. Some of these innovations have been imposed by the civil authority, under pressure from civil society organizations, but they have mainly been implemented to increase productivity in the process.

A graphic representation of this process and the type of markets involved can be found in [62], which shows that agave producers in Tequila are subject to oligopsony or monopolistic competition, depending on their contact with coyotes or with distillers respectively. It can be seen in Figure 3 and does not significantly differ from the Mezcal chain developed by [63]. According to [64], the chain includes 17,500 agaves, 10 organizations and 152 companies, as well as various service providers. On the Mezcal side, as of 2017, there were 2014 maguey farms, 830 distillers, 394 packers and 643 brands [59].

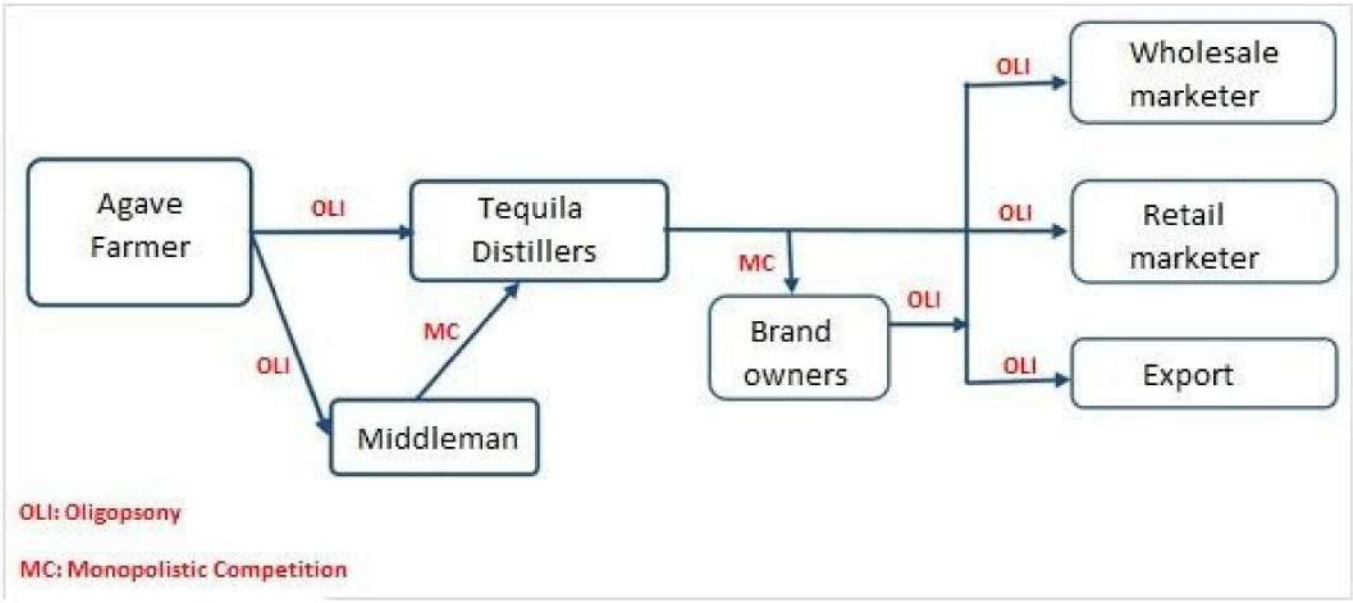


Figure 3. The Tequila chain and types of markets. Source: Authors' elaboration based on [62].

Reference [62] himself found that in this mainly oligopsonistic structure, added value is transferred towards the final links in the chain, that is, it impoverishes agricultural producers in favor of marketers. This undoubtedly throws into doubt the role of marketing chains as a development strategy for the territories involved.

This market condition can be seen in a farm-level analysis of price differentials, measured with the Average Rural Price (PMR) that SAGARPA reports through the SIAP for agave in the producing municipalities, combined with an approximation of the average export price reported by the Ministry of Economy's Internet Tariff Information System (SIAVI), which presents data related to Tequila and Mezcal exports by tariff fraction. With these sources, it is possible to estimate a part of the accumulated value in these international chains' domestic links in order to better understand the distribution between the chains' agricultural activity and their industrial and commercial activities. Results are reported in Figure 4.

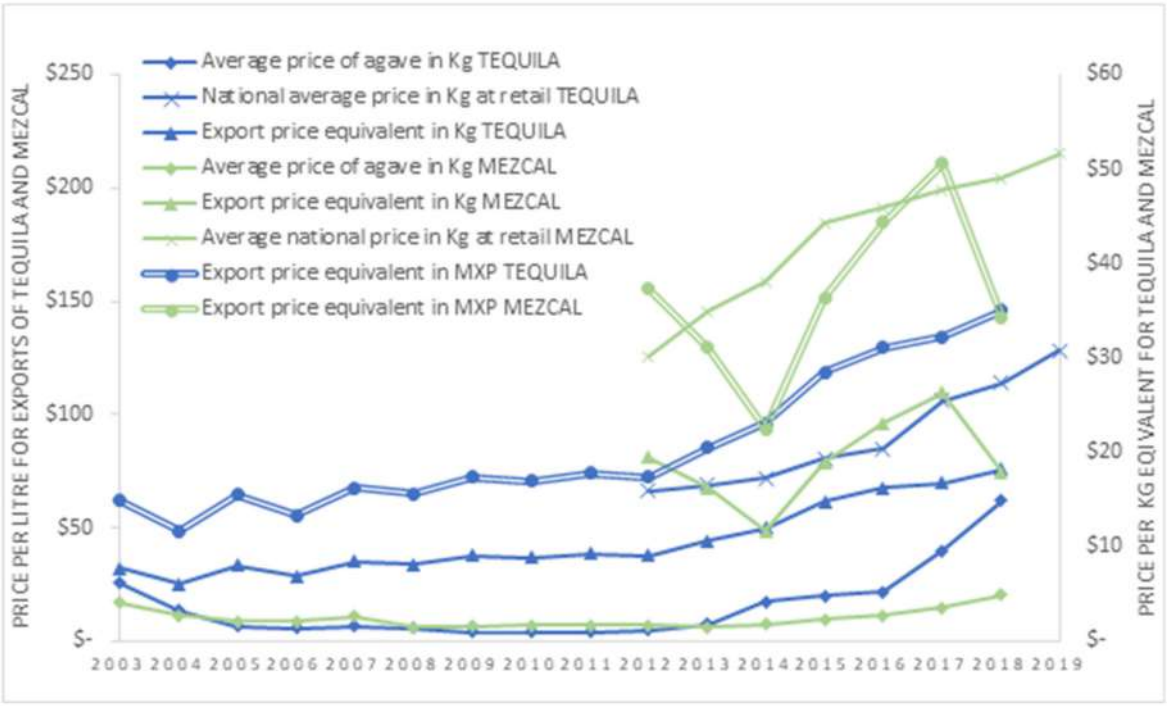


Figure 4. Approximate prices of Tequila and Mezcal by export in Mexican pesos and equivalent kg of agave and Average Rural Price of agave in Tequila and Mezcal municipalities, 2003–2018. Source: Authors' elaboration with data from SIAVI and SIAP.

Figure 4 demonstrates that export prices in pesos for both distillates are high, but when converting them to equivalent prices per kg of agave, the reality is that the differentials are very low compared to the average price for agave in the field. This implies that, in both chains, the generation of value is low in the export destination, which strongly contrasts with their prices in local consumption markets, where profit margins for Mezcal are higher than international and other distillates, although domestic Tequilas are better than foreign ones. This can be seen in both Figure 4 and in Table 3.

Table 3. Current average price (MXN) per bottle, 750 mL, in Mexico in the wholesale channel of distillates from 2012 to 2019.

Distillate	2012	2013	2014	2015	2016	2017	2018	2019
Cognac	$574	$642	$654	$681	$689	$756	$746	$819
Armagnac	$585	$622	$578	$563	$63 2	$848	$774	$844
Mezcal	$241	$279	$304	$354	$367	$382	$392	$413
Port	$284	$302	$323	$315	$338	$359	$395	$399
Whiskey	$285	$283	$281	$270	$305	$307	$278	$302
Geneva	$150	$169	$186	$254	$239	$298	$306	$299
Tequila	$127	$132	$138	$155	$163	$204	$219	$246
Brandy	$135	$136	$136	$134	$152	$152	$143	$146
Vodka	$125	$126	$126	$127	$140	$151	$143	$138
Ron	$107	$108	$108	$108	$118	$132	$130	$131
Schnapps	$25	$25	$25	$26	$27	$27	$27	$28
			Equivalent prices for kg of agave					
Mezcal	$30.13	$34.88	$38.00	$44.25	$45.88	$47.75	$49.00	$51.63
Tequila	$15.88	$16.50	$17.25	$19.38	$20.38	$25.50	$27.38	$30.75

Source: Authors' elaboration with data from [63]. Note: The equivalent prices for kg of agave are calculated based on the amount of raw material used for the elaboration of the distillates, which approximates the costs of inputs in its elaboration.

However, it should also be noted that these distillates have different market shares: While Tequila is consumed domestically by close to 1.2% of the population, Mezcal reaches only 0.06% [54]. Both are classified as spirits, which have a 4% share in the consumption of alcoholic beverages (beer dominates with 94%). In turn, Tequila is estimated to be 30% of total spirit consumption, while Mezcal is 1.5% [54].

5.3. The Geographic Scale

The third dimension of analysis relates to the geographical scale, which also presents interesting and contrasting points. In principle, agave production takes place on large areas of land, which contributes to considerable heterogeneity when it comes to the product obtained from the field. While more than 450 municipalities in 6 states report agricultural activity related to Tequila, in the case of Mezcal, the figure is even higher, exceeding 1000 total municipalities in 12 recognized states. Figure 5 identifies the municipalities in the protected regions where agave is grown for both spirits.

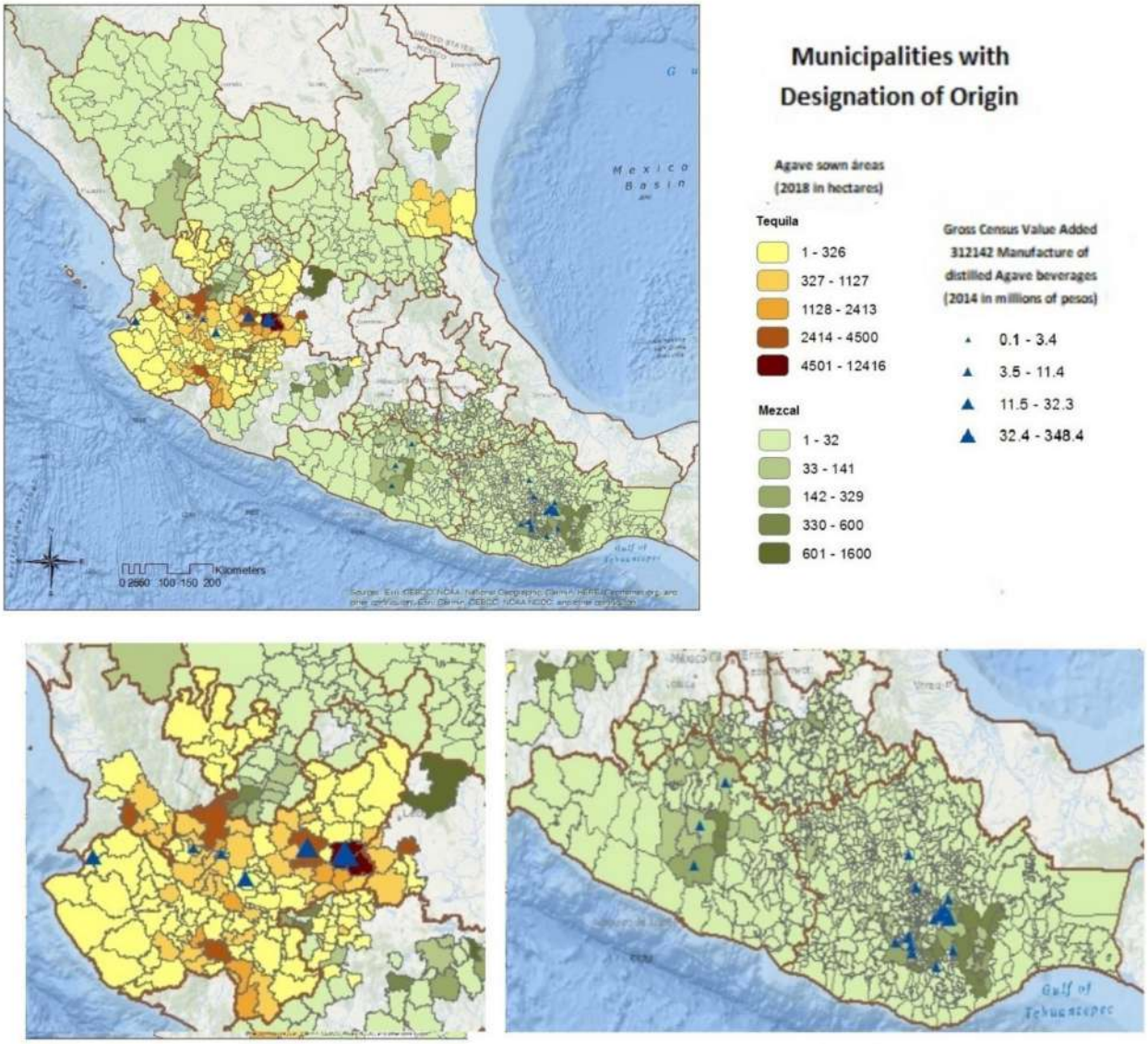


Figure 5. Agave production and industrial distillation in protected regions of DO Tequila and Mezcal. Source: Authors' elaboration with data from the Statistical Yearbook of Agricultural Production, SIAP 2018 and Economic Censuses, INEGI 2014.

However, neither agave production nor industrial distillation processes are equally dispersed in the territory. Rather, as seen in Figure 5, they are concentrated in a set of municipalities oriented to this end. For Tequila, the major producers of agave include Arandas, Jesus María, Tequila and Tepatitlán in Jalisco, San Pedro Lagunillas Nayarit and Romita Guanajuato, while for Mezcal San Felipe in Guanajuato, Queréndaro in Michoacán, and Santiago Matatlán and Tlacolula in Oaxaca stand out. As for industrial distillation activity, Arandas, Tepatitlán de Morelos and San Juanito de Escobedo in Jalisco, and Santiago Matatlán and San Dionisio Ocotepec in Oaxaca are the most important according to added value reporting from the 2014 DENUE.

This analysis also identifies high concentrations of industrial distillation activity, although agave production regions are very extensive, occupying large areas of the national territory. This geographical condition reflects the distillate's disperse added value in large agave areas, but in few industrial locations.

The largest consumption spaces are found in the country's cities, especially Mexico City, as well as in international destinations such as the United States, which is the main consumer of both distillates. As a proportion of total production, Tequila exports reached an average of 72% between 2011 and 2019, while Mezcal was at around 65% in the same period, as seen in Figure 6. This period was chosen based on the availability of information for Mezcal in Banco de México's trade reporting. Previously, Mezcal was not reported separately from Tequila (22089003). Tequila has thus been highly dependent on external markets in the last years, and Mezcal is going in the same direction, although its total exports are much lower than Tequila, which, in 2018, reached 309 million liters, while Mezcal was almost 6 million according to figures from the regulatory councils.

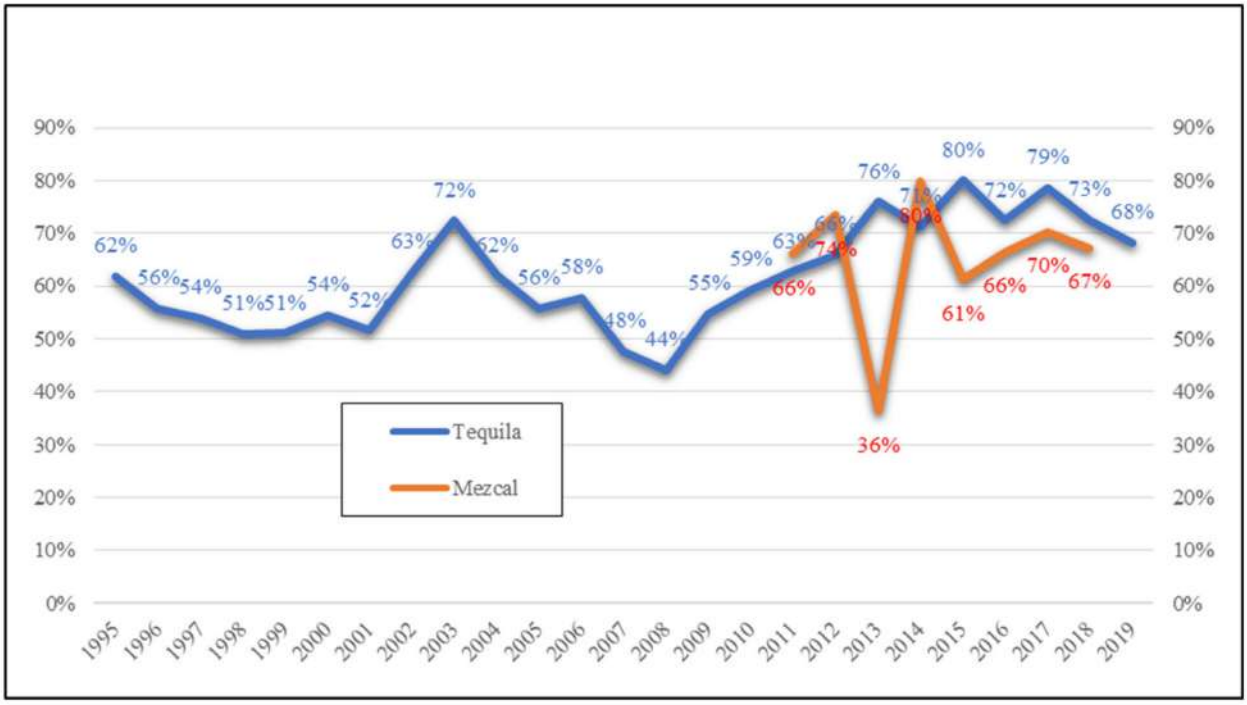


Figure 6. Exports of Tequila and Mezcal as a fraction of total production. Source: [65,66].

5.4. Governance

Originally these distillates had a mainly domestic scope. Starting with its first designation of origin in 1974, Tequila began to orient towards international markets, but the ownership of the industry was domestic. There were short social marketing chains between agents, but not so in terms of distance given that the distillate has been mainly consumed in the United States since the 1980s [67]. For Mezcal, until just 20 years ago, its main consumer

market was local and regional; during the 2000s, everything changed as it succeeded on international markets [68].

However, in the last decade of the twentieth century, the "Tequila boom" prompted changes to the production structure, pointing, according to [67], towards a premiumization of the distillate, which has shifted the industry towards long global marketing chains. In addition, ownership of distilleries and distribution facilities changed hands toward international investors, driving major product innovations to better cater to diverse consumer tastes and to consolidate international markets. The market also underwent a concentration process, leaving a majority of the industry in the hands of four companies, namely Cuervo, Sauza, Herradura and Cazadores. In 2005, these companies represented 65% of market share [51].

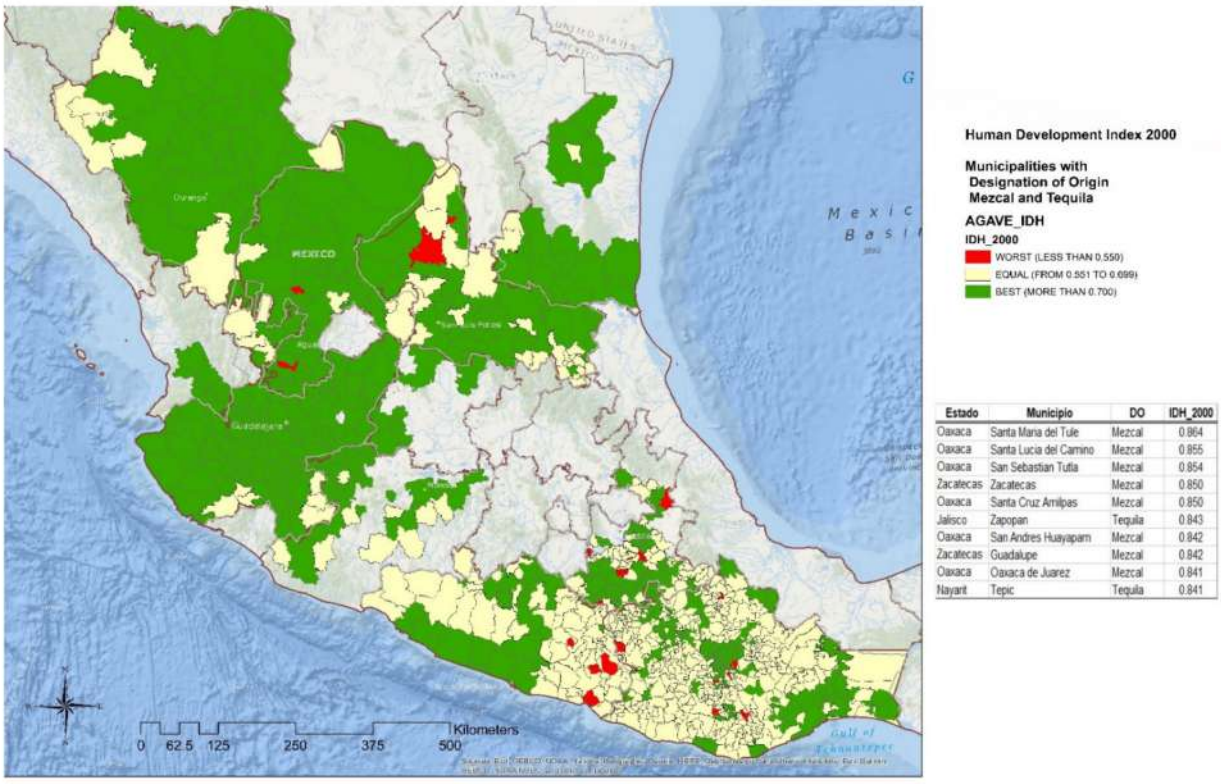
These companies are full of foreign investment from large international consortia that aim to distill and market Tequila. For example, after being a Cuervo partner for several years and responsible for international distribution of its distillates, Diageo owns Tequila De Leon and Don Julio. In addition, in 2017, Diageo acquired the brand founded by George Clooney, Tequila Casamigos.

In parallel, Brown Forman is now owner of Herradura, Jimador and Pepe López; Beam Suntory owns Sauza and Viuda de Romero after purchasing them from Alied Domeq and Pernod Ricard; Tequila Milagro is owned by William Grant and Sons; Olmeca Tequila is owned by Pernod Ricard; Bacardí owns Tequila Patron and Cazadores, among others. In a 2017 statement, the director of the CRT declared that "only" a third of the 1635 registered trademarks belong to foreigners, which is seen as positive because identity, tradition and artisan processes were not totally lost [69]. This is why [67] argues that, with the internationalization of Tequila, the chain went from governance led by industrialists to one led by distributors and marketers.

As [70] discuss, one of the most relevant elements in Tequila history is the way CRT has leaded the quality definition for this distillate, appropriating the heritage of many agave producers and small distillers along the centuries of existence of it, in the way is more convenient for big players in the chain: big distillers and traders. Even, CRT hasn't opposed the internationalization of Tequila brands and it has promoted innovations in the way it is commercialized, in bulk to be bottled outside Mexico and with the legal mixing with other distillates. Bulk exports of distillates have always been criticized by many academics and observers of these sectors, especially because of the poor control of them outside the country. Even when the Mexican Government tried to legislate to avoid it, it failed, and the bulk export was not prohibited [70]. This condition means that a lot of troubles can appear, such as the current claim of CRT against Heineken for Desperado Beer, that is announced to have tequila's flavor and CRT tries to prohibit because it doesn't have a minimum of 25% of the distillate.

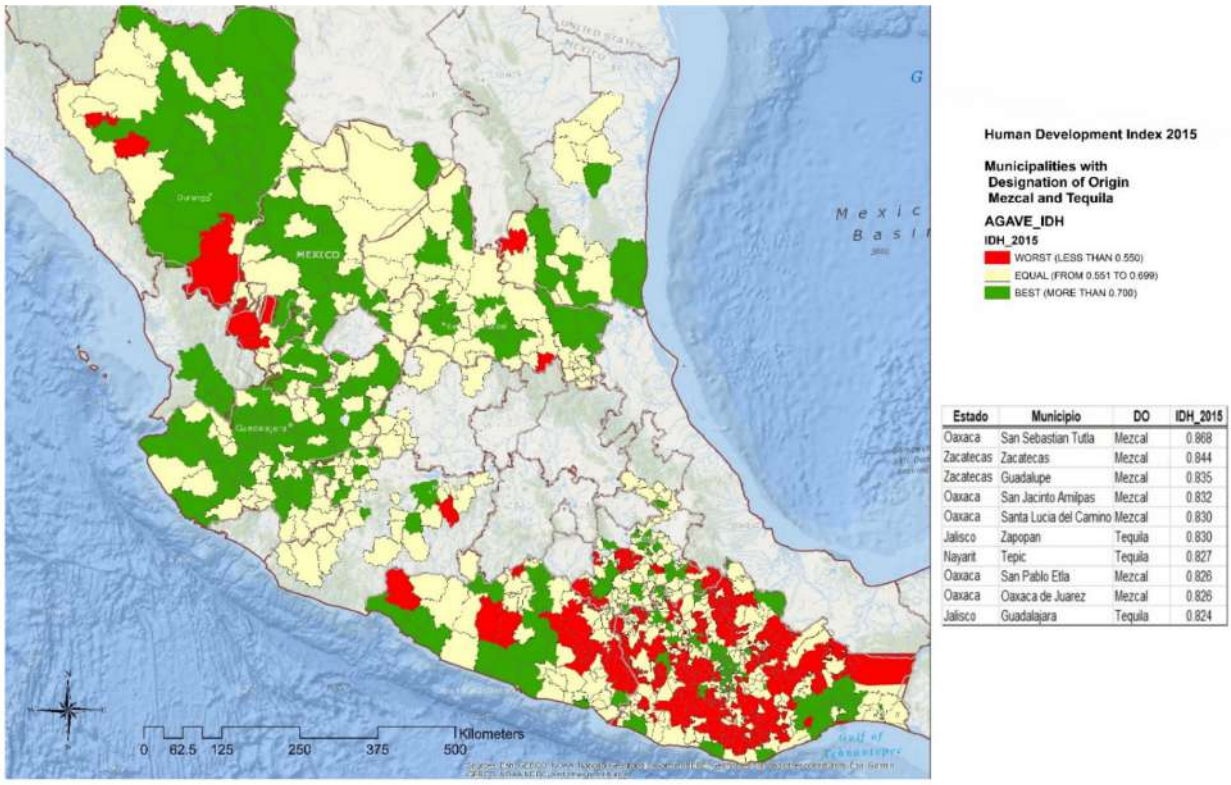
On the Mezcal side, international investments have also been on the rise, for example Diageo is a partner of Mezcal Unión [71] and acquired Mezcal Pierde Almas [72]; Pernod Ricard acquired Mezcal El Maguey and Bacardí partnered with Mezcal Ilegal [73]; Casa Pedro Domeq has a partnership with Casa Guillermo Prieto for the distribution of its brands Zignum, Señorío, El Recuerdo de Oaxaca [74]. Even Tequila Cuervo has entered the mezcal market with the creation of the 400 Conejos brand [75]. Although, until recently, the Mezcal industry lacked big players with oligopolistic power, that is expected to drastically change in the short term with all this recent activity.

In this context, it is pertinent to evaluate if agave territories have themselves improved from the strengthening of commercialization chains, foreign investment and increased volume. Figure 7 explores this question, showing OECD-measured Human Development Index (HDI) changes in the Agave municipalities from 2000 to 2015.



Estado	Municipio	DO	IDH_2000
Oaxaca	Santa Maria del Tule	Mezcal	0.864
Oaxaca	Santa Lucia del Camino	Mezcal	0.855
Oaxaca	San Sebastian Tutla	Mezcal	0.854
Zacatecas	Zacatecas	Mezcal	0.850
Oaxaca	Santa Cruz Amilpas	Mezcal	0.850
Jalisco	Zapopan	Tequila	0.843
Oaxaca	San Andres Huayapam	Mezcal	0.842
Zacatecas	Guadalupe	Mezcal	0.842
Oaxaca	Oaxaca de Juarez	Mezcal	0.841
Nayarit	Tepic	Tequila	0.841

(**a**)



Estado	Municipio	DO	IDH_2015
Oaxaca	San Sebastian Tutla	Mezcal	0.868
Zacatecas	Zacatecas	Mezcal	0.844
Zacatecas	Guadalupe	Mezcal	0.835
Oaxaca	San Jacinto Amilpas	Mezcal	0.832
Oaxaca	Santa Lucia del Camino	Mezcal	0.830
Jalisco	Zapopan	Tequila	0.830
Nayarit	Tepic	Tequila	0.827
Oaxaca	San Pablo Etla	Mezcal	0.826
Oaxaca	Oaxaca de Juarez	Mezcal	0.826
Jalisco	Guadalajara	Tequila	0.824

(**b**)

Figure 7. Human Development Index in municipalities with DO, 2000 (**a**) and 2015 (**b**). Source: Authors' elaboration with data from the Municipal Human Development Report 2010–2015, UNDP.

Even the most representative DO Tequila and DO Mezcal municipalities fail to report relevant Human Development Index (HDI) improvements throughout this 15-year comparison. This challenges the idea that DOs can be a tool for regional development in the places where the goods are produced. Although regional development or its lag may be associated with a variety of causes, in predominantly agave producing municipalities, living conditions should be impacted in the long term, which, in this case, is not clear.

Although both DO can be considered successful in terms of production volume and added value, the benefits they generate are concentrated only in a few agents along the chain. In the case of tequila, the links oriented towards the end of the chain obtain the highest profits. Industries that are located in the DO zone, which process on a large scale and traders who are often foreign packers, mainly from the United States, are the main beneficiaries of the DO. Meanwhile, producers and small and medium-sized industries are subject to the rules dictated by those who control the chains. Being a DO that was promoted by the industrialists, under a top-down process, the importance of the territory of origin and the objective of a GI to function as a promoter of local development has been neglected. This is a controversial issue because the big industry defends that there is an economic spill from the DOT, for example, towards other sectors such as tourism. The town of Tequila has a close relationship with the product, however, for foreign tourism there is only one brand of tequila that identifies it called José Cuervo. This brand has a tourist train that goes from Guadalajara city (where foreign and national tourists arrive) to Tequila town, where they arrive at the brand's factory where they are shown the process, they taste, eat and buy the distillate. There is another profile of tourists who come directly to the town where tours are offered through different factories and tequila shops, but there are very clear differences in scale between large and small industries. Those on a larger scale have the possibility of investing in promotion and diffusion, in addition to being associated with the big international brands, which is why they attract more tourism. The other brands, the local ones, stay out of the consumer's sight and only those tourists who are looking for an experience closer to the territory get to know them. So, there is an economic spillover from the DO to tourism because it also generates sales of food and hospitality, but this does not reach directly and homogeneously towards agave producers or small and local industries.

Another problem that has arisen is that at some point the high demand for tequila and the industry caused the overexploitation of blue agave in the region to the point of scarcity, which resulted in industries looking for the input in other regions such as Oaxaca that it is not part of the DOT and produces mezcal. Which resulted in both products competing for agave. Subsequently, agave production is restored in the tequila zone, but there is still the danger of not respecting the DOT if there is a shortage.

In environmental terms, it is necessary to mention that the blue agave replaces any other agave produced in the tequila zone, neglecting traditions and crops that were also native to the region.

There is another element that distinguishes this product and it is the agave landscape, whose characteristic is the view of blue agave throughout the territory under DO, more especially on the outskirts of Tequila. It has been named a World Heritage Site by UNESCO in 2006, which enhances the qualities of the DO, however, most are large private properties that belong to the same large industries. Multinationals control, either by owning or renting, part of the biocultural heritage.

That is why the DOT still has several contradictions to solve, especially in promoting local development in a more equitable and homogeneous way towards local producers. Likewise, the national small and medium-scale industry has an important challenge, which is to reach the end of the chain, commercialize bottled tequila, an activity that is currently dominated by US foreigners.

In the case of mezcal, the situation is somewhat different since it has not reached a stage of massive industrialization, although it presents other problems. The main one is that the DOM, being controlled by the Regulatory Council, marginalizes and leaves out a large number of mezcal producers. The DO region is heterogeneous and extensive

and therefore there are producers who are not represented within the Regulatory Council that controls entry into the chain. Although everyone produces mezcal, which can be considered a public good in the [1] sense, not everyone benefits from it and, on the contrary, they are excluded for not complying with the rules established by a small group that is the CR.

Mezcal producers that are not certified do not have the possibility of exporting since it can only be marketed only through the Regulatory Council. This is repeated with the commercialization in cities such as Mexico City, where the distilleries sell, for the most part, only what the CR allows. It is worth mentioning that certified producers represent approximately 30% of all producers, so the others are excluded from this chain. The remaining producers sell mezcal in bulk or under another name than "mezcal" and sell it at a lower price than the certificate one.

In the case of mezcal there are long chains, those that have several intermediaries and have a global reach and the entry is controlled by the Regulatory Council. There are also short chains, which have evolved as alternatives and are exceptions. This is the case of elimination of intermediaries, when the producer has managed to scale the chain and be the marketer. In this case, traditional production methods and local knowledge are preserved, but there are very few.

On the other hand, the high demand has had some effects on the territory, among which the environmental, social and cultural ones stand out. In environmental terms, monoculture is widespread, which has caused a greater presence of pests and diseases, as well as the genetic erosion of species and loss of agave biodiversity. Another impact is the deforestation of the soil due to not respecting the native species of the territory. The smuggling of firewood has increased due to the excessive felling of trees. Furthermore, this overproduction requires high water consumption and contamination of water bodies by process residues. The excessive production and overproduction of mezcal is endangering the biocultural heritage of the region.

In social and cultural terms, the festive tradition that gave mezcal as its identity have been lost. At the beginning, mezcal was a symbol of celebration, of collectivity and community in the region and, with overexploitation, it became an object of sale, not of socialization and identity. Mezcal teachers used to share their knowledge about the production process and that is why they are named teachers, but now secrets are beginning to be kept to differentiate their mezcal from others, competition replaces cooperation and community. Another element of fracture is the entry of external actors who come to the territory to produce and commercialize mezcal without getting involved with the tradition and uses and customs of the region. A note that should be taken into account is that the standard of certification to be formally part of the Denomination of Origin is the one that now dictates the production process and by not considering artisanal production, marginalizes it. To be part of their benefits, producers have changed production methods and tools, leaving the old ways behind. This has happened because the norm goes towards an industrial sense of high-volume production, which cannot be fulfilled under an artisanal process.

6. Conclusions

This analysis discussed the experience of the two most important DO distillates in Mexico based on production and trade volume, namely Tequila and Mezcal. The former, which has been around the longest, has functioned on geographically long chains since the 1980s, although it maintained short relationships when distiller ownership was largely national. It was not until the mid-1990s that the chain's structure changed, giving way to international investors with significant space in global markets, thus including Tequila as another part of their spirits portfolios. This has undoubtedly contributed to increased export volumes since the creation of the Tequila Regulatory Council. Today, Tequila marketing chains are global with very specific industrial standards and large

investments in marketing and product innovations that seek to offer more attractive varieties to different palates.

On the Mezcal side, the story is a little different, although it is expected to follow Tequila's path in the coming years. Mezcal began as a DO 20 years after Tequila and has also weathered significant conflict throughout its existence due mainly to inconsistent positions among those who participate in its commercialization chain. Conflict arose in 2018 with extension to the region that the IMPI and reform NOM-051 authorized. It proposed calling all alcoholic beverages that use agave as a raw material, but produce outside the DO space, Komil. These examples highlight the emerging struggles for control over this multimillion-dollar business's concepts, brands and norms.

This analysis identifies that both distillates previously had short chain participation, promoting closeness among producers and consumers and keeping scales small, although this may be changing due to the accelerated growth registered in recent years. These products have aroused the interest of international companies that invest in reputable brands, although recent changes to NOM-070, which recognizes artisanal and ancestral categories, could help reverse this trend.

In the case of Tequila, shifting from short to long chains has brought about deterritorialization, which has stripped away its cultural identity and ability to contribute to rural development. In a study of consumers in several Mexican cities, Tequila is seen as "industrialized," while Mezcal is still seen as "artisanal" [76].

These results also lead to fundamental questions about designations of origin and about their relevance for territorial development, as well as for the preservation of heritage and culture. The experiences studied herein bring that relevance into question. It is clear that Mezcal is following the trail that Tequila previously blazed in the economic sphere. Public institutions exist to establish order in the sector, support its development path and guide it towards more equitable benefit for all those who participate in its relevant chains.

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