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Abstract[*]

The value of yerba mate *(Ilex paraguariensis)* exports from Paraguay has recently increased dramatically. Much of this growth is due to positioning of the good within the universe of products where consumption growth is driven by perceptions of sustainable production and health benefits to consumers—that is, credence attributes creating a new dimension of demand. Credence claims for yerba mate—benefits to indigenous producing communities, environmental sustainability under certain production processes, healthful alternatives to energy drinks—are now widely known, but the growth of this awareness came via a new entrepreneurial strategy of a single firm. This case study explores the determinants of growth of credence-based exports of yerba mate from Paraguay, potential for increased growth, and the fragility of the credence-based model.

JEL classifications: H41, L21, L26
Keywords: Agroindustry, Exports, Credence attributes

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1. Introduction

Yerba mate *(Ilex paraguariensis)* is produced in Brazil, Argentina and Paraguay in the remnants of the South American Atlantic Forest. Its leaves were dried and used as a drink by native Americans prior to arrival of the Spanish. Commercial production began on a large scale in the 18th century in Argentina, and it is now widely consumed as a tea in the three countries and Uruguay (Zelada et al., 2016), with expanding markets world-wide. In Argentina, Brazil, Paraguay and Uruguay, mate is an integral part of the diets and cultures. Mate gourds are passed among visitors who drink from the same metal straw (*bombilla*); the act of sharing the drink is an important means of nurturing fellowship. Yerba mate has recently undergone increased exports to North America and Europe where it is marketed as a more healthful stimulant drink compared to coffee and tea (Folch, 2010).

Since at least the 1990s, an additional source of yerba mate value began to emerge in global markets--the notion that yerba mate production could benefit small-scale producers of the raw material and workers on yerba mate farms/plantations. Despite the cultural importance of its consumption, mate production had been characterized as being environmentally damaging (clearing of native forests for plantations) and having oppressive labor practices and oligopolistic market manipulation by plantation producers (Smith, 2014).[1] While originally mate was harvested as a wild product from native forests by indigenous Americans, it was converted into a monoculture plantation crop following the arrival of the Jesuits to the region. Jesuit-organized yerba mate plantations employed indigenous workers in their *misión* system; outside the missions, indigenous workers were employed in *encomiendas* as harvesters, curers and transporters of wild-grown yerba mate (Service, 1951). In the 1990s, fair trade mate networks exports began to emerge out of Misiones, Argentina, at the center of regional production. These networks were formed partly in response to reports of poor conditions for workers and small-scale participants in what has been described as an oligopolistic mate sector (Smith, 2014).

Yerba mate has been exported in relatively small amounts from Paraguay to consumers in South and North America, Europe and the Middle East (where it is consumed by the Druze). However, yerba mate exports from Paraguay have increased substantially since the 1990s. Growth

[1] In Argentina, four companies control about 80 percent of the domestic yerba mate market (Ballvé, 2007).

in demand stems from increased ability to exploit "credence attributes"[2] or consumer perceptions of certain properties of the product. Global food systems have gradually shifted away from a tight focus on price and quality toward other attributes; demand dimensionality is growing. Increased market valuation of credence attributes, including food safety, interest in organic production, carbon-neutral and carbon-sequestering production processes, fair trade, and environmental and social sustainability has opened opportunities to developing-country producers and firms. In the context of mate, three basic credence attributes are relevant—i) potential for environmentally friendly production, ii) ability to leverage social benefits among producers of the plants, and iii) healthful attributes—yerba mate is now being promoted as a "superfood." The first two attributes relate to production processes and claims about these are expensive for consumers to verify. The third attribute relates to the product itself, and the costs of verifying credence claims are lower (Dudlleck et al., 2011).

With growing demand for the credence attributes of products, enterprises that claim and defend niches within the ever-increasing multidimensionality of global demand encounter opportunities to prosper. However, opportunities to harvest value from credence attributes come at a cost—unlike price and taste, which are easily verified by the end consumer, claims of credence attributes related to production processes must be independently verified to ensure their validity (Feddersen and Gilligan, 2001).

Successful exploitation of credence attribute products by selling firms requires a tight linkage to the downstream value chain; multidimensional consumer demand creates an invisible link backwards from end users to producers and even their input suppliers. In addition, responsibilities of actors at different intermediate nodes along the value chain are altered under this multidimensionality. Organic, shade-grown, fair trade, Rainfall Alliance, B-Corp and other certifications that verify credence attributes imply additional obligations whereby intermediaries are responsible for confirming conditions associated with claims made to final consumers. The costs of such verification/confirmation are being lowered by big data technologies and innovations such as blockchain; costs can also be lowered by shortening the value chain via direct-to-consumer marketing.

[2] Credence goods are goods where the consumer does not have complete information about the quality of the good she consumes. Dulleck et al. (2011) distinguish between two strands of literature about credence goods. We follow the second strand which holds that credence goods have qualities that are expensive to verify even after they are consumed. The market is characterized by asymmetric information between the seller and buyer.

This paper begins by providing an overview of trends associated with yerba mate production and export and an overview of the industry in Paraguay. Yerba mate has been exported in bulk from Paraguay for more than two centuries, and we next describe the process by which it evolved from a bulk export into a niche product with important credence attributes. This evolution resulted from actions of a small group of entrepreneurs with the vision of promoting mate consumption as a means of achieving social and environmental goals. The paper highlights the role of the leading firm, Guayakí, and the steps it took to establish credence in the US market. We then turn to spillovers of this effort to other actors who further developed the market. It identifies the role of institutional players and public sector support for promoting credence-based growth in the yerba mate export sector.

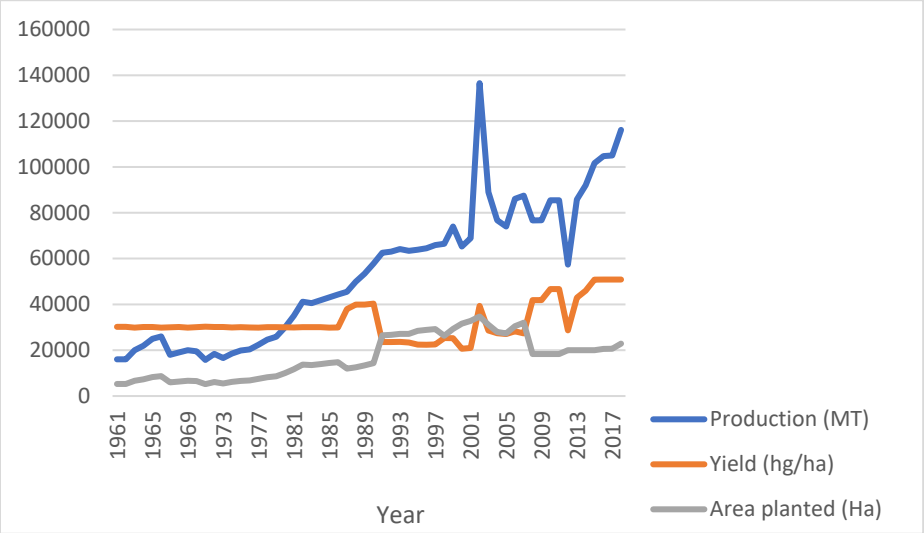
2. Yerba Mate in Paraguay: Production and Export

Yerba mate is currently produced on about 23,000 hectares in Paraguay (Figure 1). More than 80 percent of this takes place in Itapúa, Guairá, Alto Paraná and Canindeyú Departments. Yerba mate yield showed no growth prior to 1987, and it has fluctuated around a modest upward trend since 2001. Various diagnoses point to yield as a barrier to growth in exports (Barceló and Báez, 2011), but yield has gradually increased, partly as a result of new land coming into production. Total production increased about six-fold between the late 1970s to current times, with much of the growth coming from increases in yields rather than area planted.

While yerba mate has been a traditional export of Paraguay since the nineteenth century,[3] it has only recently shifted from being exported as a bulk commodity to a specialized one whose price depends on processing and branding. Since 2005, export volumes have increased more than three-fold while the real export values have increased almost six-fold (Figure 2). In 2005, main export markets were North America and other countries in South America, followed by Europe, particularly Spain, Germany and France (Figure 3). The higher value share of exports to North America suggests that exports to North America involved higher-value products; while volume of exports to North America were about one-half of total export volumes, North America's value share to was nearly three-fourths of the total.

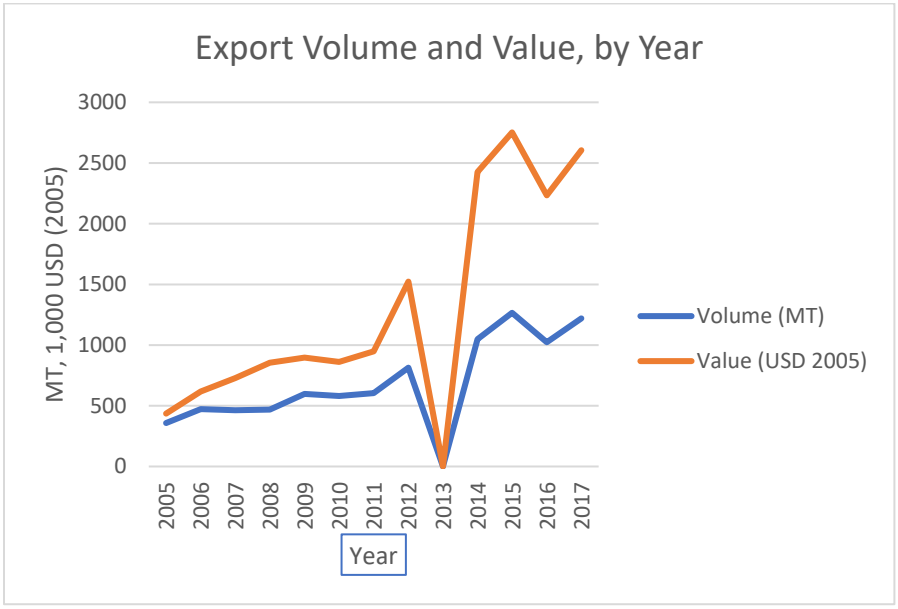
[3] The first known example of export of yerba to Europe occurred in the early seventeenth century, at about the same time that tea and coffee were introduced to the continent (Folch, 2010).

Figure 1. Area Harvested, Yield and Total Production of Yerba Mate in Paraguay, Various Years



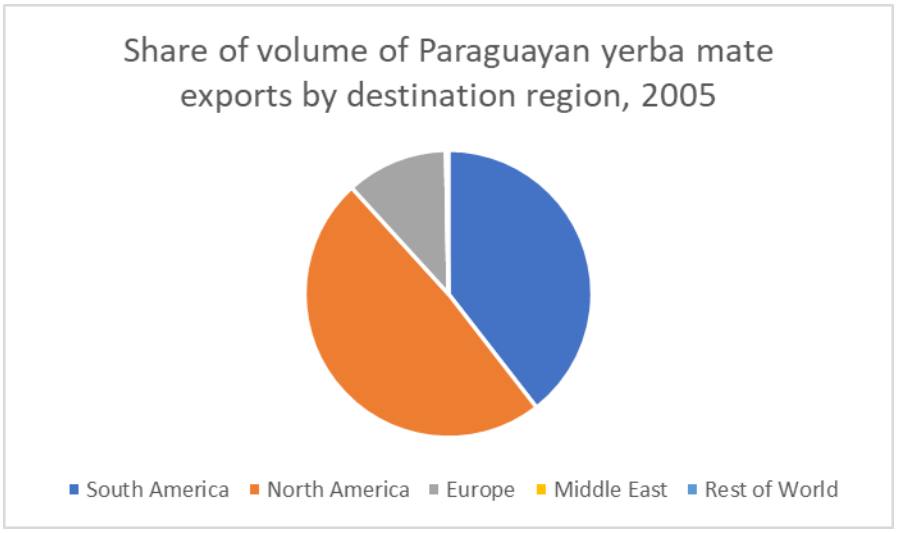
Source: FAOSTAT
Note: The 2002 and 2012 production years seem to be an anomaly. Area harvested remained at similar levels to prior year, but production jumped from 69,000 to 137,000 MT from 2001 to 2002 and back down to 89,000 MT in 2003. In 2012, production fell by more than 30 percent from its 2011 level. Experts were unable to point to reasons for the outliers.

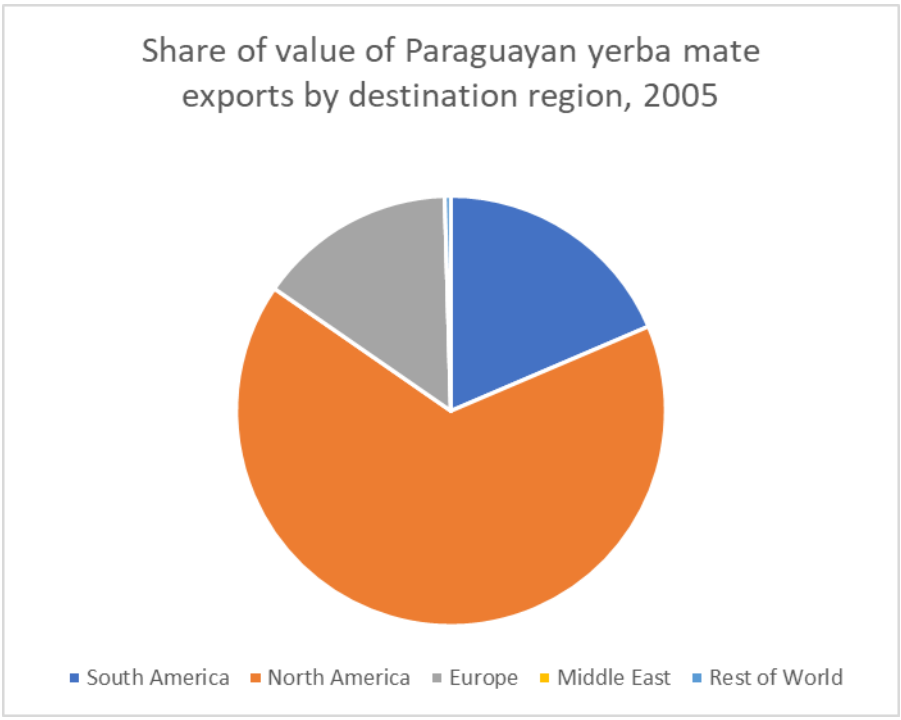
Figure 2. Export Volume and Value of Yerba Mate, Paraguay, Multiple Years



Source: FAOSTAT.

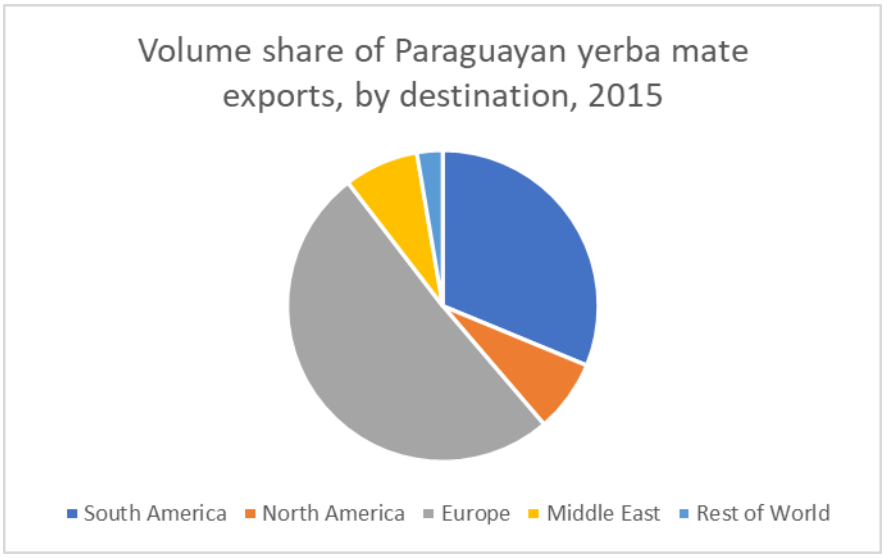
Figure 3. Value and Volume of Yerba Mate Exports from Paraguay by Receiving Country, 2005

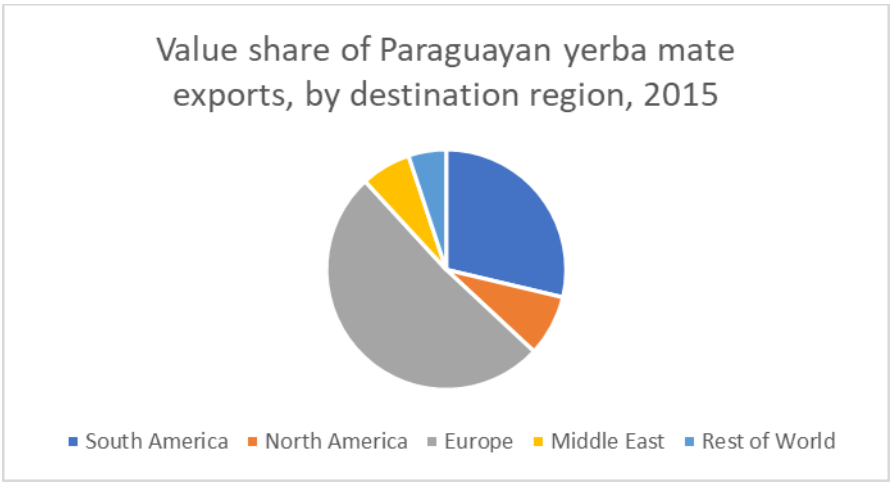




Source: FAOSTAT.

Figure 4. Value and Volume of Yerba Mate Exports from Paraguay by Receiving Country, 2015





Source: FAOSTAT.

The set of destination countries of yerba mate exports from Paraguay has been quite fluid since the start of the millennium (compare Figures 3 and 4). In 2005, outside of North America, South America and Europe, few global markets were served by Paraguayan exports. By 2015, about 15 percent of the value of Paraguayan yerba mate exports went to the middle east and the rest of the world. The European market has also grown dramatically, and many European companies are now engaged in import of dried and its processing into different forms.

Part of the increased export value is due to growth in exports of more elaborated projects. The company Guayakí US was formed in 1996 and began selling highly refined and processed yerba mate derivatives; since then, several competing brands have emerged as a part of the "clean energy drink" market (see Section 3.3, below). Global markets of these energy drinks include the US and North America, Europe, and parts of the middle east.

2.1 Production Processes

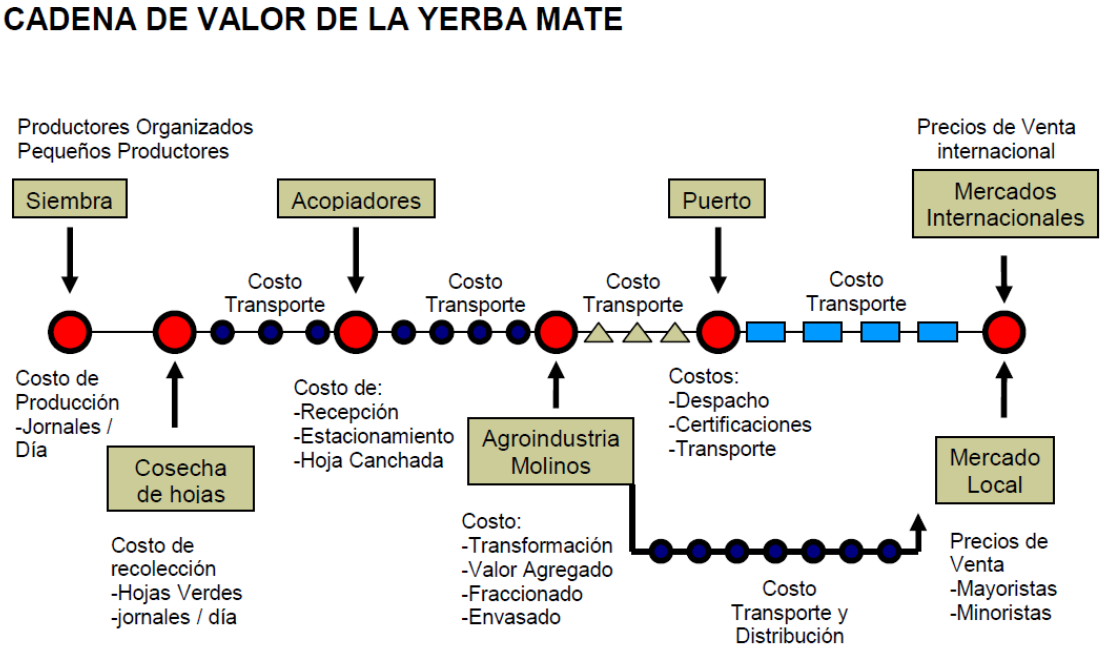
Ilex paraguariensis, a perennial bush, requires at least four years of growth from initial seeding before the first harvest of leaves and tender branches. Once established, a bush may be trimmed (harvested) every two to four years. Young plantings may yield one or two kilograms of yerba, but after several decades a plant may produce up to one hundred kilograms per harvest. Harvest in Paraguay occurs between April and October, a time of intensive labor use. During the remainder of the year, labor needs are minimal. It is estimated that total labor use in production and harvest is approximately 16 person-days per hectare, with about half of the total labor occurring during harvest (Zelada and González, 2019).

Good management of the yerba plantation requires adequate fertilization, pruning, weed control and pest and disease management. Chemical controls of psyllids, aphids and other insect pests are recommended in production manuals, but biological controls using *Baculovirus perigonia* and *Bacillus thuringiensis* have been shown to be effective organic alternatives (Zelada and González, 2019).

Within 24 hours of harvest, the newly cut yerba leaf is flash dried through direct heat at 400-450 degrees centigrade in the step called *sapecado*. Within 24 hours of the sapecado, the product is toasted using indirect heat (called *secado*), traditionally in a specialized oven called the *barbacuá*. As of 2018, there were some 68 (up from 17 in 2005) commercial dryers in the country; some of these rent their services to individual producers, while others are dedicated to single enterprises (Penner, Feliciángeli and Arias, 2006). The yerba is finally coarsely ground (*canchada* or *mborobiré*). Yerba *canchada* may be consumed as is, but frequently it is aged for at least six months before being more finely ground (Rodríguez, 2016). In fact, the most distinctive flavors

present themselves after a period of aging of between 6 and 24 months. This process, known as *estacionamiento*, is the most critical for obtaining good quality yerba.[4]

Figure 5. The Domestic Yerba Mate Value Chain in Paraguay



Source: Barceló and Báez (2011).

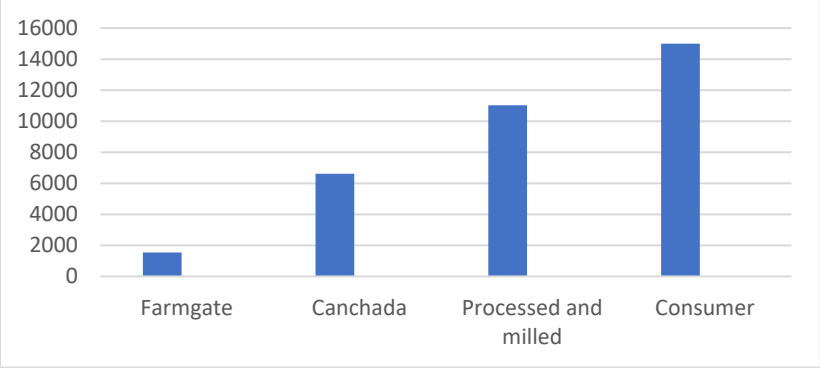
2.2 The Yerba Mate Value Chain

The value chain for yerba mate in Paraguay is relatively simple. Figure 5 presents the actors and their associated costs at different stages of the chain. As with many bulk commodity production processes, the producers receive only a small share of the value of their production (Figure 6). Penner, Feliciángeli and Arias (2006) conducted a relatively comprehensive study of the internal Paraguayan yerba mate value chain and estimated that producers receive, on average about 10.3 percent of the final consumer price. It is difficult to estimate the costs of manufacturing into energy drinks and other concoctions sold internationally, but our interviews along the Paraguayan value chain confirmed this small share of domestic value added.

[4] The website yerbamatelab.com provides information on yerba mate post-harvest processing process and how its different steps contribute to flavor and other attributes. Cut, degree of moisture content and water temperature all affect the attributes of yerba mate drunk in the traditional way.

A recent study of production in Paraguay (2017-2018 production years) shows yerba mate to be profitable under conventional management practices if yields exceed 4,600 kg/hectare (Zelada and González, 2019). For example, in 2018, the quoted producer price for undried leaves delivered to the dryer was GS 1,800 per kilogram or approximately GS 1,600 at the farmgate. The estimated total cost of production per hectare was GS 7,459,000 or roughly USD 1,260 (Zelada and González 2019).

Figure 6. Price Received per Kg along the Generic Yerba Mate Chain (in Guaranies, 2018)



Source: Penner, Feliciángeli and Arias, 2006.
Note: Updated with 2018 prices.

3. Credence Attributes Associated with Yerba Mate

Approximately 20 percent of Paraguayan yerba mate exports are now marketed with a view toward increasing the value-added using production and product-related credence attributes.[5] These markets are characterized by their ability to absorb processed products and provide price premia for certain attributes. The high-value markets have high entry costs necessary to establish perceptions of credence attributes and more compact value chains to lower the cost of certification (Feddersen and Gilligan, 2001). Once the attributes are attached to a good, market entry costs become lower, but the process of certification (to ensure the validity of credence claims) remains critical (Barceló and Báez 2011).

While the yerba mate production sector had historically been dominated by relatively large monoculture plantations with associated environmental consequences, entrepreneurs and environmentalists recognized that shade-grown production, whether between native trees in

[5] All yerba mate exports benefit from health-related credence claims.

existing forests, or as part of an agroforestry-based reforestation scheme, can repair the environmental footprint of the product. The South American Atlantic Forest, where yerba mate grew in the wild prior to arrival of the Spanish, has become a prime focus of conservation efforts in Paraguay as native forest has been decimated by wood harvesting and the expansion of the agricultural frontier. Eastern Paraguay, like its neighbor Brazil, has a unique ecology that gives it a clear comparative advantage in soybean production. Much of the Atlantic forest in the country has been cleared and converted to soybeans due to the recent soybean boom, and the remaining forested areas represent unique habitats of several endangered plant and animal species.[6] In addition, indigenous communities in the region have had their lands partitioned and disrupted by large-scale deforestation and agricultural intensification. Several Paraguayan NGOs (including the *Fundación Moisés Bertoni* and *Guyra Paraguay*) have positioned the Atlantic forest at front and center of their forest conservation efforts. As a part of these efforts, the idea emerged that shade-grown yerba can be an ecologically sound means of creating value in the forest remnants (Cockle, Leonard and Botrati, 2006) and serve as a counterweight to expansion on the extensive margin.

Others realized that, since the forest had already experienced unsustainable deforestation, the only way realistic forest regeneration would occur would be through deliberate efforts to promote reforestation. Since the yerba mate bush takes some six years from planting to full-scale production, an agroforestry system, with shade-grown yerba mate planted between native tree species, would require sustained stewardship by local actors. Local indigenous communities, some of the poorest residents of the region and whose livelihoods and culture are threatened by the relentless expansion of the agricultural frontier, offered some promise as partners in the reforestation effort (Russo and Crooke, 2016). Thus, environmental and social goals were co-joined in the yerba mate-producing areas of Paraguay. Under such conditions, the literature shows that information-supplying activists can influence the actions and perceptions of producers and consumers and lead to increased social welfare in the market (Feddersen and Gilliga,n 2001). Feddersen and Gilligan explain:

> "Activists interact also in networks and loose affiliations to promulgate information that may be important to consumers. Many activist organizations endorse products or certify producers that satisfy the requisite criteria. Activists and their

[6] Many former small-scale yerba mate plantations were converted to soybeans in this process. Because yerba mate is a perennial bush, its plantations have better environmental footprints than monoculture soybean production systems.

organizations, then, may affect the information available to consumers when making their purchasing decisions" (Feddersen and Gilligan: 151).

The "superfood" credence attribute is a market-mediated phenomenon caused by global income growth and attendant dietary diversification. Superfoods are viewed as products with a high nutrient density, and yerba mate contains 24 minerals, 15 amino acids, and many anti-oxidants; it is also a natural source of caffeine[7] (Fochesatto, 2019). As noted by Loyer (2016), superfoods emerged in the popular discourse in the 1990s as a response to the concept of functional nutritionism. In contrast to functional nutritionism, which proscribes "bad" foods, the superfood movement emphasizes consumption of "good" foods which can improve bodily function and processes (Fochesatto, 2019: p. 64). Sellers of yerba mate in the United States and other developed countries have thus been able to position yerba mate products as natural alternatives to less healthful foods such as coffee, tea and heavily sweetened and chemically enhanced energy drinks (Folch, 2010). Recognition of yerba mate as a member of the realm of super-foods began to appear in the literature in the early 2000s. Companies who bore the cost of this entry paved the way for subsequent entrants into the market. Super-food designation is functionally equivalent to a public good externality; healthful reputation is a public good from which later entrants in the market could not be excluded.

Reputation and Its Implications

Yerba mate is now advertised in developed countries such as the United States, Canada, Germany and France as a healthful alternative to coffee and tea, providing several dietary elements without stomach irritation sometimes associated with alternatives. It is sold and packaged in numerous forms, from large loose-leaf packages, to tea bags, some of which contain other natural flavoring herbs and flavors, to infusion into drinks sold in the growing global energy-drink market. Instant versions of yerba mate are also available. Beyond healthfulness, yerba mate can be marketed as a socially responsible alternative due to changing productive processes in countries such as Paraguay.

[7] Yerba mate is advertised as a healthy stimulant that brings many benefits to consumers such as vitality, energy and clarity of mind (Boyd et al. 2009). A brief search of retailers advertising on the inter webs shows the ubiquity of these claims.

A single dimension of credence—healthfulness, directly tied to consumption—is supplemented with a series of others related to production processes. These dimensions feed into an overall reputation which creates value for producers. This reputation is shared by producers of the product, but it must be maintained. In wine, for example, reputation is maintained by groups of producers whose aggregate behavior leads to what is known as collective reputation (Tirol, 1996).[8] Wine producers have long grouped together and created denominations, whether publicly or privately formed, and within these denominations production and quality standards are enforced (Castriota and Delmastro, 2014). Pooled information about activities of members enables enforcement, which effectively protects the shared reputation. When the reputation relates to the product itself, maintenance of reputation is more difficult. While the healthfulness dimension does not depend on producer behavior, the other credence attributes do. Since yerba mate is produced by heterogeneous producers over a large area, protection of reputation is made more difficult by high transactions and enforcement costs. Free riders can benefit from and eventually damage the credence reputation.

3.1 Marketing Credence Attributes

The opening of specialized markets for Paraguayan yerba mate involves one key firm—Guayakí US (discussed further below)—and the marketing efforts of its founders. Guayakí US, due to its activism in the US market, spawned a network of activists that influenced consumer perceptions around the globe. This opening established a product-specific reputation and facilitated entry of others. Unlike wine, where entire countries or specific denominations within countries generate and defend reputations, yerba mate reputation is product-specific, and exporters from Brazil and Argentina have been able to benefit from this reputation. Guayakí US bore the cost, through advertising and promotion, of establishing the reputation, but cannot exclude other firms from taking advantage of it, except to the degree to which the reputation is brand specific. Guayakí's marketing efforts have built from two broad classes of credence attributes: healthfulness and beneficial environmental and social effects generated by the company's business model.

Guayakí US developed a "market-driven restoration" business model which involves training in and provision of incentives for shade-grown, organic production. The company also reinvests a fairly substantial portion of profits into socially desirable projects, such as reforestation,

[8] Other examples include Jamón Ibérico, Greek olives, and various wines.

in producing communities (Boyd et al., 2009). As indigenous people in Argentina, Brazil and Paraguay are engaged in yerba mate production, these restoration models have the direct consequence of preserving cultural heritage while also promoting environmental sustainability (Folch, 2010; Fochesatto, 2019). "Guayakí's relations with the indigenous Aché in Paraguay are central to its marketing and business model. Guayakí's product labeling created a new yerba mate narrative that constructed yerba mate as an indigenous product rather than an Argentine national symbol" (Fochesatto, 2019: 60). The move towards marketing yerba mate as an indigenous product has combined with concrete efforts to provide increased financial benefits to workers (many of whom are indigenous) and producing families and communities.

Since Guayakí US first marketed yerba mate credence attributes, NGOs, international donors and the Paraguayan government have supported shade-grown yerba mate as a counterweight to conventional farming. A center of yerba mate production in Paraguay is in and near the *Mbaracayu* Protected area near the massive *Itaipu* hydro-electric complex. The World Bank GEF Project "Conservation of Biodiversity and Sustainable Land Management in the Atlantic Forest of Eastern Paraguay"[9] partnered with the *Fundacion Moises Bertoni* to successfully implement restoration and reforestation projects with small-scale farmers and indigenous communities in the Atlantic Forest Corridor. Among these were efforts to promote organic yerba mate production under shade, leading to creation of more than 850 hectares of shade-grown yerba mate.[10] Yerba mate has been planted in a mix of native tree species from Eastern Paraguay: Cancharana (*Guarea canjerana*), Cedro (*Cedrela fissilis*), Peterevy morotî (*Cordia glabrata*), and Guatambu (*Balfourodendron riedelianum*), among others (World Bank, 2017).

Innovative partnerships with medium and larger producers in Eastern Paraguay were formed under this GEF project with the understanding that these companies provide technical assistance and institutional support for restoration initiatives, a key component of which is shade-grown restorative yerba mate production. Among participating companies were Agro-silo and Chololó SRL, the latter of which was already involved in a partnership to support sustainable heart of palm production within forestlands. Chololó SRL was also the first partner of Guayakí US when the latter began to source and export organic shade-grown yerba mate sourced in Paraguay.

[9] This project ran from 2011-2014 (World Bank 2017).
[10] Endangered bird species populations are enhanced in shade-grown native forests (Cockle, Leonard and Botrati, 2006).

Much of the heavy lifting for Paraguayan exports to meet these credence attributes was performed by Guayakí US, who began informal exports to the United States in 1996. The remainder of this paper is devoted to three case studies and lessons learned from them. The three are comprised of a single entrepreneur who was instrumental in providing the first credence-eligible yerba mate to US consumers, a small private US company that paved the way for further expansion of the market, and a cooperative that has been marginally successful in exporting high-value yerba mate.

3.2 From Bulk Export to Specialized Markets

Historically, Paraguay mostly exported yerba mate *canchada* to MERCOSUR countries including Brazil, Argentina, Uruguay and Bolivia. Along with these, the country exported small volumes of processed and packaged yerba mate to meet the demand of niche markets created by Paraguayan expatriates residing throughout the world. Between the mid-1990s and 2005, and as a result of the soy boom in yerba mate-producing areas, hundreds of small-scale plantations were absorbed into commercial soybean operations and Paraguayan exports to Mercosur dried up. By the mid-2000s there was concern that without opening new, more lucrative markets, Paraguayan production would not meet its own national demand for the product; a yerba mate crisis was emerging and the government promoted studies and technical assistance to increase yields and improve transparency in the value chain (Barceló and Báez, 2011).

Partly as a result of these efforts, yerba mate production and exports have, grown in recent years. Above all, the production system is being transformed from mono-cultural yerba mate production that dominated until the early 1990s into shade-grown plantations where the yerba is planted between native tree varieties and reforestation projects beginning with agroforestry set-ups. This has shaped the production environment in Paraguay, which is gradually becoming more consistent with environmental and social objectives. During this same period, an emerging global credence-related market has begun to take shape.

3.3 Spillovers to Other Businesses

Since the arrival of Guayakí yerba mate in the United States, several companies have ridden its coattails and competed in the market for credence attributes. *Club Mate* is a caffeine-infused drink produced in Germany and advertised as a favorite energy drink of hackers and club-goers. *Clean*

Cause is an Austin, Texas based company formed in 2015 that advertises credence attributes with the twist that caffeine provided by Brazilian-sourced yerba mate is more healthful than caffeine from other drinks. Fifty percent of *Clean Cause* profits go to fight drug and alcohol addiction, while the company advertises Fair Trade and US organic certification; this company is contributing to the cachet of yerba mate consumption but benefits from the example set by Guayakí US. The *Kiss Me Organics* store, *EcoTea*s, and *Anna Park* all promote health benefits of yerba mate consumption and also advertise Fair Trade and organic certification. An additional US company, *Yachak* yerba mate, takes its name from the word for "shaman" in the language of an indigenous tribe in the Ecuadorean (!) Amazon. This company, owned by Pepsico, advertises all the credence attributes of yerba mate and reinvests portions of its profits in eco-preservation projects. While these companies source their yerba mate from Brazil and Argentina, it is clear that their success is at least partly due to the reputation established by Guayakí US. Other companies from South America have also entered into the credence markets; for example, *Tukangua* is an Argentine company that has exported yerba mate since 1956 but has only recently obtained organic and fair trade certifications. The US market is now so saturated that a website dedicated to yerba mate reviews and technical analysis of different products was created in 2017 (https://www.yerbamatelab.com).

4. Case Studies

While Guayakí US has been a major actor in opening the credence attribute market to yerba mate in North America, it was assisted by a Paraguayan entrepreneur Francisco Rivas. This entrepreneur was i) seeking a means of differentiating his yerba mate, which was organically produced by indigenous communities in Paraguay, and ii) identifying a means by which the market could be exploited to the joint benefit of the environment and small-scale producers.

4.1 Empresa Chololó

Chololó SRL was founded by the Rivas Almada brothers. Their farm is in the District of Francisco Caballero Alvarez, Canindeyú, within an ecological reserve of eight thousand hectares belonging to the firm. Among the operators within the reserve are natives of the Aché-Guayakí (who gave the brand its name). Chololó SRL began producing palm and wood from native trees; over time the business expanded to yerba mate and livestock (Rivas, 2020).

Chololó SRL started producing yerba mate in 1990, and in 1995 the company Guayakí was formed jointly by the Rivas Almada family and Alex Pryor. Alex was one of the founders of the company Guayakí US, which received its initial shipments of organic yerba mate from Chololó. The companies worked together for approximately six years, but prior to entering relations with Guayakí US, Chololó SRL had never exported higher-valued (due to credence attributes) yerba mate from Paraguay; the relationship with Guayakí US opened doors for its exports. When Guayakí US (which patented the name) split from Chololó, the company continued shipping from Argentina, where production costs were lower (Rivas, 2020).

As Guayakí US sourcing shifted from Chololó to other producers, Chololó SRL was producing and buying better-quality yerba mate, in 30 kg bags, from small-scale producers. These were processed and exported to Uruguay, without a trademark and with no advertised certification (Rivas, 2020). Subsequently Chololó SRL re-entered the international organic yerba mate market with a new ITABO trademark. The first loads were sold to LONDON IMPORT SA, the owner of which was associated with Francisco Rivas (Rivas, 2020).

In 2020 Chololó, SRL launched its first direct exports of organic yerba mate under the ITABO trademark: 1,200 boxes of 12 units of 500g, equivalent to 7,200 kilograms of processed mate (Rivas., 2020). Total yerba mate production was approximately 250 tons, sent to France, Uruguay and Argentina. The remainder is either sold locally with the ITABO trademark or exported in bulk. With ITABO's trademark, the product is packaged in polyethylene bags with magnetic closure and in special cardboard boxes in 500 g. units. Chololó, SRL also markets organic hearts of palm under the GUAYAKÍ trademark[11] (Rivas, 2020). The company has approximately 100 workers in all its farm operations.

Since beginning production of yerba mate in 1990, the Rivas vision was to cultivate in a sustainable and ecological way. Native forests in which the yerba mate is grown are certified under Law 3001, an act of environmental services, which signifies a product with high quality standards and minimal environmental footprint (ABC Rural, 2018). This law means that only organic inputs are used; weed, pest and disease controls are organic-certified. Copper dust is used for fungi, while aphids, the main insect pests are controlled using insecticidal soap and through manual removal. Current yields oscillate between five and seven tons per hectare, above national averages, which

[11] The Guayakí trademark used by Chololó, SRL is registered in Paraguay and should not be confused with Guayakí US.

are about five tons per hectare. As noted above, yerba mate production becomes profitable when yields surpass 4,600 kg/hectare, so these yields indicate highly profitable figures.

4.1.1 Government Role, capital and Certifications

Interviews with the principal operator (Francisco Rivas) found that the Paraguayan government never provided assistance either for production methods or for export. Capital for operations and exports were raised internally by the sibling partners, and ITABO's penetration into global markets such as the United States, France and Spain was achieved using third-parties. That is, the firm itself has not opened its own markets, but there is no question that organic certification has been responsible for export growth.

Certification was initially conducted with the Guayakí US team through Farm Verific Organic (FVO), and the costs were paid by the company. Yerba ITABO is now CERES-certified, meaning the production is organic, following specified best production practices and strict environmental and social criteria. The cost of the certification is $2,500 per year and is paid by the company. ITABO continues to purchase from small-scale producers. ITABO shares costs of certification with these producers, depending on historical purchases.

4.2 Guayakí US

Guayakí US was founded in 1996 by Alex Pryor and David Karr. The two became friends while at Cal Poly University in San Luis Obispo, California (Ceaser, 2002). In 1995, Pryor visited the land of Francisco Rivas in Alto Paraná, Paraguay, which held "undisturbed rainforest" where Rivas had begun producing shade-grown yerba mate. Rivas' company, Chololó, SRL ,had contacts with indigenous communities who provided labor to his enterprises (Ceaser, 2002). Pryor saw an opportunity to sell the product in California because he felt consumers wanted an alternative to coffee or tea. He took samples to San Luis Obispo and immediately began marketing to fellow students, neighbors and curious Americans who had never heard of yerba mate. The yerba mate from the Rivas farm had numerous credence attributes; aside from being an alternative to coffee, it obtained organic certification in 1996[12] and comes from a shade-growing system rather than the monoculture plantation method that contributed to deforestation the region. From its start, Guayakí US has maintained a commitment to social justice and environmental restoration in the

[12] This is a relatively early certification, as US organic standards were only developed and promulgated in 1990.

communities where it sources its yerba mate. These social justice criteria led Guayakí US to seek alternative sources of yerba mate under circumstances where it could apply its market-driven regeneration model directly with indigenous communities.[13]

4.2.1 Production and Raw Materials

Since its founding in the mid-1990s, Guayakí US has expanded its supply sources to other producers in the region, and today it sources its yerba mate from Paraguay, Brazil, and Argentina. Guayakí US works with producers to obtain organic and fair-trade certifications and holds workshops with field workers to teach organic harvesting methods while also requiring insurance and benefits for all workers (Ballvé, 2007: 10-13). The company works with farms near protected areas such as national parks and wildlife preserves to create buffer zones and wildlife corridors in high priority areas for conservation (Ballvé 2007, 10-13).

Although the company works with numerous small farmers, their name and marketing build from a relationship with the Aché indigenous people. The company uses their name, "Guayakí," and has trained an Aché community of 40 families to grow and harvest yerba mate on their lands, located on the end of the Mbaracayú Biosphere Preserve (Ballvé, 2007: 10-13). In 2008 only 10 percent of the company's yerba mate came from families living in the Itabo Rainforest Preserve (the Chololó property mentioned above) while 90 percent came from reforestation projects in Argentina and Brazil, which include projects in partnership with small family farms and cooperatives (Fochesatto, 2019: 61). Guayakí engaged with communities living in or near rainforests while trying to create a downstream market for the sustainability attributes of their product. They pay between 130 and 200 percent of the market price for their yerba mate.[14] The company's goal was to create 1,000 jobs in this region, and to restore 200,000 acres of rainforest by 2020.

Guayakí US ships yerba mate *canchada* to Sebastopol, California, where they process, package and add value to their drinks. Processing in California eliminates a potential problem of intermingling organic and non-organic mate in countries of origin and allows for better quality control. Since consumers in the United States are not familiar with yerba mate, and the traditional consumption through a gourd has not yet translated, Guayakí's value added processes in the United

[13] The company emphasizes what it calls "the triple bottom line": profitability, environmental and social sustainability.
[14] Due to the COVID pandemic, it was impossible to interview representatives of indigenous communities which are deemed to be highly sensitive populations, but the information presented here was verified by numerous sources.

States include transforming yerba mate into forms consistent with American food consumption patterns. Products include mate tea bags flavored with chocolate, mint, chai and others, as well as mate latte concentrates, bottled iced mate, canned mate, mate energy shots, and loose-leaf bags. Best-selling products are the 25-count traditional tea bags and the eight-ounce loose leaf mate bag. Guayakí's drinks represent a natural alternative in the energy drink industry, which is dominated by large players selling products mainly made from water and chemicals (Russo and Crooke, 2016).

4.2.2 Marketing

As a business, Guayakí comprises various organizations. It was structured as an LLC in the United States with the mission of manufacturing and marketing the beverage. It controls a private commercial corporation in Argentina to trade the yerba mate it sources and export it to the United States. It also controls a nonprofit, the Fundación Agroecológica Iguazú, which operates in Misiones, Argentina. Its mission is to ensure the sustainable development (social, economic and environmental) of the territories and communities where it operates (Jaén, Refricco and Berger, 2020). Guayakí also sells single source products such as Ache's Pride, which is produced using yerba only sourced only from the abovementioned indigenous families families in Paraguay. Such products and their unique branding command high prices in US markets.

The Guayakí growth story is now relatively widely known. Initially the partners marketed the product themselves, traveling in a van to health food stores and festivals throughout the United States. They set up demonstration tables wherever they were and used brisk sales to establish a network of buyers. Internet orders were fulfilled using UPS and self-delivery. This was the beginning phase of the credence activism. Around 1999, Guayakí began working with Mountain People Warehouse and other distributors. Mountain People eventually merged with Cornucopia Natural Foods, a Rhode Island operation with a large distribution network on the East Coast. The merger created United Natural Foods, Inc. (UNFI), with whom Guayakí worked to break into mainstream supermarkets such as Whole Foods. To supply smaller markets such as convenience stores, gas stations and others, the company engaged with distributors who specialize in the relevant target retail sector. Subsequently, the company built its own distribution network in the United States and no longer relies on these distributors.

The company was able to break even through non-traditional sales channels and they caught the eye of large-scale media in 2003 when stories appeared in *Money* and *Woman's World*. Subsequently, sales increased dramatically, and a major challenge to the company has been to manage expansion. Because the company's production conditions are, by design, so demanding, it has been a challenge to meet the raw material requirements needed for higher growth. Guayakí ownership/management has resisted being absorbed by large companies and has avoided the lure of buyout via venture capital. As contributing to the health of the culture and livelihoods of indigenous peoples is at the core of the business model, the company's leadership would always avoid compromising their social mission (Crooke and Russo, 2016).

Starting in 2014, Guayakí's revenue growth settled at around 25 percent a year, with over 300 yerba mate growers and an area of more than 20,000 hectares (49,420 acres) of preserved Atlantic Rainforest. In 2016, it reached US $60 million in sales. Guayakí has grown steadily and built a reputation as a sustainable enterprise. It is the first yerba mate company selling in the North American or European markets to earn an organic production certification (Non-GMO) and Fair Trade certification, and it was one of the first companies of any kind to obtain the B Corporation certification. The company has had to deal with growing pains as its ability to sell yerba mate products in the US and Canada outstripped its ability to source raw materials under its existing model; that is sourcing raw materials while insuring that its environmental and social sustainability criteria were also fulfilled.

4.2.3 Finance

Sources of finance for Guayakí have evolved over time, but most of the company's operations were originally funded through savings of the five original partners and creative sources such as credit cards (Russo and Crook 2016). Loans from the Small Business Association provided relatively small amounts of capital ($50,000 in 1997, $100,000 in 1998 and $200,000 in 2000). The partners borrowed money from friends and families and eventually landed $300,000 from an equity fund created by the founders of Ben and Jerry's Ice Cream. Additional funding came from family foundations, and their access to non-traditional sources of capital dovetailed with their desire to maintain control of their business. The founders were devoted to their concept of a triple bottom line (profitability, social and environmental improvement), and their interactions with like-minded foundations facilitated expansion on their own terms. The company encountered several

opportunities to sell shares to venture capitalists but resisted due to its commitment to the triple bottom line.

4.2.4 Certifications

An essential means of capturing value through legitimate claims about credence attributes is to obtain third-party certification. Because of their business model the Guayakí leadership wanted to establish numerous certifications related to production conditions, social conditions in producing areas, environmental outcomes and other criteria. The challenge was that few yerba mate producers had ever obtained certification and the company underwent a rigorous search for possible certifiers. For example, it was difficult to secure a labor practices certifier because of the cultural nuances involved in their model of production. The Guayaki leadership eventually chose a Swiss non-profit called the Institute for Marketecology, which had substantial experience across many contexts in the developing world. The Institute now certifies Guayakí's products under its Fair for Life program. Guayakí now has the following certifications: USDA Organic (CCOF-certified) Fair for Life, Fair Trade Corporation, KSA Kosher, B-corporation, AHPA, and Non-GMO verified.

None of these certifications came easily or cheaply, and the need to maintain certification can affect business practices. For example, several certifiers index the cost of certification to sales volumes, so Guayakí had to trade off growth targets with certification costs. Another example is Non-GMO certification; while the nature of the production process made it obvious that yerba mate was non-GMO, the company decided to pay for the certification to satisfy demands of its customers. A third example is B-corporation certification. In 2007, Guayakí became a founding B-corporation. This unique idea certifies an entire organization as being committed to social and environmental ideals, and B-corporation status is built into a company's articles of incorporation. Thus, even if the company undergoes leadership change, the new leaders must adhere to these important conditions. The company directly pays more than $100,000 per year to maintain these certifications, as it pays for certifications on all its sourcing farms. Indirect costs in terms of training and resource transfers (such as direct payments to farmers and costs of reforestation) to producing regions are far higher.

4.3 Cooperativa Colonias Unidas

As an alternative to the private sector-driven marketing of specialty yerba mate, the cooperative model is an interesting case. Cooperative Colonias Unidas Ltda. (CCU), headquartered in Obligado, Itapúa Department, was founded in 1953 by 78 farmers in the farming "colonies" named Obligado, Hohenau and Bella Vista. Its historical mission has been to provide products and services to benefit the members and clients while adhering to a cooperative model characterized by social responsibility (Cooperativa Colonias Unidas, 2020). Currently, CCU has about 3.500 active members, the majority of whom are farmers, with approximately 80 percent cultivating fewer than 50 hectares. The most important crop for CCU members is soybean, whose areas have expanded dramatically since the start of the soy "boom." Other crops include wheat, yerba mate, tung, sunflower, maize and sorghum. In addition, CCU produces milk and milk products and animal feed mixtures (Yerba Mate Colón, 2020).

Yerba mate has grown in importance to CCU, and currently the cooperative has 320 yerba-producing members, who farm relatively small extensions. About 57 percent of CCU yerba mate producers plant between one and six hectares; 22 percent have 6-13 hectare plantations; 8 percent farm 13-20 hectares; and 9 percent plant between 20-50 hectares. Only 4 percent of members have plantations exceeding 50 hectares (Barceló and Báez, 2011). CCU also provides access to drying services, some of which are member-owned. These driers provide services to other members and non-members.

4.3.1 Product attributes

The CCU currently produces and sells traditional yerba mate and yerba mate mixed with 100 percent natural herbs (Cooperative Colonias Unidas, 2020). It has engaged its members and associated producers of yerba mate in technical training in yerba mate best management practices (BMPs). The CCU gathers dried yerba mate from members who own drying equipment, and these driers provide services to other yerba-producing members and non-members. This partially processed product is delivered to the CCU's factory during normal harvest periods. Delivered yerba mate has to comply with rigorous benchmarks. These include various indicators of quality such as moisture content, percentage of sticks and fine yerba, a maximum percentage showing impurities including number of black spots, and organoleptic analyses such as the evaluation of color, aroma and granulometric appearance (Cooperative Colonias Unidas, 2020).

After passing these quality controls, the raw material is stored in special tanks for the *estacionamiento* process. This fixing of the yerba mate to convert it to the *canchada* form is done in a completely natural process requiring no added ingredients. The product remains at rest for about two years, leading to the characteristic green color with elaborate flavors and scents. The *canchada* yerba is then moved to the mill where the processing is finalized. Milling begins with another quality control, undergoing chemical and taste/flavor tests. During milling, the yerba mate is separated by degree of fineness and other parameters.

Four different grinds are produced by the CCU factory: "special selection," "granulated," "semigranulated," and "fine." These grinds depend on the granulometric characteristics of the product corresponding to each type of grinding, and sampling is carried out during preparation of different grinds. Once the desired grind is obtained, the product is "split" into sizes of 1/4, 1/2, 1, 3, 5, and 25 kg, in paper or polyethylene containers, depending on the label to which it refers, and the products are sold under the trademarks "Colón" and "Colonias Unidas." Quality controls on packaged products consist of physicochemical, organoleptic and microbiological controls carried out as part of the quality control system established in the factory.

4.3.2 Marketing

The Colón brand sells an average of 9 million kilos per year, and of that, about 160,000 kilos correspond to sales to the international market. The commercial coverage of Yerba Mate Colón is national; the cooperative distributes 80 percent through its own distribution system and outsources the remaining 20 percent, ensuring that the cooperative's marketing strategy is adhered to. Colón exports small amounts to countries such as Bolivia, Chile, Canada, the United States, Poland, Spain and Germany without any certification or aggressively promoting credence attributes. This is because the traditional producer/members of the cooperative do not comply with the rigorous criteria for the various certifications. The growth target set for 2020 was 8 to 10 percent. CCU claims that its careful quality control improves its acceptability in demanding international markets, but it has not taken advantage of the explosion in credence-related demands. The cooperative is riding the tails of a global spike in demand for yerba mate, which is partly driven by health attributes and partly by certifiable improvements in production conditions. It is benefiting from only part of the credence-related explosion and hopes its markets will grow without it having to bear the costs of certification.

4.3.3 Production Quantities

CCU has expanded its production recently through a process of technology transfer to its 320 member-producers of yerba mate. Producers have been trained in integrated pest management (IPM), advanced agronomic management and effective pruning. A key component of the yerba mate BMP package is removal of damaged or diseased branches from the plantation; another is better management of soil fertility. While the IPM package is not entirely organic, producers have reduced their pesticide applications from as many as 16 to only two per year. This helps producers maintain populations of beneficial insects and reduces production costs without affecting yield. Concurrently, yerba mate prices have rebounded from their lows at the turn of the millennium; those prices have increased by more than 100 percent compared to their low levels prior to 2005. These higher prices, together with reductions in input use, have enabled yerba mate to regain its competitiveness compared to soybeans.

CCU has also associated itself with five other cooperatives in Itapúa, who have established contractual production plans to meet the needs of the larger cooperative. CCU provides technical assistance to these associated smaller cooperatives and provides a consistent market for their production. According to interviews, the cooperative movement is well-established among small-scale yerba mate producers who need access to better production techniques and access to drying and milling facilities. The cooperative has also developed lines of yerba mate mixed with natural herbs. Within three years of this process, CCU has attained self-sufficiency in herb production, providing another means of income earning for its members.

5. Support Structures and Role of Government

The Paraguayan government has engaged in various activities to support the yerba mate sector including research and technical assistance, access to finance and minimal assistance for exporters. The sector also benefits from provision of public goods such as energy, connectivity and other forms of generic public investments.

The Paraguayan yerba mate industry has organized itself in several ways. The Paraguayan Yerbatero Center is a non-profit guild where the main actors in the yerba mate value chain meet to plan and compare strategies. It was created in 1952, and 90 percent of the Yerbatera Industry is currently associated with the guild. The “National Yerba Plan” was developed in 2014 following participation of all relevant stakeholders (growers, dryers, transporters, mill operators, etc.). It

provides a comprehensive vision of the future of the industry which, if implemented, includes a huge expansion of area planted and value-added exports. As of 2019, however, no substantial funds had been allocated to the plan.

While Paraguay, unlike Argentina and Brazil, does not have a research institute dedicated to yerba mate, several research and extension projects have benefited the sector. Examples include the 20-month project starting in 2012 to strengthen the yerba mate guild.[15] This project was designed to improve the quality of Paraguayan mate so that producers complied with norms such as certification ISO 17025. The project also built a laboratory to monitor quality throughout the value chain and, in doing so, improve the international competitiveness of the sector. It was supported by the Ministry of Commerce and Industry with financial assistance from the European Union. Several research projects have been supported by national funds in the past 10 years, including an investigation into genetic classification of yerba mate plants found in Paraguay, and a project designed to develop and promote best practices in yerba mate management.

The sector has also benefited from specific donor-driven interventions such as the GEF/World Bank project to assist production in protected areas near the Itaipu dam, PRODERS, a World Bank rural development project which provided funds for a yerba mate processing facility, a 2007-2016 JICA project to strengthen cooperative management and production, and a Korean KOICA-supported program to train yerba mate producers in San Pedro.

A challenge to the public sector (or the guild) is to provide technical assistance to inform more small-scale producers about how to exploit new global opportunities based on credence attributes. The three cases covered here suggest that the main means of exploiting various certifications is through a second-level actor who can position the product on international markets. Guayakí US has its own producers and is not looking to expand, while Chololó, SA is a private enterprise focused mainly on the production side. Its marketing is done by third parties and it is not clear that it has established a comparable niche in its export destinations. CCU is a good outlet for its members but does not have the international reach necessary to exploit the opportunities identified here.

[15] Project was named "Fortalecimiento a Productores de Yerba Mate en Paraguay," funded by the European Union with contrapart finance provided by the Centro Yerbatero Paraguayo.

5.1 Credence Attributes Challenges

Most of the credence characteristics such as organic certification are maintained through a value chain via trust in the different actors. As demand for certification and the dimensionality of credence attributes grow, maintaining trust through a network becomes cumbersome and costly. As a result, firms have sought to reduce the length of the value chain in the interest of gaining confidence in trust by reducing intermediaries. In the yerba mate sector, this has resulted in very short value chains, but still with high costs of maintaining trust. Guayakí, in particular, faces daunting obstacles in increasing its volume of sales while maintaining certainty about the validity of its credence claims. Blockchain technology has the potential to reduce costs and improve traceability, but the technology has not yet been used for such processes for yerba mate (van Hilten et al., 2020).

Costs of certification remain high due to challenging conditions in the yerba mate growing areas and the difficulty of verifying the social benefits generated in remote areas. While the technology now exists to verify organic production processes remotely (Denis and Tychon 2015), shade-grown bushes in highly wooded areas or in agroforestry conditions under an understory prevent such verification. Verifying that reforestation commitments are honored and socially beneficial investments are made is also difficult and costly.

Organic production of yerba mate is not very challenging as the crop has traditionally been produced with few purchased inputs. Achieving yield gains is challenging, however, as it is important for high-value exporters to continue to adhere to environmental and social constraints. In fact, these credence attributes are so fully tied to yerba mate consumption than consumers fully expect more yerba mate production/consumption to lead to better-quality forests and maintenance of indigenous communities. New varieties are not likely to become available, and inorganic fertilizers cannot be used, so the challenge is to increase production through better management in shade-grown or reforestation-geared systems. Production increases can also occur through new plantations, but these plantations would likely have to be in agro-forestry or reforestation-geared systems.

A major challenge for the Paraguayan “credence” yerba exporters is maintaining the collective reputation of yerba mate, particular regarding social and environmental consequences of production. These form a core attribute which is widely advertised and a key component of reputation. Not all yerba mate is produced under similar conditions, and reports of labor or

environmental problems in the wider yerba-growing area of South America could cause lasting damage to the collective reputation. Since production and the wider industry is so fragmented, internal enforcement of the reputation is impossible; one alternative would be for groups of credence exporters to form a credence-related brand to defend and advertise.

5.2 Lessons Learned

The credence-focused growth in the yerba mate sector in Paraguay has been completely driven by the private sector. The Guayakí story is a success due to the unique attributes of its leadership (Jaen, Refricco and Berger, 2020). Working with nontraditional partners in inclusive supply chains requires more than aligning material incentives, and Guayakí's experience suggests that responsible leadership with a strong ethical foundation can provide powerful leverage to ensure buy-in and commitment from the various actors involved. The Itabo/Chololó case both contributed to (at the early stages of Guayaki's growth) and took advantage of the opening created by the Guayaki group. Its leadership is also visionary in its recognition of the environmental and social potential of responsible sourcing of yerba mate. The CCU case shows a cooperative which, by construction, is creating benefits for its producers, but one where the full benefits of the expansion of credence demand have not been exploited. While the cooperative advertises the social and environmental benefits created by its production of yerba mate, it has not obtained the certifications necessary to enter into higher-valued markets.

The Guayakí story is also one of incrementalism. The groundwork for credence demands in the United States was laid gradually over time. The firm began with a modest product line and expanded slowly as new niche products were identified. The two biggest obstacles the partners faced were to entering larger distribution channels and obtaining barcodes for their products, which are necessary for sales in many venues. With growth, the company was able to establish its own distribution channels and now retailers seek its product. It is even sold online in Bahrain.

The Paraguayan government has been relatively hands-off in its support for credence-based exports of yerba mate. There does appear to be growing recognition of the potential environmental benefits expected from nudging producers toward new production practices. Such movements could be supported by training and information programs. The growth in export and export potential of the yerba mate sector has not gone unnoticed by the public sector, but little momentum is observed toward more active support of exporters. Areas where public interventions might be

fruitful are the following: development and validation of best management practices for yerba mate production, creation of a Paraguayan certification encompassing environmental and social criteria, facilitation of certification by third parties, support for a certified organic value chain for organic producers.

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