

Grape supply chain: Vertical coordination in Ningxia, China

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Abstract. *Li S, Bitsch L, Hanf JH. 2021. Grape supply chain: Vertical coordination in Ningxia, China. Asian J Agric 5: 12-21.* Since 2018, China has been the second-largest grape-growing country in the world, with 875 thousand hectares in total. A former study indicated a transformation within the wine grape supply chain management in the Chinese wine market, from traditional coordination to significant vertical integration. The Ningxia Helan Mountain's Eastern Foothill wine region (China) is considered to be the best wine region in China and has potential to lead domestic wine production. This study summarizes the typology of grape supply models in the Ningxia wine industry. We also examine influencing factors for the arrangements of current vertical coordination models of grape materials supply, particularly the hybrid organizations and contractual relationships are analyzed.

Keywords: China, political influence, supply chain management, vertical coordination, wine

INTRODUCTION

A stable supply of raw materials and quality of final products is crucial to various agricultural industries, particularly for the grape and wine industry. Theoretically, the problems of quality and/or quantity are supposed to be overcome through the application of vertical coordination. Wine grapes are perishable products, requiring close coordination between growers and processors during production processes. Therefore, numerous studies spend great effort on examining related motivations and various organizational arrangements of vertical coordination, exploring the roles of contractual relationships, especially in well-established European and American wine regions (Chambolle et al. 2006; Fernández-Olmos et al. 2009; Franken 2014; Goodhue et al. 2003). In addition, some research has considered the design and implementation of vertical coordination in developing wine regions (Chaddad et al. 2017).

Since 2018, China has been the second-largest grape-growing country in the world, with 875 thousand hectares in total. 163,000 hectares are used for table wine production (OIV 2019). The Chinese wine grape industry has a wide variety of vertical coordination mechanisms, a significant degree of product differentiation. The industry has variation in the product, size of business, and dispersed wine regions (Zhang 2018).

A former study indicates a transformation within wine grape supply chain management in the Chinese wine market, from traditional coordination to significant vertical integration. Currently, in production volume, productive partnerships are still dominant applied by medium to large-scale companies. The number of processors having vertically integrated vineyards now takes up a greater share, especially with boutique and emerging wineries in Ningxia wine region. Commonly, in the Chinese wine regions, a single wine producer adopts several coordination

forms simultaneously. Existing studies revealed quality as the driving motivation for the adoption of tighter coordination. The used forms and mechanisms of coordination that are more specialized and tighter contractual relationships are interesting areas to be identified explicitly for the Chinese wine regions.

At the China Wine Summit Forum 2019, the Top 10 Chinese Wines of the Year were jointly recommended and awarded by wine critics Jancis Robinson MW, Bernard Burtschy, and Ian D'Agata. Among them, six wines were from Ningxia Helan Mountain's Eastern Foothill wine region (Ningxia region). The Ningxia region is considered to be the best wine region in China and has the most potential to lead domestic wine production. Therefore, it is reasonable to choose the Ningxia region to represent the quality wine regions. Due to differences in political backgrounds and market development processes, it is necessary to examine if the Ningxia grape market situation is in line with previous findings.

Through the conduction of qualitative research in the form of face-to-face in-depth interviews in Ningxia region and qualitative data analysis, this paper proposes to examine the structure and mechanisms of grape supply models. Specifically, to identify arrangements of contractual relationships in aspects of contract design, content, duration, contract enforcement, etc.

Theoretical background

In general, vertical coordination refers to the synchronization of successive stages in the vertical marketing channel from producers to consumers to overcome problems of supply and quality (Götz et al. 2009). It does not include transactions on spot markets, where the commodity exchange is based on a price agreement only. It includes both productive partnerships and vertical integration (Swinnen et al. 2007). The key for all types of vertical coordination is contracting. Marketing

contracts only address the issue of supply disruptions by private contractual initiatives (Dries et al. 2005; Gow et al. 1998), whereas production contracts address quality concerns (Gorton et al. 2003). Meanwhile, contract enforcement is still one of the most severe barriers to successful vertical coordination (World Bank study 2005). In some cases, public enforcement institutions are not fully functioning and lack appropriate governance mechanisms. Two reasons for the breaching of contracts have been detected. First, producers mistrust their buyers and feel uncertain about committed payments. Second, they may not be able to fulfill a contract because contractors cannot offer basic inputs (Gow et al. 1998).

Consistent with the broad quality-coordination relationship, it is found that wineries employ different contract specifications to motivate desired behaviors by growers in different regions, which is also supported by Fraser (2005). According to existing studies, it is assumed that the higher the priority to secure quality and/or quantity of raw materials is, the stronger is the shift from spot market transactions towards advanced vertical coordination mechanisms. Goodhue et al. (2003) and Ewert et al. (2015) find that coordination that is more formal is associated with higher product quality. As noted by Fernández-Olmos et al. (2009), wineries that produce high-quality wines are more likely to integrate vertically than those producing low-quality wines. In line with these findings, a former study indicates that the type of vertical coordination in the Chinese wine grape supply chain has also experienced a transformation from random grape transactions to more complex and closer coordination. For example, there are more specialized contracted relationships between grape cultivators and wine processors. ‘Dragon-head enterprises’ or independent wine processors, who strive into the direction of vertical integration through different mechanisms led to this development.

Starting in 1978, the Chinese national government introduced a new era of modern agriculture, inducing a shift from small-scale to large-scale agriculture (Herma et al. 2017). ‘Dragon-head enterprises’ (DHEs) refer to large firms selected by the government since the 1990s to lead the drive for ‘Agro-industrialization’ and agricultural modernity. In this process, the government adopted the replacement of local markets with contractual farming, replaced dispersed small-scaled production (which is proposed as backward and unproductive) with large-scale agribusiness (which is proposed as efficient and modern) (Schneider 2017). In China, fruit production is dominated by small farmers because of the nature of land tenure (Huang et al. 2008). In detail, every farm family is given on average around 0.3-hectare land for agricultural cultivation, while the agricultural land in China is not considered as private property since rural collectives officially own land and manage land leases. As shown by Zhang (2015) and Ye (2015), there is a highly developed market for land use. By separating the land into ownership, contract, and use-rights, village collectives and individual villagers could transfer the right of use on a piece of land to another economic entity, while maintaining ownership and contract on the land.

The government supports DHEs to lead coordination relationships with farmers. With close ties to the regional government, they are also recipients of grants and policy support, and many are or have been at least partly state-owned. Some prior studies have illustrated that government interferences affect the arrangements of supply chains in China dramatically. The vertical integration led by DHEs was promoted aggressively by the government as the more favored form of vertical coordination, to realize industrialization in some agricultural production fields. For instance, grape transactions through contracted coordination with DHEs are more common in traditional Chinese wine regions like Yantai of Shandong Province. Vineyards here are farmed quite intensively and have been well established for a long time. Meanwhile, the Shandong Provincial government is one of the nation's leaders in following the central government's provision to select and support large-scale capitalistic DHEs, spending 50 million RMB each year in direct subsidies to select DHEs since 2002 (Report: 219). Aside from grape cultivation, some specialized farm cooperatives are organized by local county collectives in Penglai to better control the quality of inputs, offer advanced techniques for planting golden pears, and share market information with cultivators (Yu et al. 2009). It is shown by Huang (2011) that individual farm households benefit more in specialized cooperative coordination with private wine processors than compared to working with DHEs. Yet DHEs are overall bigger, more profitable, and more subsidized by the state. They are expected to cover larger numbers of farmers and create a greater economic performance. On the other hand, according to Huang et al. (2010) and Zhang (2012), in China, the cooperative organizations that are spontaneously formed by farmers have a hard time surviving. Reasons for that are the double risk of the market and the agricultural management due to their lack of leadership, internal cohesion, and strong external support (e.g., policy, finance, technique, etc.). In this case, it is more efficient than those formed cooperative organizations led by DHEs to realize large-scale agricultural production. The success of each of the models depends on the future choices of the Chinese government, which model will be promoted (Huang 2011). After reviewing existing studies about supply chain management in other Chinese wine regions, the role of the government is not marked as significant (Jin 2015; Dong 2017). Nevertheless, as other studies have shown, a strong influence of the national or regional government on the emergence of vertical coordination is possible (Ma et al. 2014). For this study, the government interferences on vertical coordination in the regional wine grape supply chains are examined within the Ningxia wine region. In the Chinese wine regions, grape material supply chain arrangements vary by wine processors. To a certain extent they depend on the production scale of the processor, the requirements on quality/quantity of the grape material needed, the degree of the local grape and wine market development as well as on the interferences of the local government on policies of grape supply chain management and strategies of local wine region development. For the Ningxia wine region, the evolved processes of the models

and organizational mechanisms of vertical coordination have not been identified yet. In terms of contract enforcement during the grape supply process, previous studies in the Wuwei wine region of Gansu Province (Jin 2015) and in the Xinjiang wine region (Dong 2017) indicate that some cases of farmers breaching their contract were detected, which led to the failure of the contractual relationship. As a result, local wine industrialization level cannot be improved. Partners must overcome problems of uncertainty, opportunistic behaviors, and contract enforcement among vertical coordination to produce higher quality products. Thus, vertical integration is most often introduced if these problems cannot be overcome. Therefore, arrangements of the contractual relationship, contract design, and contract enforcement problem in Ningxia are also crucial points for this study.

Grape and wine market in the Ningxia Helan Mountain's Eastern Foothill wine region

The Chinese wine production is transferring from a quantity orientation towards a more quality-oriented production, especially in some of the emerging quality regions. Ningxia region is often considered the best wine region in China nowadays and can lead the domestic wine production quality-wise.

The Ningxia Helan Mountain's Eastern Foothill wine region has just started to develop for the last few decades. In 1984, the Ningxia Agricultural Reclamation Yuquan Winery was the first winery to be established in Ningxia. Since then, Ningxia began to plant grapes on large scale. The Yuquan winery (now named as Xixia King Winery) belongs to the Ningxia State Farm, which is the biggest wholly state-owned agricultural enterprise in Ningxia.

During the early development period around the 1990s, very few wineries were established to ferment the grapes. The bulk wines produced in Ningxia were transported to Shandong and Hebei provinces for blending. The wines were sold under brands of large enterprises, which were mainly COFCO Great Wall, Changyu, and Dynasty. The urbanization process in China and the expanded cultivation area of economic crops increased the cost of farming land; also, the labor cost, especially after 2008. All these economic and social factors motivated the movement of the Chinese wine-producing industry from the Eastern coastal regions to Northwestern China.

The wine grape planting area in Ningxia increased from 2.66 thousand hectares in 2003 and has reached 38 thousand hectares in 2018 (figure 1), becoming the largest concentrated wine production area in China (Zhang 2018). Up to now, there are 198 wineries in this region. Among all these wineries, 86 wineries were finished and their products could be seen in the market, while another 112 wineries were built but they were still under construction. Domestic and foreign big wine companies such as COFCO Great Wall, Changyu, Pernod Ricard, and Moët Hennessy Domaine Chandon have established wineries in Ningxia. Their scale and the characteristics of the company affect the wine producer's requirements of grape quality and quantity. Thus, in this study, the wine producers are separated into two major groups to be discussed: 1) 'Dragon-head Enterprises' (DHE) and 2) other wine producers. Firms like Changyu Pioneer Wine Company, COFCO Great Wall Wine Company and Xixia King Winery are examples of 'Dragon-head Enterprises' in the Ningxia wine sector.

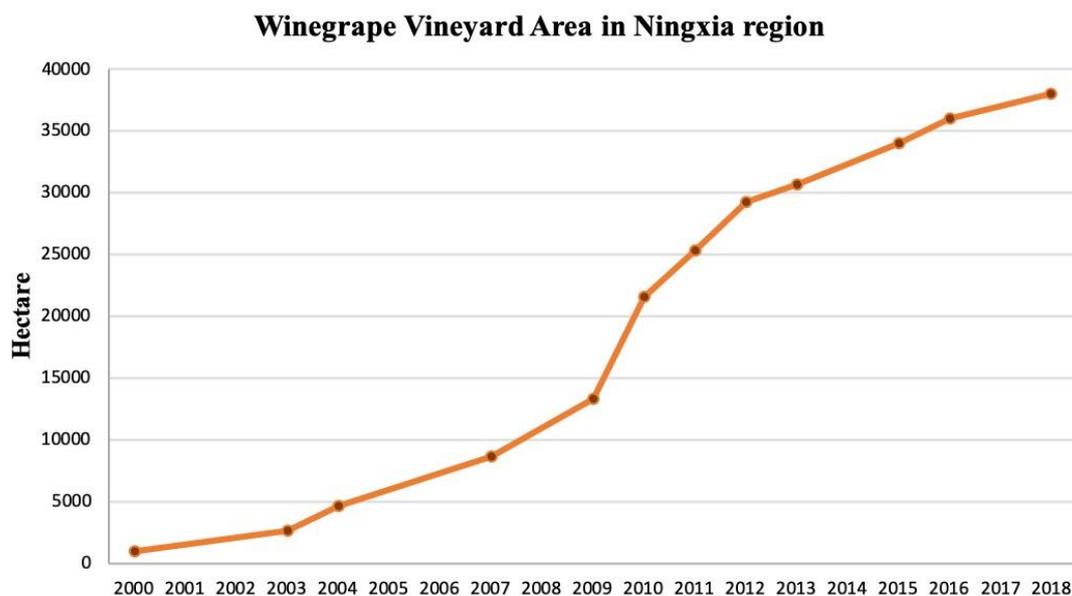


Figure 1. Development of vineyard Area in Ningxia region. Source: Zhang (2018)

Table 1. Overview of the major selected interviewees in Ningxia

Interview groups	Subgroups	No. of active companies	No of inter-viewers	In percentage
Government institutes	Ningxia Wine Bureau	1	2	/
Education institutes	Universities	2	2	100%
	Research institutes	3	1	33%
Wine producers	DHEs	3	3	100%
	Other wine producers	83	8	10%
Grape suppliers	Farmers	/	4	/

Under the guidance and support of the government departments, the wine industry in Ningxia has made great progress since 2010. To increase the value of grape growing and to face the challenge from the Chinese giants and imports, local authorities in Ningxia decided to adopt the “estate wine, regional brand” strategy for the local wine industry. That is to encourage wineries to possess private vineyards and make quality wines with their harvests to introduce more wine brands into the industry, making full use of the strong ambition of each producer to succeed in specific market segments. The massive production of standardized products was not welcomed at that time, as it is often regarded as cheap and inferior in quality. With the growing income and accumulated wine-consuming experiences, Chinese consumers are looking for domestic wines with good quality, attractive stories, and more accessible interactions. Small-scaled boutique wineries could better meet these requirements. In a short term of five years, Helan Qingxue, Silver Heights, Kannan Winery, Moet Hennessy Domaine Chandon, and several other brands have gradually built their reputations both domestically and internationally, by being well-known for their delicate estate wine production. However, since last year new investments in boutique wineries are not favored anymore by the government, due to some modifications on the policies concerning vineyard investment and winery establishment. That is also the reason why some wineries are still not finished. They cannot get construction permissions from the government to proceed. Meanwhile, the government collects grapes from their dispersed vineyards to be fermented by other large-scale wine producers. These adjustments in policies tend to strengthen the vertical integration in the grape supply chain even more.

Aside from grapevine growers, there are groups that need to be considered: wine producers, government institutes, educational institutes, and other active actors in the Ningxia grape market. Professional instructions, as well as their supportive roles on grape cultivation and vineyard management, may affect the arrangements and/or mechanisms of the grape supply models in the local region.

During the development of the Ningxia grape and wine market, grape supply models' arrangements have also gradually evolved to balance the requirements on grape quality and quantity, improve the production efficiency, and better adapt to market and the developments of the companies. Nevertheless, there are only a few relevant studies about the organization of the grape market and vertical coordination applications. Years ago, some studies about the Eastern wine regions had been conducted, but the

results cannot be applied to the Ningxia region due to different market environments. Thus, it is worth examining the Ningxia grape market to identify the vertical coordination mechanisms while considering the specialties of this region. Our findings help to understand the structure of the Ningxia grape market and to derive implications for the optimization and development of the local wine region.

MATERIALS AND METHODS

Methodology

The study used an exploratory qualitative research approach. The qualitative research approach helps to extract patterns of meaning based on the collected data. Qualitative research is about recording and analyzing to uncover the deeper meaning and significance of social behavior and phenomenon (Creswell 2003). The data collection and analysis approach is methodical, but allows for greater flexibility than in quantitative research. The data collection of this research consisted of field research, particularly in-depth interviews were carried out.

For this study, the approach of a face-to-face, semi-structured individual in-depth interview was adopted to collect the required data. Face-to-face semi-structured interviews perfectly fit this study, offering the possibility to collect longer descriptive answers in a relaxed and trustful atmosphere. In total 20 interviews were conducted in Ningxia region, starting from 27th of March 2019 to 15th of April 2019. The interviews were conducted face-to-face in Ningxia, mostly in the working office of the respondents. The native language of the researcher and interview partners was the same, thus making it ideal and easy that all interviews were carried out in Chinese. Concerning the topic of this study, a set of predetermined questions were fixed as the interview guideline and respondents were encouraged to answer in their own words based on their experience. Almost every interview was recorded with the oral approval of the interviewee. On average, each interview lasted about 45 minutes. Table 1 shows a general picture of the 20 selected interviewees. All interviews have been transcribed. Qualitative data analysis after Mayring (2015) was applied.

RESULTS AND DISCUSSION

According to our findings, government interferences play a determining role in Ningxia grape and wine market development. It is logical to first understand the influences

of the Ningxia authorities on the evolution of the grape supply chain. Secondly, the existing vertical coordination models in the Ningxia grape market are illustrated. Accordingly, the factors driving wine producers' to different choices and arrangements on grape supply are clarified. In the last section, the contract design, and problems of contract enforcement in contractual production relationships are evaluated.

The influences of the government on vertical coordination in the Ningxia wine industry

In the Ningxia region, the Bureau of Ningxia Grape Industry Development (Wine Bureau), as a governmental institute, is responsible for the grape and wine market. It is the office of the Administrative Committee of Grape Industry Zone of Helan Mountain's Eastern Foothill Wine Region in Ningxia; it is the first provincial government wine department in China. It works as a branch of local authorities which (i) carry out industrial development plans, (ii) formulate strategies and standards, (iii) solve land management, and (iv) coordinate among growers, producers, and distributors. The Wine Bureau has great impacts on the evolution of local grape supply models and vertical coordination mechanisms.

The government and local collectives take the role of land agencies. Since no individual in China owns their land (land belongs to the village and is contracted to households for 30 years for no rent), all farm households have access to their land (Rozelle et al. 2006). According to the interviews with the government institutes, a large area of vineyards was integrated by local collectives after the year 2000 and then reallocated to DHEs and wine producers who applied for land of vineyards. When the 'estate wines, regional brand' strategy was chosen by Ningxia authorities around 2010, several of the boutique wineries were attracted to this region. According to our interview sample, five of 11 wine companies were established around 2010. Three of these five companies mentioned that they applied for the land of vineyards from the government. The using right of the land was then transferred to the company by paying the rent to the government and signing a land lease with a duration of 30 years. For the other two companies, one rented the land from the Ningxia State Farm, and another one rented the land from the rural collective.

Following an official document issued in 2016 by the Ningxia authorities, one of the requirements for the application of establishing a boutique winery was to possess private vineyards of at least 15 hectares. Besides, supportive policies for encouraging vertical integration of grape supply chain are also presented in the document: *'To encourage vertical integration between vineyard and cellar management: the government would integrate part of the existing vineyards from companies/farmers who purely work on grapevine cultivation, meanwhile domestic and foreign companies (investors) are encouraged to establish wineries with existing vineyards. New investors and original vineyard owners (companies or farmers) form a consortium of interests by means of land auction, shareholding, renting, transferring, or contracting, etc. New vineyards can be applied for allowances for the first three*

years. There are subsidies for wineries that vertically integrate vineyard and cellar management. From now on, enterprises and farmers are not supported or encouraged to purely grow wine grapes.' (Ningxia Wine Bureau & Ningxia Provincial Department of Finance 2016). These policies promoted the rapid transformation to vertical integration in the grape supply to better control the grape quality and to make unique quality wines and implement the 'estate wines, regional brand' strategy.

However, now the policy direction changed towards the 'Great Item' strategy starting with the renewed document in 2018. Since 2018, it has been hard for small- to medium-sized boutique wineries to apply for land from the government. Besides, there are some boutique wineries that just established vineyards two or three years ago, while their cellar's construction permission is still not granted by the government. Due to the changes in policy, only companies who can comply with the capacity to produce wine from at least 135 hectares would be permitted to be established (Ningxia Wine Bureau & Ningxia Provincial Department of Finance 2018). This change is also confirmed by the establishment of the 'Xige Estate' who owns 1,267 hectares of vineyards and the appearance of a wine brand 'Helan Hong'. This brand integrates many grape bases, which all have strict managing standards. 'Helan Hong' grapes are now fermented with grapes from more than 2,000 hectares of vineyards. In the aspects of marketing and brand promotion, all the financial supportive policies for individual wineries or enterprises are canceled. The Wine Bureau is organizing promotions on the great regional brand 'Helan Hong', which is expected to represent Ningxia wine. These modifications in policy push the industry to further vertically integrate with regard to vineyards. Thus, the policies and strategies issued by the government have determined the grape supply models and the direction of the industry's development to a great extent. It can be said that the current situation of the vertical coordination within the Ningxia grape market was determined by the political influences of the government.

Existing vertical coordination models in the Ningxia wine sector

Summarizing from all the 20 interviews, several organizational models of the grape supply of wine processors are discovered. Based on the data analysis results, there are mainly five existing grape supply models. Below is a description of the vertical coordination mechanisms of these five models in the Ningxia region:

First. Dragon-head enterprises (DHEs) vertically integrate farmers' vineyards to establish standardized vineyard bases. The standardized vineyard bases are completely controlled by the DHEs specialist's management, with relatively strict quality control mechanisms. These grapes from their own vineyards are used to make estate wine. Generally, the land for standardized vineyards is collected by the local rural collectives or the government and then reallocated to DHEs and/or large-scale firms. The using right of land was transferred to the DHEs, while the farmers, as the original owner, are paid with the rent; it is also common for the

farmers to continue working in the vineyard or the cellar as an employee. During the development of the Ningxia wine industry, vertical integration was used to emphasize the concept of 'estate wine', maintain the order of the market, and decrease the loss of farmers. In other words, vertical integration emerged due to a greater demand for higher quality products in a more developed market, which corresponds with the expectation that the degree of market development is important for the degree of vertical coordination.

Second. Dragon-head enterprises also work on contracted vineyards with grape suppliers by using five to ten years long-term contracts, which regulate the requirements of quality and quantity, as well as the agricultural assistances offered by the enterprises. Specialists from the company and/or education institutes are sent to the farmers to give cultivation instructions during the growing season. The price settled by the DHEs is considered a benchmark for other transactions of grape procurement. The government subsidizes electricity and/or irrigation systems, grapevines, and vineyard construction in the first three to five years; in some cases, farmers and/or firms receive cash directly. For DHEs, the grapes from contracted vineyards are mainly used to make table wines. Contract enforcement is not a problem for this model, except for some farmers who complain about a low income. In this case, the contractual relationship between DHEs and grape suppliers is relatively stable. Farmers believe in the enterprise and rely on the enterprises' stable demand for grape materials to maintain a risk-free income. At the same time, DHEs need grapes from contracted vineyards to keep consistency in their production. Thus, these contracts tend in the direction of vertical integration because the firms almost completely control the vineyards.

Third. Wine producers integrate the farmers' vineyards into their vineyards by renting land from farmers or collectives. The area of private vineyards varies between companies with different economic scales. Generally, the outcomes from the private vineyards account for 80 to 100% of the company's whole production. The vineyard management is fully controlled by the experts or the winery managers. Seasonal vineyard workers are hired from surrounding villages. The local government supported the villagers in moving from poor mountainous areas and settling in emerging wine towns close to the wine companies. The quality of the grapes from individual vineyards is at a high level and these grapes are used to produce high-quality estate wines. In Ningxia, the private vineyards of some emerging wineries are allocated to the government allowance projects.

Fourth. For some wineries, 10 to 20% of their whole production relies on contracted vineyards through contracting with grape suppliers in the form of mid-term contracts, annual contracts, or oral agreements. These different organizational forms of contracted vineyards belong all to productive partnerships. Mid-term contracts are always used by boutique wineries, which are booming in recent years. They have strict requirements for high-quality wines. These wineries require mature grapevines or grapes with specific characteristics that are missing in their

grapes. The grape supplier manages the vineyards following the clauses in the contract. Some companies would participate in decision-making and guide growers during the growing season. On the contrary, short-term contracts or oral agreements could be marketing contracts. They are more applied by wine producers who consider securing the quantity of their production with the grapes from contracted vineyards. The agreements address mainly the harvest schedule, quantity of grapes, and payment method. The required quantity may vary in each vintage due to concerns of storage, market expectation or extra orders from customers, etc. For them, the quality of these grapes is not a big issue, and they have no pressure on finding a partner who owns the required number of grapes. Thus, the flexible or rather loose contractual relationship fits better with their requirements. The expectation in theory framework is verified: the design of partnership differentiates in contract duration and the themes in production contracts and marketing contracts, depending on the strategy of the contracting initiators.

Fifth. The last option we found is grape procurement on the spot market during the harvest season. The grape's quality cannot be guaranteed. These grapes sometimes are used to make up for the shortage of production for some wineries in particular vintages, which may be caused by extreme weather, damages, or unexpected additional orders, etc. Besides, DHEs assume the social responsibility to deal with the excess grape materials at the end of the harvest season.

Summarized from all interviewed wine companies, the wine producers in Ningxia usually do not only apply a single grape supply model. Almost all the wine companies are applying multi-supply models. The ratio of each model varies between the companies, depending on the producer's decision, product strategy, and the demand of the market. Wine companies in Ningxia prove this. Among all interviewed Ningxia wine producers, only two rely entirely on private vineyards and one innovative wine producer simply obtains grape materials from contracted vineyards. Briefly, every interviewed wine producer in the Ningxia wine region, except the innovative wine producer, possesses private vineyards under strict control and is used to make quality estate wines. Aside from the crops in their vineyards, grapes are at the same time supplied by contracted vineyards or procured on the spot market. For some DHEs, private vineyards, contracted vineyards and spot market procurement are coexisting. The current situation was gradually formed under the influences of politics and market response during the evolution of the Ningxia wine industry's development.

Influencing factors on the formation and selection of vertical coordination models in the Ningxia wine grape market

Due to the differences in the company's characteristics, the scale of the company, local policies, the requirements for grape quality/quantity, and strategies of marketing, the wine producers apply distinct supply models to manage their grape materials.

The characteristics of the companies are essential factors for the decision of raw material structure and sourcing models. The dragon-head enterprises are those companies defined by the country and they are assigned with responsibility for driving the local industrialized economic development. All interviewed DHEs mentioned that the company has social responsibilities: (i) including assisting farmers with the reclamation of wasteland into vineyards, (ii) providing references for the formulation of the Chinese wine quality standards, (iii) solving excess resources through direct procurement at the end of the harvest season, (iv) improving the infrastructure in surrounding villages to facilitate the lives of villagers, etc. In order to take full advantage of the superiority of the wine region and to ensure a constant supply of high-quality grapes, the companies have been committed to constructing standardized vineyard bases with the farmers, which is the primary motivation to apply large-scale vertical integration.

As a result of the large demand for their products, two of three DHEs in Ningxia have vineyards above 1,000 hectares and possess large production capacities. This extraordinary large-scaled production has pushed DHEs to be the first and the largest group which needs to be considered while talking about grape supply arrangements. They perform direct grape procurement, contractual partnership, and vertical integration of farmer's vineyards. Four of eight wineries own vineyards of around 20-35 hectares for other wine producers. Except for grapes from their vineyards, three of these four wineries buy in about 10 to 20% of grapes from external vineyards. The amount and required quality of the grapes vary by the demand of the winery for each vintage. There are two wineries owning vineyards of 60 to 150 hectares and two possess vineyard areas of more than 1,000 hectares. None of them needs to buy grapes.

In the Ningxia wine sector, local policies determine the organization of the grape supply models to a great extent. A wide distribution of viticulture appeared, and extensive vineyards were established under governmental support, which aimed to develop agriculture on wastelands and help residents overcome poverty. At that time, the Ningxia region was just a region producing grape materials for mass production in other wine regions. Since the 2000s, the integration of farmers' vineyards has been organized by DHEs together with the government to drive the 'Agro-industrialization' and the agricultural modernity in the wine sector. Around the year 2010, specialists and investors revealed the great potential of Helan Mountain Eastern Foothills wine region. In order to follow and respond to the government's 'estate wine' strategy, all 11 interviewed Ningxia wine producers, except one, possess integrated vineyards and grapes from individual vineyards. These vineyards are all used for their estate wine production.

Supportive policies were issued to promote integration in grape cultivation and attract new entrants. The interviewees demonstrated that their vineyards are either integrated backward by paying rent for farmer's land (around 1,200 Euro/ha per year) or they applied for the land from the government through signing land leases.

Regarding the management mechanisms of vineyards, the company can fully manage the private integrated vineyards. Vertical integration is the most effective form to overcome the quality/quantity problems within a single firm. The research expectation is confirmed. The determining role of politics has shown stronger power in recent two years. Two of the wine producers interviewed established the production facilities in the last two years. Both own more than 135 hectares of private vineyards (partly applied from the government) and they are preparing for their expected huge production capacity. Due to the modification in policies, further vertical integration is expected.

As specific requirements for target products, grape quality and/or quantity, are considered. These goals are achieved by either specialized management within the individual vineyards or via collaboration with contracted vineyards. As stated by the companies who employ experts to manage their private vineyards, the aim is to produce higher quality grapes. Meanwhile, more than half (eight) of the interviewed companies rely on contracted vineyards. For the two DHEs, they have more contracted vineyards than their own vineyards, aiming to provide bulk wine for other product lines, keep the consistency of their final products, and make up for insufficient yield same time assume their social responsibility in poverty areas. While for the other five wine producers, the reason to rely on contracted vineyards is to meet unique grape quality requirements (e.g., variety, acid levels, tannin structure, etc.; around 10 to 20% of their production relies on contracted vineyards. In the first ten years after the establishment of the vineyard, the grapevines in their own vineyards are too young to make the targeted wine, which is expected to have great maturity and complexity. Besides, some of the interviewees stated that the quality of their own cultivated grapes is not necessarily better due to the shortcomings of terroir conditions. Likewise, some wine producers search for grapes with more fruit flavors and better health conditions. In addition, the popularity of some favored grape varieties, like Marselan, is another motivation for wine producers to contract with a new partner for the long-term.

Contract design and contractual obligations in the Ningxia wine sector

As mentioned above, around 70% of the wine producers rely on contracts and agreements. Details about the contract design and contractual obligations were examined with the interviewed wine producers and grape suppliers.

There are several forms of contracts and agreements between grape suppliers and buyers. A type of marketing contract is signed during the summer until the beginning of September. In this case, buyers go to farmer's vineyards to select grapes and/or plots. They decide on the required quantity and the final quality (often judged by the sugar content) which is fixed in the contract. Concerning the 'price criteria', two DHEs set the lowest price as a benchmark and other buyers take the same prices or prices above the benchmark. In general, the prices vary between grapes in different vineyard locations and varieties. For the wine grape, the price relies on quantity, sugar level,

ripeness, polyphenol compounds, healthiness, and other quality indicators. It ranges between four to ten RMB per kilogram. The price criteria also differ greatly between wine producers. Some wine producers have strict quality requirements and are willing to pay a higher price only if the grapes meet their requirements. The requirements regarding the quality can sometimes not easily be measured and this is in line with the findings from prior studies.

The cooperation model is different for the farmers who own vineyards that are positively recognized by producers, as they have the potential to produce top-quality grapes or cultivate popular grape varieties. In this case, wine producers are more in favor to use mid-term contracts. Six producers stated that they work with two to five-year contracts. Normally, producers would renegotiate the agreements with farmers each year and make clear which is the required quantity and quality for this vintage. The clauses in the contracts differ between wine processors. Processors pre-pay fees to grape suppliers in spring. Some processors ask to be informed when the grower plans to use pesticides and the experts from wineries always join the canopy management during the growing periods. Some provide grapevine material to growers and offer training services of advanced technical operations for grape cultivation as farm assistance. However, no interviewed wine producer would provide fertilizer, pesticides, machines, or other agricultural materials to farmers. If extreme weather or disasters happened during the growing and/or harvest season, the growers mostly bear the losses, but the buyer provides some necessary support to reduce the loss. For the price statement within the short-term contracts, wine producers would pay for the final quality of the grapes. For grapes far from the required quality, producers pay the supplier with the market price. If the grapes meet the required quality, the payment is the price that was agreed to in the contracts or an even higher price. In this contractual relationship, the contractor provides a market for the goods, engages in many of the grower's decisions, and retains ownership of important production inputs, which is in line with our research expectation.

While a five to ten-year long-term contract is only found with DHEs, it is the most common form for DHEs to work with contracted vineyards. Like the clauses of other contracts mentioned above, the yield and required quality are regulated. The enterprise always sends experts to the farmers during the growing season to give cultivation instructions and give guidance for the correct treatment of the vine. The income of contracted farmers mostly depends on the sugar content and the weight of the grapes. Due to huge demand, a great reputation, and the large economic scale of DHEs, farmers are subsidized in the first several years to collaborate with DHEs and do not need to worry about contract enforcement. Nevertheless, many farmers complain about the price, which is always lower than the market price. This production partnership is close to vertical integration under outer political pressure.

In terms of contract enforcement, as mentioned by some producers, they must offer some extra benefits to farmers to keep the contract running. Most of the wine producers, except one, state that a breach of contract has never

happened but they heard that cheating of farmers was common some years ago. The experts from educational institutes feel that contract enforcement is still a big challenge. There is no specific legal protection or enforcement or supervising department. Some deviant behavior of farmers does not match with clauses in the contract and sometimes, a breach of contract occurs. One producer shared their experience: 'In great vintages, farmers disregard the contract and sell to buyers who promise higher prices; while in poor vintages, they may come back to the suppliers, forcing them to take grapes and pay the price; agreed on in the contract.' Talking to farmers about contract enforcement revealed that some independent farmers refuse to work with contractual relationships: they do not believe that wine producers are always trustworthy. Some deviant behavior of wine producers is given. For example, it is hard for farmers to ask for compensation from companies for poor vintages; wine companies do not pay the price as they promised in the contract: the companies reduce the price regardless of the income of the farmers or the wine companies delay the payments, etc.

A conflict of interest can breed mistrust and stagnation, ultimately contributing to the failure in fulfilling the contract. No relevant agencies or departments supervise the effectiveness of the contract. Contract enforcement entirely relies on the consciousness of both partners and their emotional connections. The risk of contract enforcement is a reason for the preference for private vineyards.

Discussion

This study has examined the structure and organizational form of vertical coordination mechanisms in the grape supply chain, as well as possible determining factors for the evolution and arrangements of vertical coordination in the Ningxia wine sector. One of the main findings is that almost all of the wine companies are applying a multi-supply model. Spot market transactions are used to secure basic range products while for higher quality products, the vertical coordination mechanisms advance more towards vertical integration. This confirms the assumption, that the higher the needed quality, the tighter the chosen coordination mechanism.

The ratio of each model varies between companies as it depends on product strategies and market demand. It has been evident that politics and market responses hugely influence the current situation during the evolution of the Ningxia wine industry development.

In the Ningxia wine sector, politics influence the shift from uncertain random transactions on spot markets towards vertical coordination mechanisms in the grape supply system. After collecting dispersed vineyards in the early stage, DHEs are first asked to conduct vertical integration with farmers. Since 2010, when the 'estate wine' strategy was promoted, integrated private vineyards are then supported and motivated to be applied with emerging small- to medium-sized wine processors. However, policies and strategies concerning the regional wine industry development have shown some modifications since 2018. The 'Great Item' strategy has been adopted. New entrants with the scale of boutique wineries are no

longer favored, but large-scale producers are welcomed, and the regional brand is strongly promoted to improve the power of the regional brand and to increase market share. A larger share of vineyard bases have been integrated for the regional brand and enterprises and are managed by international teams under high standards to keep quality but also improve the cost performance. Therefore, this adjustment has further accelerated the vertical integration of grape raw materials.

As a result, of the market response, business relationships between grape suppliers and wine producers were progressively induced from spot market procurement to vertical coordination. Since 2010, many wine producers entered Ningxia, which led to a rise in grape prices and the spot market for grape material was extremely frequented. However, the depressed market in 2013 combined with the lack of market experience of new companies. This led to difficulties in product sales, which consequently ended in a decline in the demand for grapes and therefore in a price decline until 2016. During that time, numerous arguments came up due to a breach of contract from either the grape growers or the companies. The market pressure forced many grape growers to exit grape cultivation, thus the government had to integrate their vineyards to save and keep the grapevines. Contract enforcement problems caused hesitations on both sides of the contractual relationship, making them afraid to touch productive partnerships again. Nevertheless, contracted vineyards are still common for DHEs and some wine producers. DHEs have long-lasting partnerships with their contracted farmers to guarantee consistency in the quantity of their products. However, contracted vineyards have increased in recent years, as the wine market and consumers have become more mature and there is more awareness to look for high-quality wines. As shown in our results, some wine producers start to discover more top vineyards, engaging in specialized investments into vineyards, realizing the importance of maintaining stable and close coordination with grape suppliers. Overall, the findings are in line with other studies (Goodhue et al. 2003; Fraser 2005; Fernández-Olmos et al. 2009; Franken 2014; Chaddad et al. 2017). Contractual coordination and vertical integration are driven by the demand for quality wine production. The arrangements of the contractual relationship are mainly decided by processors. The decisions are influenced by the production scope and the marketing strategies of the processors. The contracts show differences in contract duration, agricultural or financial assistance from buyers, involvement levels in viticultural practices, and grape quality measurement methods. As stated above and in the theoretical background section, the forms of vertical coordination in the Ningxia region are dramatically affected by local policy. At first, vertical integration was promoted to make foster quality production and now vertical integration is used to support capital enterprises (DHEs) to form large-scale businesses. The topic of contract enforcement confirmed the same findings as in other regions. The lesser an environment is institutionally developed; the legal protection of contractual rights cannot

be guaranteed. However, there is progress going on in the Ningxia wine region.

Conclusion

In this study, the required information was collected through conducting face-to-face semi-structured individual in-depth interviews with 20 selected participants. This study summarizes the typology of grape supply models in Ningxia wine industry and examines influencing factors for the arrangements of current vertical coordination models of grape materials supply in Ningxia region, particularly the hybrid organizations and contractual relationships are analyzed.

In line with prior findings is that vertical integration of grape cultivation increases due to the recognition and desire for wine producers to produce quality wines. Meanwhile, the local political regulations and the guidance of the government are crucial for the preferences of individual vineyards. The possibility of governmental interventions in the grape supply chain has been realized since the land ownership in the Ningxia region. The role of political institutions in the development of the Ningxia wine industry cannot be ignored.

On the other hand, for productive partnerships, long-term contracts are more frequently used by dragon-head enterprises to keep consistency in production. While some boutique wineries prefer mid-term contracts with high requirements on grape quality. In short-term contractual relationships or oral agreements, the quantity of grapes is more important for buyers than specific requirements on grape characteristics. In this case, grape suppliers have no bargaining power over prices. The wine producers dictate prices. For a more detailed analysis of the contract design, a much richer data set from wineries needs to be collected and matched to the specific grower requirements.

As illustrated above, to produce high-quality products, vertical coordination partners must overcome the problems of uncertainty, opportunistic behavior, and contract enforcement. However, within the less developed institutional environment in Ningxia, the problem of contract enforcement cannot be completely overcome. According to the interviewed wine producers, contracts can proceed smoothly relying on a smart cooperative partnership and a well-balanced relationship maintained by the partners themselves. Rather than legal concerns, the emotional connection between partners is one of the key factors for guaranteeing contract enforcement.

Considering the possible trend in a contractual relationship, the problems of contract enforcement need to be overcome in the long run. The government must establish a well-organized institutional environment, taking charge of the role of supervision on negotiations about contract enforcement. It is also critical to improve the wine law and ensure its implementation. A grape cultivation association could be organized and authorized to participate in the grape value determination process during the grape procurement to guarantee proper profits for grape suppliers. The bargaining power of independent farmers is low. Independent farmers are too dispersed; they cannot request a higher price. As shown in the results, the farmers

working on mid- to long-term contracts with wine producers is better compared to other farmers. In this case, the establishment of a contractual relationship is suggested to farmers to decrease the risk of the transaction and offer more protection for their business.

For future research, the relationships between grape suppliers and producers should be analyzed in detail. Besides, the means applied by wine producers for strengthening connections and maintaining smooth contract enforcement have not been investigated. These would be topics worth conducting in future research.

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