Case study: multidimensional comparison of a local and global wine supply chain in France (task 3.5)

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GLAMUR

Global and local food assessment:
a MUltidimensional performance-based approach

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CONTENTS

LIST OF FIGURE AND TABLE

1. Introduction

1.1. Presentation and structure of the report

This case study report presents the results on the performance of local and global wine chains. The case study is carried out by INRA but proceeds from a collective work with the FIBL team. Two local and two global chains are analysed in France. The two local chains (LC) consider wines produced, bottled and sold in the surroundings of Montpellier, Languedoc-Roussillon region. In the first case of LC wine is sold on farm, directly to consumers, who can be local inhabitants or tourists. In the second LC case, bottles of wine are sold to an intermediary (restaurant, wine shops), whose commercial activity is located in Montpellier. For the global chains (GC), the first case corresponds to basic wine without PDO (protected designation of origin) label, sold in bulk from a wine cooperative to a wholesaler, bottled far from the production area, branded as "J.P Chenet" trade mark, and distributed in Switzerland through supermarkets. The second GC case is a "specific «wine, guaranteed by PDO and/or organic label, bottled on farm and exported through many intermediaries to Switzerland. For our analysis we consider all stages from the grape grower to the consumers.

The report is organised according to the GLAMUR research questions (i.e. the five dimensions of performance) applied to both French and Swiss wine chains. We specify these questions for the wine sector by using literature review, interviews of experts and primary data already collected by the team. We took into account the national (French and Swiss) challenges on food chain performances, as they have been reported in WP2, specifically territoriality and global competition. Discourse on food in Switzerland is more oriented to biodiversity, land use planning, landscape protection and traditional ways to manage land (Comparative report, 2014). France mostly faces the challenge of maintaining its leading position in the global wine market by increasing productivity and quality and adapting the wines to the evolution of consumer's preferences.... without losing the reference to patrimonial style of food, local know-how and local resources, embodied in the notion of "*terroir*" [1](Comparative Report, 2014).

Research objectives and relevant attributes have been defined with FIBL team, taking into account similarities and differences of our two countries. Following the GLAMUR systemic and analytic perspective, indicators have then been selected and adapted from reference grids (f.i. SAFA) or from works on the wine sector, in order to respond to the research questions and to assess and compare wine chains performances regarding specific attributes.

In the first section, we briefly present the French wine sector embedded in both national and international markets ; in the second section we describe the background of our case studies focusing on the distinction between "local" and "global" wine chains, the scope of the value chains and general characteristics of the case studies. In the third section, we present the research framework with specific questions and objectives, the selection of attributes from the GLAMUR list, and the definition and contextualization of the selected indicators. In the fourth section we develop our method of data selection and analysis. In the last section we present the results of our work, reviewing and discussing the selected attributes. This report reflects the work in progress.

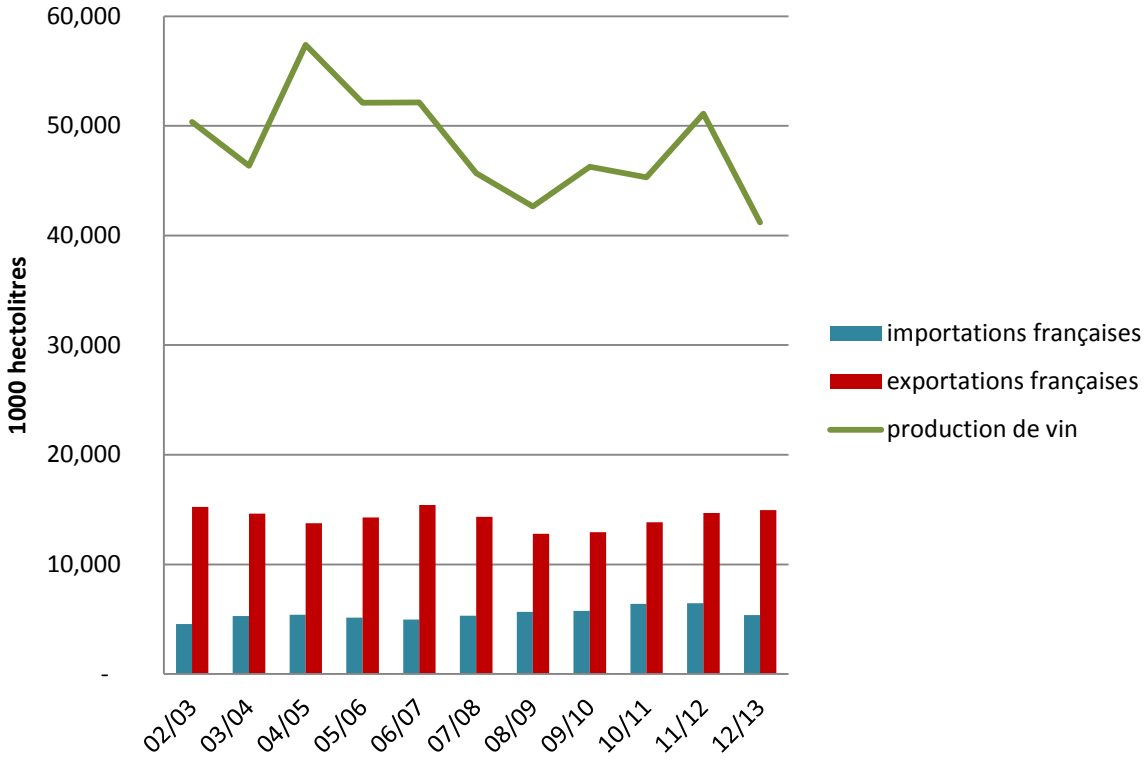
[1] The terroir is a delimited geographical area in which a human community, built in the course of its history collective knowledge production, based on a system of interactions between physical and biological environment, and a set of human factors. The socio-technical paths and brought into play, reveal an originality, confer typicity and lead to a reputation for a good native of this geographical area. (National Institute of Appellations of Origin, INAO)

1.2. Introduction to the French wine sector

Wine is a strategic and emblematic product for France, combining in different ways the local and global dimensions of markets. Indeed the segmentation of the French wine market is based on specific links to local areas, and France still plays a leading role in the global wine market.

Since 2005, French wine production has varied between 50 and 40 million hectolitres per year, from which between 15 and 12 million hectolitres have been exported. As far as the volume is concerned France shares with Spain and Italy the first ranking position worldwide for both wine production and wine export. However, France remains the leading country in terms of value for both production and export (17% of the world production, 15% of exports), benefiting from higher prices for its wine (OIV, 2013). France is also the first wine consumption market (purchases of 30 million hectolitres in 2012), mainly supplied by national production, and only by 5 million hectolitres of imported wines. French average consumption per inhabitant reaches 50 litres per year in 2012, one of the highest levels in the world (behind Vatican), but resulting from an important decrease since 1970, when French people used to drink around 120 litres per year. French wine consumption dramatically changed during last 40 years, shifting from daily cheap red table wine, to less frequent drink of quality (and more expensive) wines.

Graph 1 : Volumes of wine production, import and export, France, since 2002



Source: own elaboration on data provided by FranceAgriMer, 2013

The strategic role played by wine in the French society reflects many aspects:

- In 2012, wine and spirits provided 9.5 billion euros of surplus for the French trade balance, becoming the second best item after aeronautics. Wine is thus a basic sector for the French economy, injecting value from outside. This role is strengthened by externalities on other economic activities linked to tourism, gastronomy and culture. Wine is one of the main attributes cited by foreigners to qualify the French attractiveness (Bastian, 2008);
- Vine plays a specific role in land and landscape management. Vine covers 788 700 ha, among which 771 500 ha are dedicated to wines (Agricultural Census 2010). This area covers 2.6 % of the French Agricultural land and contributes to 15% of the agricultural production in value. Wine is thus an intensive production that maintains economic activity in rural areas, sometimes very far from cities and economic centres. Vineyards also have positive impacts on landscape and on reduction of fire risks in south of France;
- Wine provides jobs through 87 400 farms cultivating vine (Agricultural Census 2010). The number of grape growers is declining, but wine production keeps on generating 250 000 direct employments, i.e. 23 % of agricultural labour (AWU). Different studies also suggest that more than 500 000 jobs are linked to the whole wine industry in France (FranceAgriMer 2012). The wine sector is thus work intensive and gives opportunity to maintain employment;
- Wine is also linked to local and regional identities. Vineyards are located in specific areas where producers have defined "specific wine quality" linked to "specific local conditions", both natural (soil, climate) and human (local knowledge…). Wine is thus considered as part of local cultures, leading to develop the French notion of "terroir", recognized by PDO labels. Patrimonial and symbolic dimensions of wine have strong impacts on its value (price).

The quantitative decline of the wine national consumption, a strong competition in the global wine market with "New World" countries (Australia, USA, Chile, South Africa…) and specific CAP policy (f.i. subsidies for uprooting) led to the decrease of vine area and wine production in volume (but less than in Italy and Spain). Nevertheless the French wine industry remains competitive and creates value through quality strategies. These strategies rely on different production systems and quality signs recognized by consumers:

- French wines are mainly differentiated by Geographical Indications, involving 90% of the vine growers and covering around 80% of the national wine purchases. PDO labels (AOP/AOC) are predominant (50% of purchase), strictly referring to "terroirs", when PGIs reach 28 % of the market, mainly referring to varieties and regions. The production of wines without GI has decreased since 1970 but these wines are finding new markets by taking advantages from their new right to sale variety wine;
- The market segmentation is also based on complementary signs, such as producer's names and trademarks. References to environmentally friendly practices are also promoted. Different grape production systems are coexisting in each region: conventional (high use of pesticide), reasoned or integrated (reduction of pesticide use according to "observations and needs"), organic (label AB) and biodynamic. Organic viticulture has a growing influence, but remains limited (6% of the area in 2012), when "reasoned viticulture" has extended to a large part of the French Vineyard, but has shown limited impact in terms of pesticide use reduction (Touzard, Pull, 2013).

Wine technical and marketing chains are organized into different steps: i) production of grapes; ii) wine making process which can be developed on farms ("domains", estates), in cooperative cellars (around 50% of the processed grapes in France) or by wineries (buying grapes, mainly in Champagne); iii) storage (on farm, in cooperative cellar or in traders cellars; iv) filling (bulk, bottle or Bag In Box); v) marketing through different ways and retailers; vi) place of purchase and/or consumption (on farms, restaurant, stores, Super Markets…). 1/3 of the French wines are bottled on the property and about 2/3 are commercialized through retailers. A wide diversity of chains are thus co-existing, from direct sales (including wine tourism) and local supply chains of restaurants, to global chains exporting both basic wine in bulk to super markets and bottles of "icon" wine sale in specialized stores.

1.3. The great transformation of the Languedoc-Roussillon vineyard

The French local and global wine chains will be assessed by starting from grape-growers located in the Languedoc-Roussillon vineyard, in the South of France. Until the late 1980s, Languedoc-Roussillon was the first vineyard in Europe, where grape was collected from about 100,000 farms, and processed into basic wine by a large number of local co-operative cellars. 80% of the Languedoc wine production was sold in bulk as "table wine". During the last 30 years, this region has been converting to the production of higher quality wines with two different strategies: French 'Appelation d'Origine Contrôlée' (AOC/PDO) certified wines coming from the upland vineyards, and varietal wines (mainly certified as IGP/PGI) from the flatlands. This radical transition from table wines to quality wines production has been pulled by the decrease of the table wine demand and price, but it has also been accompanied by two EU structural measures, in order to better adapt supply to demand: "up-rooting premium" (PAD) matching the highest yield vines, and "vineyard restructuring premium supporting the plantation of new aromatic varieties. As consequence of this great transformation the Languedoc-Roussillon vineyard reduced by almost 45%from 400 000 ha to about 230,000 ha currently (FranceAgriMer, 2012).

Figure 1: Evolution of the vine area in Languedoc Roussillon : 1800 - 2010

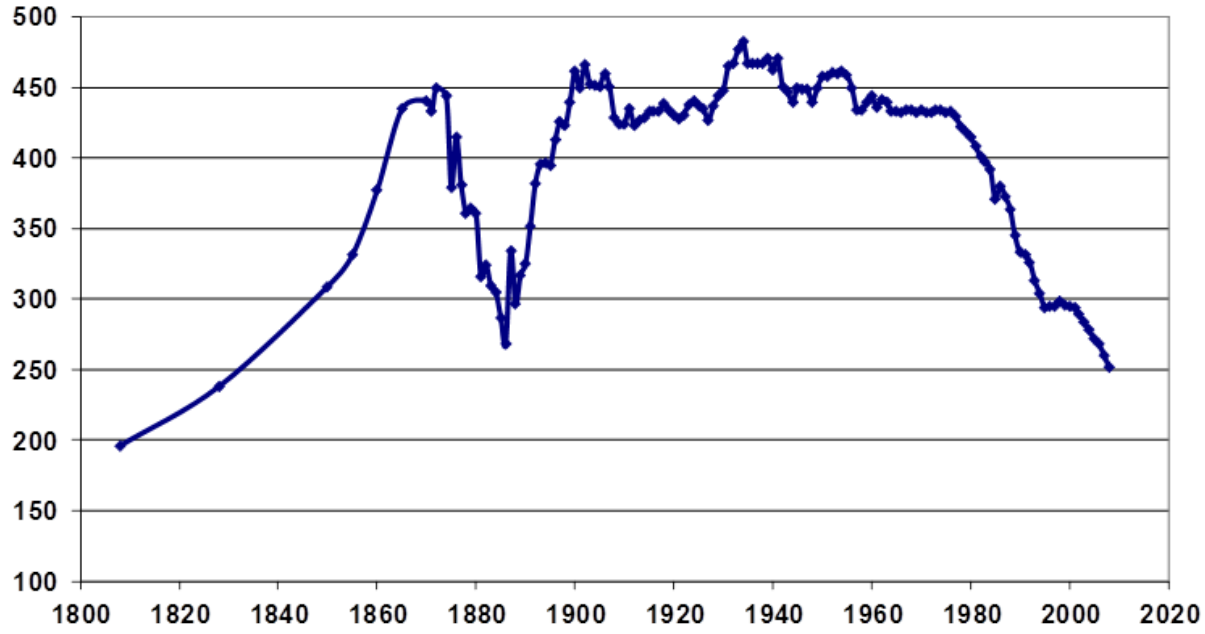
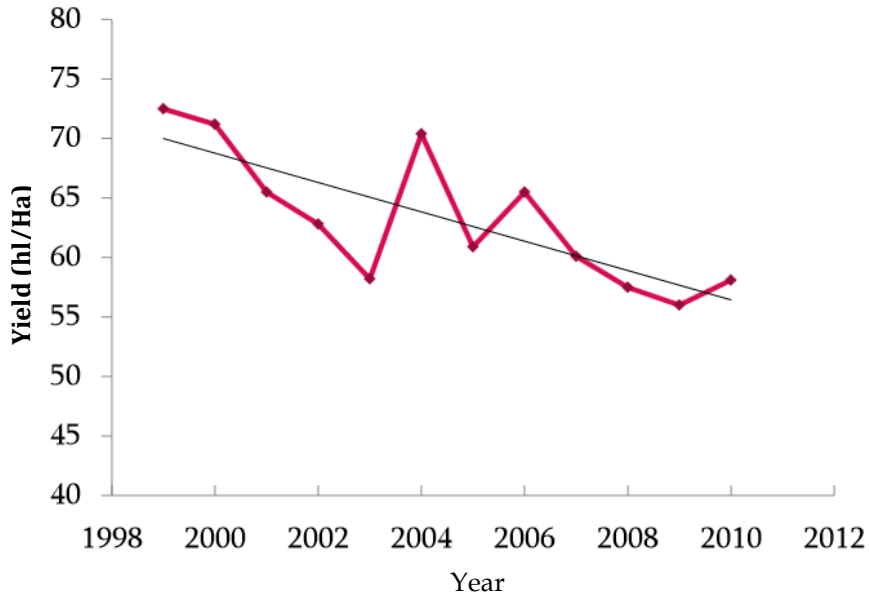


Figure 1 : Evolution of the total area in the Languedoc-Roussillon vineyard

The volume of production also dramatically decreased from 30 million hectolitres to about 12 million in 2013. The reduction of the vine area mainly explains this production fall, but the average yield also declined, as it can be shown for the Hérault department (one of the four wine departments of the administrative Languedoc-Roussillon region) where 10 hl / ha have been lost in 10 years (Hannin and Zébic, 2012). This yield decrease resulted from both the plantation of less productive new varieties and the impacts of climate change (accentuation of dryness during summer).

Figure 2 : Evolution of average yield in Hérault department



Source: IAMM; Hannin and Zébic, 2012

Nevertheless, the structure of both the Languedoc vineyard and the Languedoc wine production has radically changed. In 2014, low quality varieties have become marginal and table wine covers less than 20% of the value of Languedoc wine production. Many wine farms and wine cooperatives disappeared, but the incomes of the grape growers and wine producers are increasing again. Both cooperative cellars and private cellars have been involved in this transition, adopting a wide range of technical and marketing innovations.

2. Background: case studies

This section presents the four key criteria selected according to their capacity to differentiate local and global chains. We first explain each criterion in the context of Languedoc wine sector, and then identify specific characteristics of each criterion that could differentiate local and global chains.

2.1. Distinction of a "local" and "global" wine chain

In summary, our criteria that distinguish local from global are mentioned in the table below:

1. Physical / geographical distance between producers and consumers
2. Governance of the supply chain
3. Category of wine quality
4. Mode of handling and packaging

The local chain is characterized by a limited number of intermediary stakeholders while the final product presents a defined and recognizable bottle which is sold in cellar or specific wine shops or restaurants. The global chain is characterized by a more intricate and long supply chain where wine is exported in bulk and bottled. The final product can be found principally at retailers' stores.

Table 1: Table of key dimensions for the distinction "local" and "global"

KEY-DIMENSION	LOCAL		GLOBAL	
PHYSICAL, GEOGRAPHICAL DISTANCE BETWEEN PRODUCERS AND CONSUMERS	Production, process bottling and distribution in Languedoc, Montpellier area.		Production, process in L-R, bottling in Bordeaux and distribution in bottle in Switzerland	Production, process, bottling in Languedoc-Roussillon and distribution in Switzerland
ORGANIZATIONAL MODEL AND MANAGEMENT OF THE SUPPLY CHAIN	Production model: Family and large scale domains making wine on farm		Production model: Grape-growers, cooperatives, federated marketing coop Switzerland supermarkets	Production model: Large scale domains with employees making wine on farm Specialized stores, restaurants
	Direct sell at the cellar	1 local intermediary between producer and consumer (not supermarkets)		
PRODUCT QUALITY LINK WITH TERRITORY	hillside and PDO Languedoc		plain ; PGI Pays d'Oc	Hillside; PDO/AOC Languedoc (& organic wine)
MODE OF PACKAGING	Bottle		Bulk	Bottle

2.1.1. Physical, geographical distance between producers and consumers

Distance between wine producers and wine consumers are key criteria for GLAMUR. Two objective dimensions of this distance have been chosen: the number of intermediaries and the geographical distance between production and consumption. A wide range of situations can be noted as presented below:

The general structure of the Languedoc wine supply chain has been described by Domergue and Couderc in 2009. Various categories of actors and transactions have been pointed out in the marketing chains. They noted that the frontiers between production and marketing are often confused because of the development of both "downstream" activities by cooperatives (f.i. investing in selling points) and "upstream" activities by traders (f.i. buying vineyards). Nevertheless the mass-market remains the major distribution chain for Languedoc wine at national level (around 40% are sold in French supermarkets) and international level (20% exported through long chains). About 20% of the turnover is made through regional sales and around 20% are supplying quality specialized long chains, at national and international scales.

2.1.2. Governance of the supply chain

1. Organizational model of wine production

Languedoc wines proceed from two main organisational models, divided in two sub-models:

a) Private domains: the same economic unit is cultivating grape, making wine and selling wine

- **Large scale domains with employees;** more than 40 hectares, manager and permanent employees, strategy of asset valorisation, production of quality wines through labels and own trade mark….
- **Family domains;** mainly between 10 and 40 hectares, strategy of income increasing, innovations carried out by the farmers, helped by professional adviser (chamber of agriculture), production of personified quality wines….

b) Cooperative system: There are different types of cooperatives, according to their size, specialization, quality orientation, business model, management... Cooperatives can also join "federated cooperatives" mainly for marketing issues. Two kinds of cooperative members (grape growers) are noted:

- **Full-time grape growers** (from 8 to 25 hectares), often directly involved in the cooperative board, aiming at increasing family income, helped by cooperative technicians and professional advisers.
- **Small grape growers** (less than 8 hectares, generally less than 4 hectares) that are part-timers or retired people, combining social and economic goals, often representing the majority of the cooperative members

2. Marketing Chain management

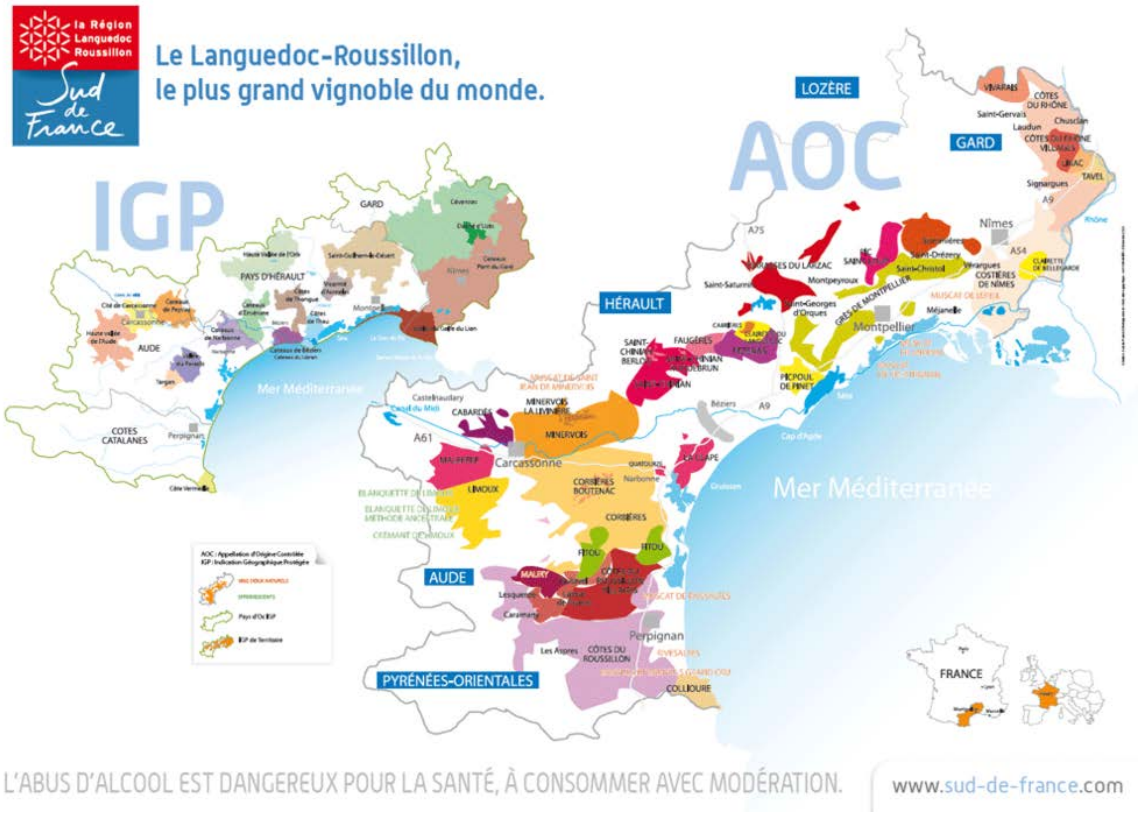
Different governance models and flow managements are coexisting in the wine supply chains. We can identify the main actors or structures that control flows of information and value, and capture added-value. The study conducted in 2003 by Jerome Chandes and Dominique Estampe suggests several models of wine marketing chains. Four models can be found in Languedoc:

1. Supply chains driven by the producer who mastered most of the operations, from the grape production to the wine final marketing. This is the case of many reputed wine estates (Domaines or Chateaux) but also of some wine cooperatives managing their own network of sellers in different niche markets.
2. Supply chain driven by supermarkets, final wholesalers or network of wine shops (i.e. Nicolas), through their own brands. This downstream governance is limited to specific market segments or supermarket companies (i.e. Intermarché, Auchan) but has relevant impact on Languedoc vineyard (vertical integration to many cooperatives).
3. Supply chains driven by wholesalers or traders who purchase wine in bulk and develop their own trademark in the international markets, distributing bottled wine in different final chains (supermarkets, wine shops, collective restaurant, hotel chains…)"Grand Chais de France" illustrates this case, in particular by selling variety wine through "JP Chenet" trade mark.
4. Supply chains co-driven by producers and traders at regional scale through "marketing boards". Champagne illustrates this case, which is not really developed in Languedoc (weakness of the "wine interprofessions")

2.1.3. Category of wine quality

Languedoc vineyard has a specific profile. In contrast to the national level, Languedoc IGP/PGI vines cover a larger area (61%) than PDO/AOC vines (31%). It results a diversified market structure (in volume) offering 56% of IGP/PGI wines (including 45% IGP Pays d'Oc), 21% of PDO / AOC wines, and 23% of wines without GIs (STG).
We consider the three main categories of wines in our study: Pays d'Oc PGI, Languedoc PDO, and wine without GI.
Pays d'Oc is the most important category of wine in Languedoc, and the main French PGI label. The label is used in order to guarantee the regional origin of "variety wines" (32 authorized varieties proceeding from different French regions or recently created by research). Pays d'Oc wines are mainly distributed in global chains. About 60% are exported and Switzerland is its 7th importer country (29 113 hl in bottle and 71 386 hl in bulk in 2011). The national PGI market is driven by a few retailers (Grand Chais de France…) and supermarkets. Small stores, cafes and restaurants are supplied by non-specialized retailers (such as distriboisson or C10) or in few cases by direct marketing chains.
PDO wines are produced by about 30% of the Languedoc wine-growers and grape-growers (in many cases in addition to Pays d'Oc). PDO label indicates that the wine comes from traditional varieties and that all stages of process are located in the same delimited area (the "terroir") giving specific characteristics to the wine (INAO, 2012). About 40% of Languedoc PDO wines are directly exported, 30% are providing French supermarkets and 30% are sold in traditional or short chains (direct sale, restaurants, specialized stores…).

Figure 3 : Map of the Languedoc PDO and PGI vineyard



Source : http://www.sud-de-france.com

Wines without Geographical Indication or TSG, (VSIG or "Vin Sans IG" in French), historically called "vin de table" (table wine) in France, correspond to basic wines, blended, sold in bulk and paid according to its alcohol degree. The production is decreasing but remains relevant for some cooperatives located in plains (high yields). Small volumes are locally sold to local consumers (members of coop).

2.1.4. Mode of handling: Packaging

As far as the first sale is concerned (from domains or cooperatives), three kinds of packaging may be distinguished: wines sold in bulk, wine sold in bottle, wine sold in Bag in Box (BIB). These types of packaging are coexisting in the global market.

The market in bulk is mainly supplied by cooperatives, collected by traders (French or foreign firms) and bottled near the main consumers centres (north, west or east of France, other countries). There are at least two intermediaries. All labels are sold in bulk, but TSG (99%) and PGI (85%) wines are first concerned (about half part for PDO volume). Direct market in bulk is less developed in Languedoc than in other regions (f.i. in Loire valley) and is limited to a few direct selling from cooperatives.

Wines locally bottled and sold in the global market are supplying "specialized markets", with higher qualities and prices. Bottling “on farm”, “on cooperative cellar” or “in Languedoc” is seem as a complementary guarantee of origin and quality (vintage) and as a potential source of additional benefit. Bottling in the wine production area is imposed by some PDO code of practices. In fact bottles are necessary tools to conserve wines for long period, including at home. They provide local markets for all kinds of labels, especially local restaurant where “opening a bottle of wine” is a strong tradition.

BIB (Bag in Box) is a more recent packaging used for basic and intermediary wines, labelled as TSG, PGI or PDO.

2.2. Scope of the value chains under study

Our preliminary analysis of the wine sector leads to choose a pair of chains in the Languedoc-Roussillon region. This region includes a wide range of wines (according to their quality, packaging, price), distributed through both "local" chains (sales on farm or to local restaurants and stores), and "global" chains (export and national market, supermarkets). Languedoc remains the first French vineyard in terms of volume and surface (236500 ha in 2010) and the third in value (after Champagne and Bordeaux). Languedoc vineyard includes 2700 private domains processing their grape and selling their wine, and 211 wine cooperatives (70% of the regional production of wine) supplied by 18 000 grape growers (Agreste 2013).

As in the GLAMUR DoW it is required that some global case studies are conducted in common, and that the volumes of Swiss wine sold abroad are really low, both countries decided to analyse a common global supply chain of French wine exported to Switzerland. Moreover, specific local supply chains have been identified in both countries and described. Therefore, concerning the definition of both chains it is important to highlight the following characteristics:

2.3. Presentation of the case study

2.3.1. Global wine chain: Wine from Languedoc-Roussillon to Switzerland

For the global chain we will take the case of export market, in bulk and bottle. We focus on export from Languedoc to Switzerland, after having checked that these flows were important. More than 100 000 hectolitres per year have been exported to Switzerland (during the last 5 years) and this country belongs to the top ten importer countries of Languedoc wines. The first quick analysis (expert interview) [2] confirm that many actors are involved in these (long) chains and that two subcategories of global wine chains can be identified:

- Wine sold in **bulk** by cooperatives and unions of cooperatives and imported by wholesalers and distributors from Switzerland. These wines are produced by grape grower members of the cooperative. The wine is sold in bulks to French and Swiss traders, wholesalers and bottlers (e.g. LGCF group, Schenk, Bataillard, Scherer&Bühler or HaeckyGruppe). These importers provide other wholesalers non-specialized in wine, like retailers and supermarket. The wine is sold under the retailer’s brand combined with a geographical indication (PDO/IGP) or the label “Vin de France” mentioned on the bottle.

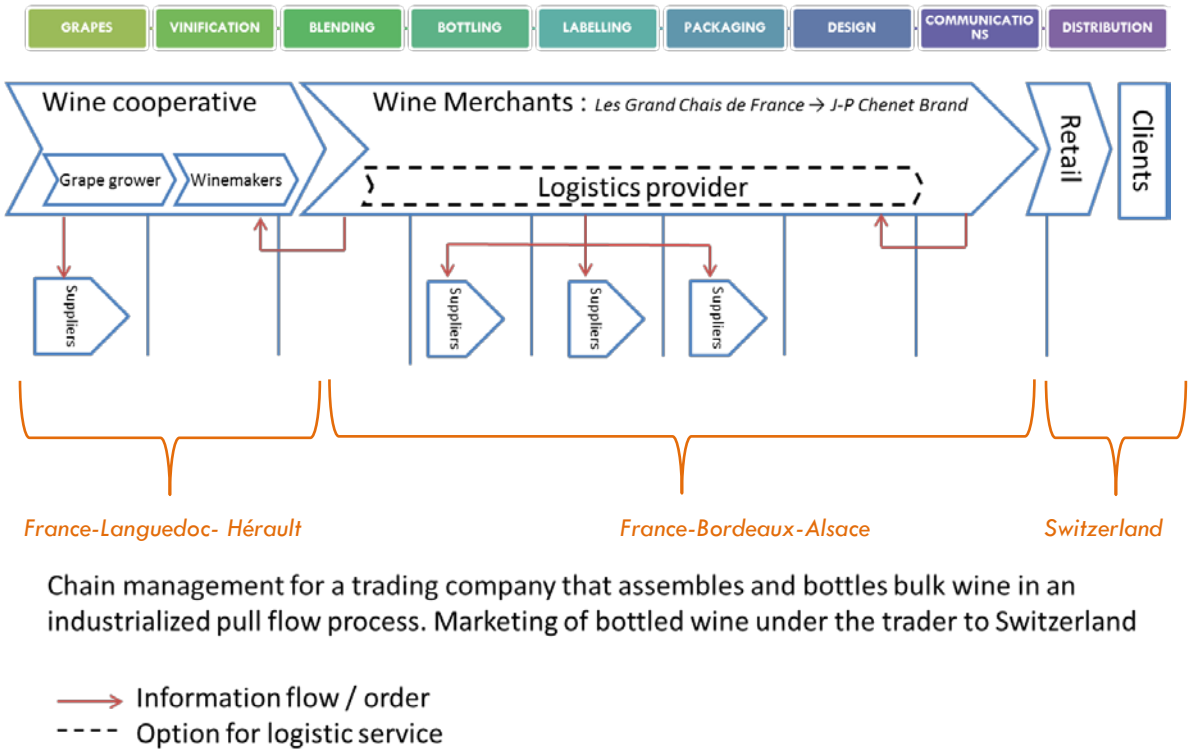
[2] Refer to the Quick Scan methodology implemented for wine chains : Step 1 : identification of a pair of chains and listing of preliminary sources, Step 2 - Selection of 5-10 key respondents, representative of FSC actors, Step 3 - Interviews. About ten interviews were conducted with experts in the wine sector to define i) the criteria for differentiation of local and global chains and, ii) Key issues related to chain performance.

- The export market specialized in **bottled** wine mobilizes other operators within the global chain. Bottled wine is thus sold on the global market by wine estates and cooperatives. Production strategy enhances the quality image and the link with the "*terroir*" is identified by the labels DOP or PGI or suggested by the name of the producer. Swiss operators provide specialized stores and restaurants.

Table 2 : Detail of the selected global chains

selection criteria	TWO GLOBAL CHAINS	
Representative area	Region of production: Hérault department (Languedoc-Roussillon)	
Type of product	Still wine, red wine, various vine varieties	
Organization mode for the wine production	Grape-growers, cooperatives, federated marketing coop	Domains making wine on farm
Geographic situation / wine category	Plain ; PGI Pays d'Oc	Hillside; PDO/AOC Languedoc (& organic wine)
Packaging	bulk	bottle
Distribution chain	export to Switzerland by traders, bottled far from production place, sold in supermarket	export to Switzerland by specialized traders

Figure 4 : Scope of the Global Bulk Wine Chain



Chain management for a trading company that assembles and bottles bulk wine in an industrialized pull flow process. Marketing of bottled wine under the trader to Switzerland

→ Information flow / order
---- Option for logistic service

Figure 5 : Geographic scope of the global bulk wine chain

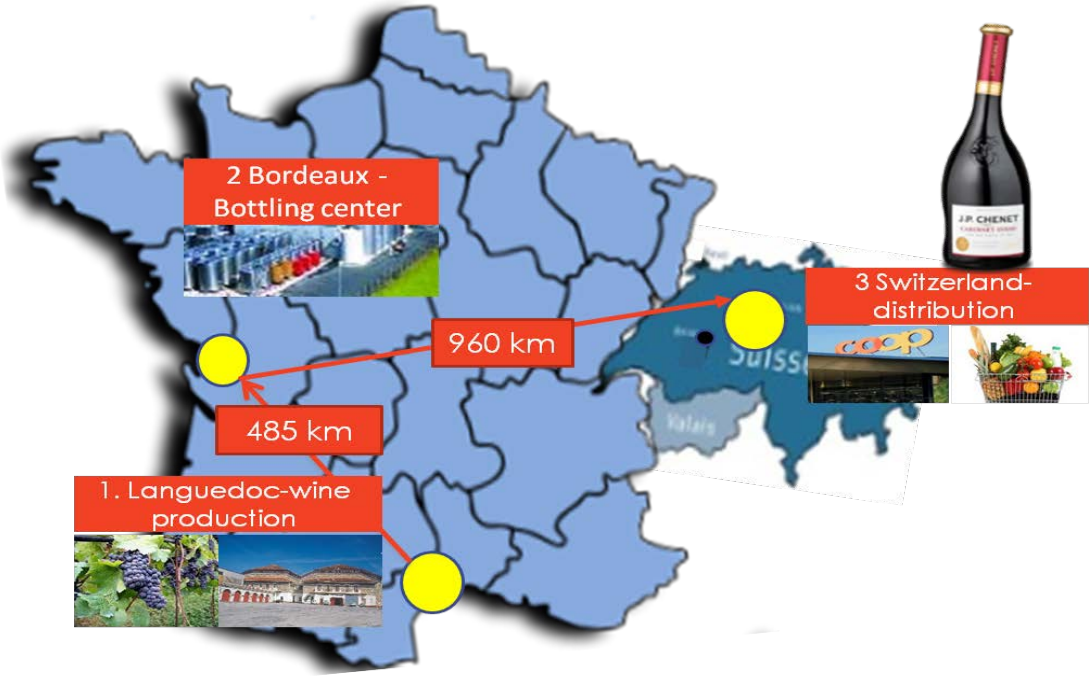
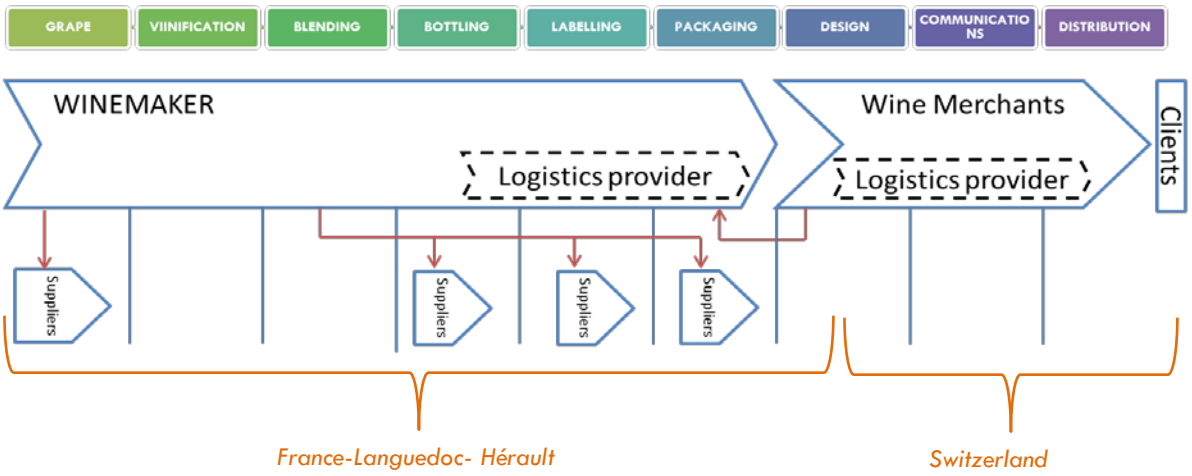


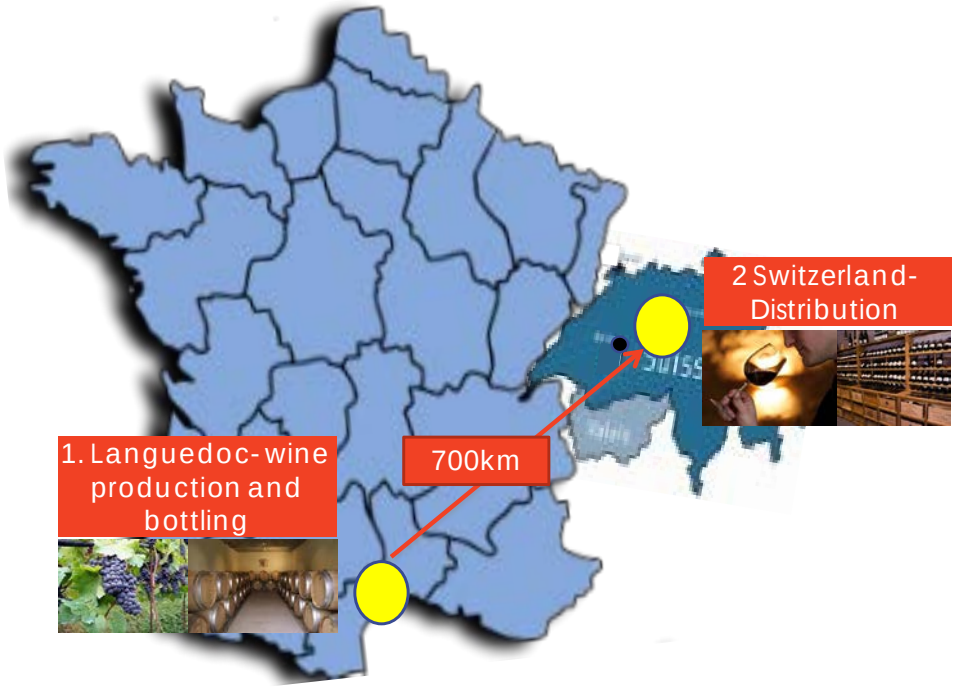
Figure 6 : Scope of the Global Bottled Wine Chain



Chain management working in just in time production or pushed production by a producer who master most of the chain operations with outsourcing to a specialist trader or a logistics provider to export wine to Switzerland

→ Information flow / order
---- Option for logistic service

Figure 7 : Geographic scope of the global bottled wine chain



2.3.2. French local wine chain

In Languedoc, local chains apparently have a weak position in the whole wine market (less than 20% of the volume). However, direct sales at the cellar are traditional practices and are increasing in terms of volume, according to the last agricultural census. Local chains are characterized by i) a limited number of intermediaries, ii) geographical proximity between production and consumption (in the same region), iii) recognition of the local identity/origin of the wine, through relevant label (on the bottle) or reliable information given by the wine growers.

Wine tourism could be considered part of these local chains, even if the bottles of wine are not always drunk in the region. Wine tourism is defined by all the services provided to tourists in the vineyards (winery visits, tastings, accommodations, catering and secondary activities connected to the wine and to regional traditions) (Bussereau, 2007).

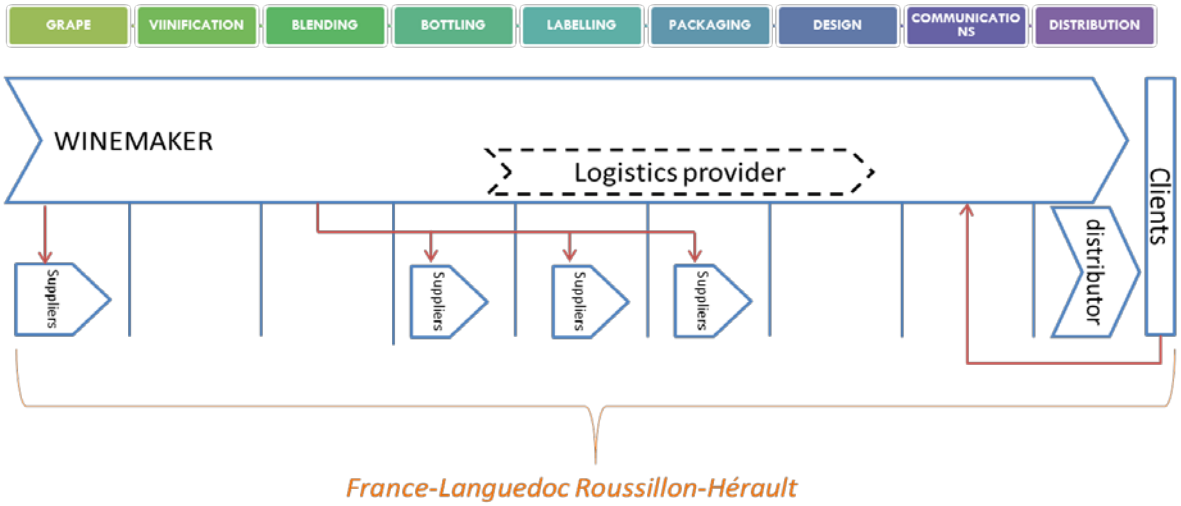
In our study, we identify wine "local chains" as chains located in the Hérault department, one of the four wine departments of the administrative Languedoc-Roussillon region. We will focus on the wine produced in "family domain", even if small cooperatives also sell wine to local consumers. We will give priority to PDO wines, proceeding from “local” varieties like Syrah, Carignan, Grenache, and Mourvèdre...but we will also take into account other signs of local identity, including direct acknowledgment of the producer by the consumers. The head city of Herault department is Montpellier agglomeration (400 000 inhabitants). We will focus on two local chains: direct selling on the domain (to local people or tourists); and short chains providing wine to stores and restaurants in Montpellier. Quality guarantees implied in the PDO and PGI labels are substituted with interpersonal relations between consumers and producers, allowing them to judge and know the quality of the wine sold. Vine growers are interested in value the link to the place, "territory" and "*terroir*", local resources and know-how (traditional grape varieties, landscapes, networks, customers).

- Direct sale at the cellar (private cellar) to local consumers and tourists,
- Sell to one local intermediary, (restaurants, territory specialized stores, specialized events) commercializing the products in *Hérault*.

Table 3 : Description of the two selected local chains

selection criteria	LOCAL CHAIN	
Representative study area	Region of production: Hérault department (Languedoc-Roussillon)	
Type of product	Still wine, red wine, local vine varieties	
Organization mode for the wine production	Domains making wine on farm	Domains making wine on farm,
Geographic situation / wine category	hillside and PDO/AOC Languedoc	hillside and PDO/AOC Languedoc
Packaging	bottle	Bottle (and bulk / BIB)
Distribution chain	Sale to restaurants and specialized stores in Montpellier	Direct sale on farm, to local consumers and tourists

Figure 6: Scope of the Local Wine Chain



Chain management working in just in time production or pushed production by a producer who master most of the chain operations

⟶ Information flow / order

- - - - Option for logistic service

Figure 7: Geographic scope of the local bottled wine chain

2.3. Main critical issues of the local and global chains

The main issues[3] related to the wine supply chains reflect for both countries the current situation of the sector as well as the future challenges to overcome. These issues are listed below and they were used to select the indicators listed in the next section.

- Pesticides and fertilizers used to obtain high yields
- Impact on human health from pesticides and fertilizers
- Soil quality and preservation
- Management of water resources
- Biodiversity of grapes and surrounding plants
- Climate change impact, which makes the preservation of ancient varieties difficult
- Energy footprint and fuel consumption
- Fraudulent activities (mix of different type of wines not announced in the packaging to increase benefits) that affect traceability of the final product
- The role of State government as well as GI bodies in leading multiple and strict controls
- Food quality link with nutritional values (contents of polyphenols) and alcohol consumption
- Working condition and producers' livelihoods

3. Research Design: research questions and indicators

3.1. Research Questions, Specific objectives

Due to the high number of research questions listed by each country, we transformed them into research objectives which will be easier to analyse for our case study. These are listed below:

1. To analyse the main structures, interrelationships and complementarities between the global and local supply chains for both countries taking into account nature of upstream and downstream relations.
2. To examine along the whole supply chain the main performance issues related to diversified attributes and topics such as : Creation and distribution of added value, Governance, Information and communication, Biodiversity, Pollution, Resource use, Food safety, Territoriality

3.2. Attributes and Indicators selection and contextualizing

Attributes and indicators are considered as the most relevant and available to be declined into indicators. These attributes have been defined by first using the common GRID of indicators of GLAMUR and the guidelines of SAFA. After a first comprehensive analysis we completed them through a literature review and some inputs from others

[3] An analysis of the issues is presented in the Research Plan drafted with the Swiss team (Fibl). A review of scientific literature and interviews with expert allowed us to highlight eleven research themes. Source: "WP3 case study: Global and local wine supply chain in Switzerland and France, Research Plan, FIBL and INRA, May 2014".

references[4] to bring all consistent and significant regarding the GLAMUR objectives and our specific research questions.

The exchanges between the French team and the Swiss team allowed achieving a final list of 8 attributes and 20 indicators. Different sources have been used to define the indicators and develop a measurement strategy adapted to available data and to the specificities of wine chains actors.

Three indicators were created specifically for the case study. Table 4 describe sources and gives a definition of these indicators

Table 4 : Description of new indicators specifically created for the case study

Indicator	Source	Definition
Market management	Global value chain analysis (Gereffi et al., 2005)	Assessed through the level of difficulty to enter the chain, according to actors and formally (guidelines...). Proxy to assess the exclusion/inclusion capacity of the chain.
Social cohesion and Conviviality	Rural sociology World Food programme (Fonte, 1991)	Socio-cultural relations and externalities linked with food chains, contributing to create social cohesion Assessed through the number and type of socio-cultural events favoured by the chain
Association of product with territory	(Degenne, Forsé, 1999) And FAO (Vandecandelaere et al., 2009)	It refers to the capability of a supply chain to strengthen links between product, local actors and the territory. Two aspects of this indicator: (i) Measures the ability of the chain to connect producers, consumers and local actors and, (ii) identify specific characteristics of the product which make it linked to the territory (natural resources, tradition, competencies and know-how).

Table 5 presents indicators selected to assess the performance of local and global wine chains in Languedoc-Roussillon.

[4] El-Hage Scialabba, N. 2013. SAFA indicators. Food and Agriculture Organization of the United Nations, Rome 2013, 281 p. Gabrielsen, P. and Bosch, P. 2003. Environmental indicators: Typology and Use in Reporting. EEA internal working paper, European Environment Agency, Copenhagen, 2003, 20 p. Vilain, L., et al. 2008. La méthode IDEA, Indicateurs de durabilité des exploitations agricoles, Guide d'utilisation. Educadri éditions, Dijon, 2008. 184 p. Hohnen, P. et Blackburn, W. GRI et ISO 26000 : Pour une utilisation conjointe des lignes directrices du GRI et de l'ISO 26000, entre dans la catégorie « Outils ». Global Reporting Initiative, 2010, 20p.

Table 5 : Final grid of indicators

Dominant dimension	Attribute	Indicator	Explanation	Data source	Time period of data set	Stage relevance
Economic	CREATION AND DISTRIBUTION OF ADDED VALUE	Gross Income	Total revenue earned by the farmers	Farmers semi-structured interview and secondary data	2013-2014	producers
		Reduction of direct subsidies	Amount of direct subsidies collected for production(including equipment) along the chain on the turnover			producers and cooperative
		Distribution of added value along the chain	Share of commercial margin obtained by the actors at each stage of the food chain.			Producers and consumers
		Contribution to employment	Number of jobs in equivalent full time at each production stage.			producers
Economic, Social	GOVERNANCE	Decision making mechanisms	Mechanism of decision within the supply chain: (1) price decision making, (2) contract negotiation	Farmers semi-structured interview and expert interviews	Last 5 years	Producers , cooperatives, traders (global chain) or consumers (for local chain)
		Fraud management within the chain	Level of control in the whole chain	Farmers semi-structured interview, expert interview and secondary data	Last 2 years	Producers and third party actors
		Market management	The level of difficulty to enter the chain, according to actors. Commercial management: How the market is managed by actors of the supply chain in order to be resilient	Farmers semi-structured interview and expert interviews	Last 3 years	Producers and cooperatives
		Farmers' cooperation	Measure the level of connection between farmers		Last 5 years	Producers, cooperative
Social	INFORMATION AND COMMUNICATION	Availability of information	Presence and availability of information without taking into account the label of the product.	Farmers semi-structured interview and direct observation	2013-2014	Producers, cooperative, retailers and consumers
Environmental	BIODIVERSITY	Species conservation practices	Participation in a voluntary scheme for protection of specific threatened species	Farmers semi-structured interview and secondary data	Last 5 years	producers

		Cultivars diversity	Diversity of vine varieties and others crops systems in the farm. Identification of "good agricultural practices" for the maintenance and protection of biodiversity			producers
Environmental	POLLUTION	GHG emission from transportation	Identification of critical point for GHG emissions within the chain.	Secondary data for chain GHG analysis	2013-2014	Producers to retailers
		GHG emissions from production	Presence and efficiency of mitigation practices for GHG reduction in the farm.	Farmers semi-structured interviews and Secondary data for chain GHG analysis	2013-2014	Inputs, producers
		Environmental pollution mitigation practices	Sums the practices implemented to reduce pollution on air, water and soil	Farmers semi-structured interview and secondary data	2013-2014	Inputs, producers
Environmental	RESOURCE USE	Water Use Practices	Sources of water used for production and transformation of grape. Implementation of water treatment practices.	Farmers semi-structured interview and expert interviews	Last 3 years	producers
		Material Use practices	Identify different sources and types of waste along the chain linked with actor's practices. Checks the presence of each type of waste or wasting practice.		2013--2014	Producers and cooperative, traders bottlers
Health	FOOD SAFETY	Food safety standards and controls	Type of food safety standards applied to ensure food safety	Farmers semi-structured interview and secondary data	2013-2014	Producers and cooperative
		Artificial additive	Quantity of sulphite added to the wine	Farmers semi-structured interview	2013-2014	Producers and cooperative
Social and economic	TERRITORIALITY	Association of product with territory	Active association linking the product to the territory, such as an appellation of origin. Frequency and type of meeting with local actors and consumers.	Farmers semi-structured interview, secondary data and expert interviews	Last 3 years	Producers and cooperative
		Social cohesion and Conviviality	Socio-cultural relations and externalities linked with food chains, contributing to create social cohesion	Farmers semi-structured interview and expert interviews	Last 3 years	Producers and cooperative

3.3. Contextualizing and benchmarking of the indicators

First, we identified with the Swiss team, a set of indicators to answer the research questions and illustrate the performance levels for each dimensions defined by the GLAMUR framework.
In a second step we searched in the scientific and technical literature, criteria related to performance indicators for our study area. These criteria are either practices or outcomes, or impacts. Indicators provided by FAO in the SAFA guide are difficult to evaluate because non- adapted to the wine sector and the French context. We redefined a way to evaluate indicators using existing references and field observations. The key question for assessing indicators was: What kind of data must we collect to measure each indicator?
In a third step we defined the benchmarks for each indicator. We conducted research on "best practices" and benchmark data to compare results and get a performance score in percentage.

3.3.1. Performance evaluation approach

For understanding the “final performance matrix” (ANNEX 1), we would provide details on the construction of the indicators and the selection of benchmarks.

For qualitative indicators
As we specified previously, qualitative indicators are evaluated according to several criteria. Criteria are mainly practices that impact the performance we are evaluating. Criteria we asses are not actor’s perceptions, they represent how actors manage theirs activities and how practices impact on supply chain performances. The benchmarks’ construction is based on a rating system of the performance criteria. Criteria are selected if they influence directly, positively or negatively indicators trend. Low effect practices and not significant effects not appear in the indicator performance ranking.

For quantitative indicators
The primary data collected is compared to the reference value recognized as relevant to the context and the type of product.
Two different quantitative benchmarks are mobilized in this study:
-an absolute value reference: a fixed value determined by a standard or scientific recommendations (e.g. amount of sulphites in 1 litter of wine)
- A relative value reference: a regional average, a trend

Remarks on benchmarks method: benchmarks construction should avoid certain situations to remain representative of the observed situations: It is important to base the performance evaluation on a representative number of criteria. In this study, we consider between 2 and 10 performance criteria per indicator.
The approach we developed was presented and discussed with a panel of stakeholders/experts involved in local and global wine chains in Languedoc-Roussillon during a workshop session.

3.3.2. Expert Workshop : Methodology feedback

As suggested by the guidelines for the Participatory Checklist Method (PCM), other methodological tools have been used to build a strong methodology of performance assessment:
As far as feedback mechanisms are concerned, both teams suggest organizing a workshop or "focus group" including representative actors from the chain. This workshop was prepared jointly by the two teams. Participants were informed in advance of the objectives and topics to be discussed during the focus group, by sending a working document (focus group guide). The aim was to encourage participants to think about the research questions, the attributes/topics and the related indicators. It is a condition to ensure the quality of the group discussions and the data collection.
We asked them to :

1. Assess the relevance of attributes and indicators selected for wine case study
2. Identify among the final indicator list, those relevant to distinguish local from global chains performances.
3. Assess relevance of benchmark sources we selected and the method to rank performances.

The table below shows the list of experts we consulted in order to validate indicators and benchmarks process.

Table 6: List of expert for the benchmarks of indicators and critical review of preliminary results

NAME OF THE EXPERT	ORGANIZATION	AREA OF EXPERTISE
Touzard Jean-Marc	INRA UMR INNOVATION	Director of research in wine economics
Hannin Hervé	Institut des hautes études de la vigne et du vin (IHEV)	supply chain management and marketing strategy in wine industry
Boudou François	Wine Cooperative of Montpeyroux	Director of Institut Coopératif du Vin (ICV)
Ribes Isabelle	Coop de France Languedoc-Roussillon	Supply chains and wine Cooperatives in Languedoc-Roussillon
Zébic Olivier	Consulting agency, Zebic	Expert on innovation in the wine sector

3.3.3. Final methodological matrix

The final performance matrix (Annex 1), shows the indicators and benchmarks construction process. We thus calculate indicators performances, presenting in the part 5. Results.

4. Methods of data collection and analysis

We present in this section 4 the strategy of data collection allowing us to measure and evaluate indicators, by using different methodologies and data sources. The main approaches are in-depth interviews with key informants, focus groups, participatory Checklist and documentation review.

Vine and Wine constitute one of the "model plant and product" for the national agricultural research (INRA): many data have thus been produced and many research projects have been implemented. A difficult and time-consuming job was nevertheless to gather all the available information, to look at the conditions in which data have been produced, and to select the relevant sources. In parallel, technical institutes and professional organisations also provide extensive information on wine exchanges and practices in this industry. The GLAMUR project is thus an opportunity to build a specific data base on wine supply chains: we coded all the available sources according to their relevance and to our list of indicators.

4.1. Plan for data collection

4.1.1. Primary data collection: Interviews and survey

In the case of France, the data collection has been completed through direct semi-structured interviews.

In both countries, some quantitative data have been collected giving key information on environmental indicators of grape and wine production steps, as well as transport stage in the chain (to be completed). The questions relating to these indicators will be formulated using LCA methods (especially input-output), in order to be able to estimate specific environmental impacts.

Table 7: Sources and method for data collection

Chain	Actors	Data collection method
LOCAL	Producers / Family domain	8 quick Interviews in wine fair and 3 in-depth interviews (on farm) in *Hérault* dept.
	Cellarman	3 quick Interviews and 1in-depth in Montpellier
GLOBAL	Cooperative directors	2 in-depth interviews of cooperative presidents in *Hérault*
	Grape growers	1 in-depth interview
	bulkwine trader	refused to cooperate, use secondary data and expert analysis
	Languedoc Cooperative corporation	2 interviews (president and vice-president)
	Producers / Large scale domain	2 in-depth interviews

4.1.2. Secondary data collection

The collection of secondary data was an important iterative process in order to define and describe the wine chains, and to choose benchmarks or references. The benchmarks were selected according to criteria of data quality and correspondence with the indicators we assess. Nevertheless, it remains difficult to mobilize all secondary data due to i)a lack of control and reliability on all sources, and ii) the difficulty to clearly distinguish local aspects from global aspects. In many cases the categorization of information reflects other dimensions than local and global, such as the wine quality model (f.i. PGI vs PDO), crop systems (organic vs conventional), the location or size of firms

List of main documents used to complete data collection

Main References for secondary data
Bockstaller C. Guichard L., Makowski D., Aveline A., Girardin P. & Plantureux S., 2008. Agri-environmental indicators to assess cropping and farming systems. Agron. Sustain. Dev. 28, pp 139–149.
Renaud C., Benoit M., Thiollet-Sholtus M., Jourjon F. 2011. Evaluation globale des impacts environnementaux des itinéraires techniques viticoles par l'Analyse du cycle de vie (ACV). Revue suisse Viticulture, Arboriculture, Horticulture, Vol. 43 (3), pp.184–189
Zébic O. 2011. Etude pour l'adaptation du vignoble héraultais à la commercialisation du vin en vrac. Rapport final au Conseil Général de l'Hérault. IHEV, Montpellier SupAgro & O. Zebic, , Octobre 2011.
Bernaleau-Cardinel N., Lamoureux F., Delpech E., Cthelineau S., Laveau E., Michaud M-C., Montagnon R., Samie B. 2012. Référentiel Technico-Economique du Vigneron Bordelais. Edition 2012 . Chambre d'Agriculture de la Girande. 14 p.

Expert interviews

We supported the collection of primary and secondary material by interviewing experts on Languedoc-Roussillon wine industry. They helped usto specify the factors on which our team had not enough information, and to develop a critical analysis on the factors that can differentiate local and global chains.

organisation	Expert names	Method of data collection	Chain concerned	Indicators concerned
FranceAgriMer	Laurent Mayoux	semi-structured Interview	Local and Global	Descriptive indicators Rate of Subsidies
Coop de France Languedoc	Boris Calmette	semi-structured Interview	Global bulk chain	Global Food Chain approach, economic expertise
Coop de France Languedoc	Bernard Augé	semi-structured Interview	Global bulk chain	Global Food Chain approach, economic expert

4.2. Data analysis and ranking

Based on the final matrix (ANNEX 1), the scores are calculated for each indicator, and converted into a performance percentage between 0% and 100%. Performances highly dependent on selected benchmarks.

Example 1 : Qualitative indicator

- Attribute: Biodiversity
- Indicator: "Species Conservation Practices"
- Unit: Qualitative, Ordinal
- Evaluation method: We use sources and references proposed by FAO, French Ministry of Agriculture, research centres (INRA, CIRAD). We conducted an inventory of practices which impact on biodiversity at the level of the vineyard. It appeared that the relevant scale of observation was the farm. Including cropping systems of vines and other plant and animal species. Among all the possible criteria, we selected those for which data was available. For the indicator "Species conservation practices", 10 "good practices" were selected result of the construction process.
- Benchmarks method: Each criterion is associated with a value, a score. We applied different scoring depending on the criteria describing the indicator: 1) Boolean notation (0 or 1 point) for presence of absence of the practice or other criteria. 2) Rating on a scale ranging from 0 to n, n is the degree of impact on the indicator.

Example 2 : Quantitative indicator

- Attribute: Creation and distribution of Added Value
- Indicator "Reduction of direct subsidies"
- Unit: Qualitative, Ordinal
- Indicator measure: Regarding which data was available for each type of chain, we decide to measure the annual amount of direct subsidies for wine production actors (producers and cooperatives) divide by the turnover. This indicator show the subsidies' contribution to the economic result.
- Benchmark: We use the Average subsidy in Languedoc wine sector in 2013 to compare with values of local and global chains. The regional rate of direct subsidies is about 20% of the farms turnover (FranceAgrimer, 2013).
- Performance ranking : For this indicator, the target performance is a compromise between reduction of direct subsidies and ability to finance investments. 100% of performance is considering when actors not require subsidies. For performance calculation, we compare the average value of direct subsidies for actors of the chain to the regional average (20%). The Chain performance Rate correspond to : 100% - (Rate of subsidies / benchmarks). 100% of performance = 0% of direct subsidies

We followed the SAFA approach and translated all quantitative and qualitative scores in percentage scores of performance.

PERFORMANCE	PERCENTAGE SCORES
BEST	80-100 percent
GOOD	60-80 percent
MODERATE	40-60 percent
LIMITED	20-40 percent
UNACCEPTABLE	0-20 percent

Source : WP3 Case study Guideline-GLAMUR project, 2014

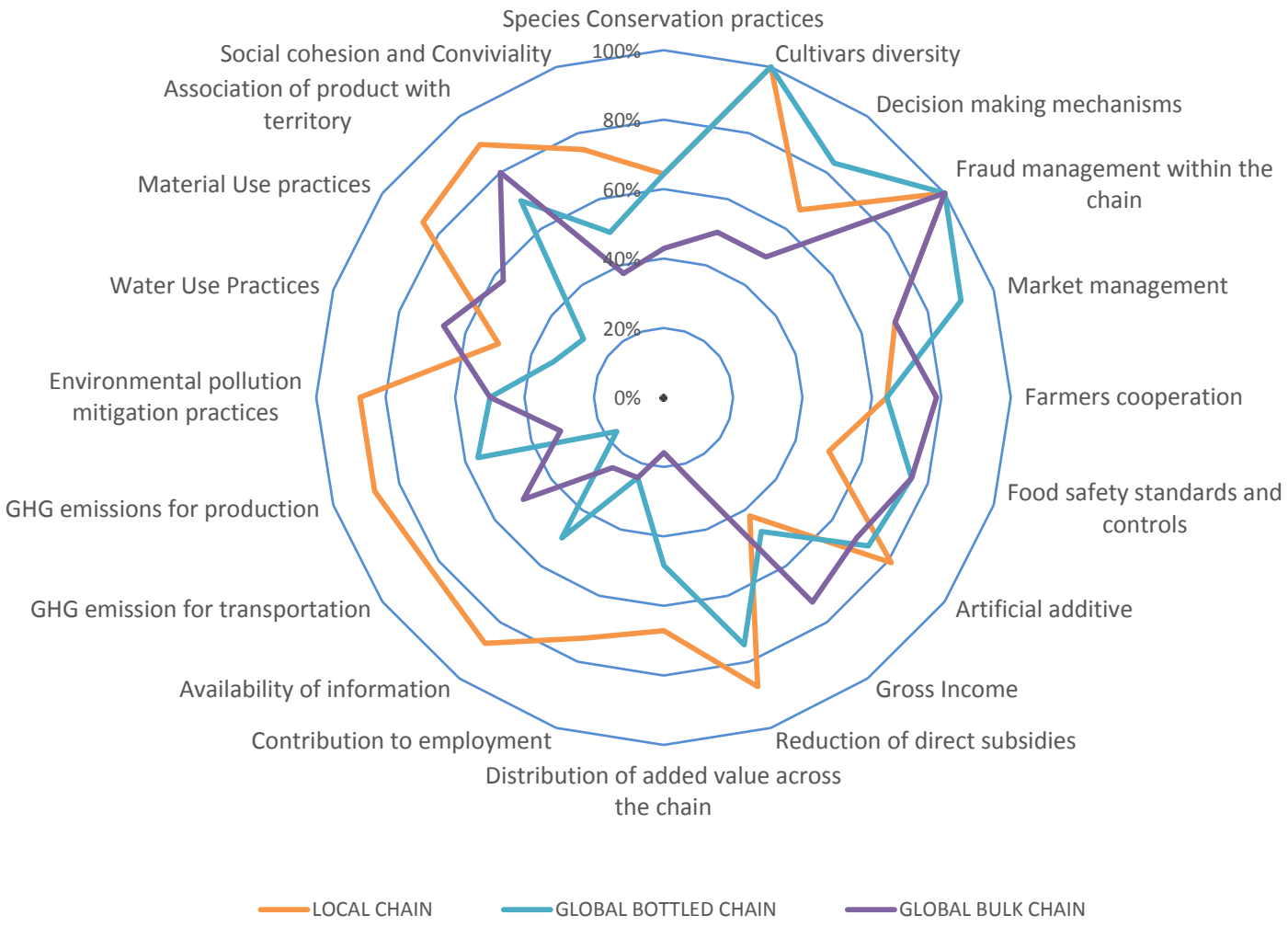
4.3. Data quality check for primary and secondary data

The criteria for data quality control are representativeness, reliability and pertinence. In order to check the quality of data stability, equivalence and homogeneity, we use the pedigree matrix approach (Ciroth, 2012; Lewandowska, 2004).The data quality score (DQD) is calculated for each data, allowing to estimate a global data quality. We had also to consider an "adequate period" for the data collection. In order to ensure temporal correlation between our result and the situation observed, we verified and adjusted some of the oldest information, helped by the experts, and a specific workshop we organized with them at INRA Montpellier. The data quality remains heterogeneous according to the sources, but we reached to provide a globally good representation of many indicators of the wine chains. See in Annex 2 the Data Quality check matrix.

5. Results

Figure 8 present in a graph the rate of performance of each chain for all indicators. The performance area covered by the local chain is larger than those associated with the global chains. Strong differentiation is observed between the chains for the following attributes: pollution, information and communication, distribution of value added. Results are organized following the order of the indicators list and regrouped per attribute.

Figure 8 : Summary of the chains performances assessment



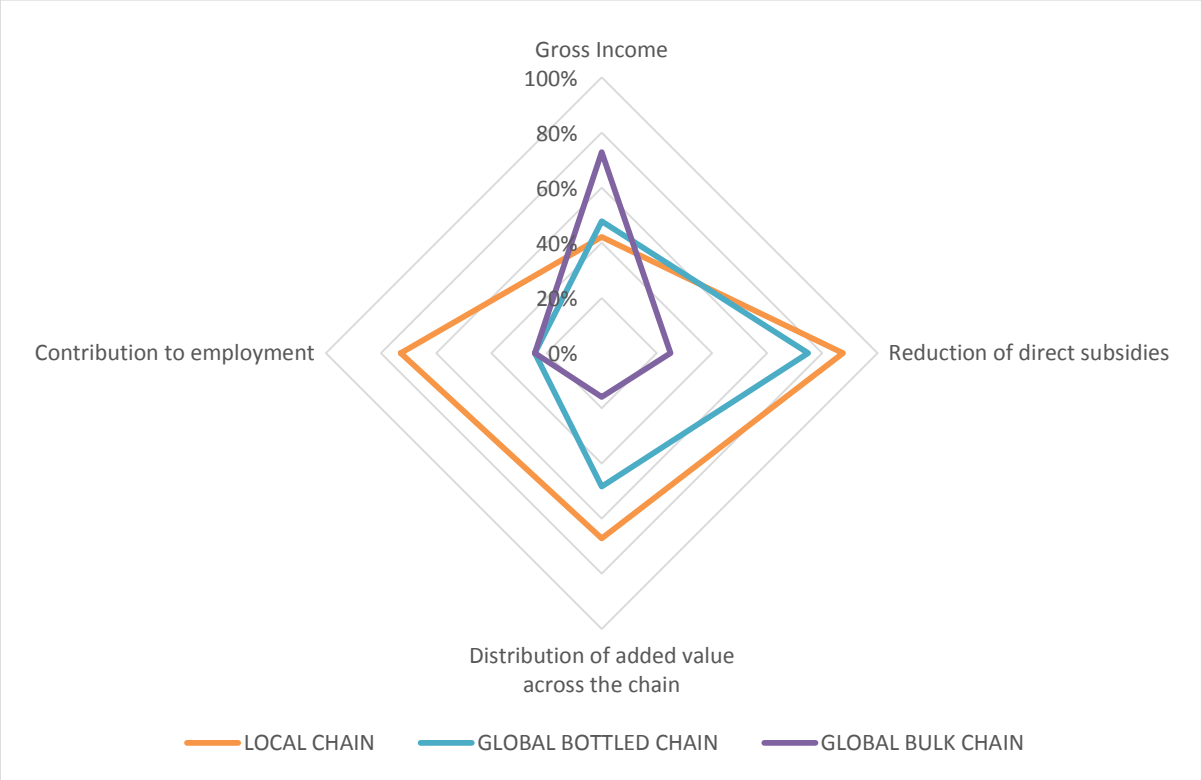
5.1. Attribute Creation and Distribution of Added Value (Economic Dimension)

Indicators and sub-indicators	Local bottled wine chain	Global bottled wine chain	Global bulk wine chain
Net Income	42%	48%	73%
Reduction of direct subsidies	88%	75%	25%
Distribution of added value across the chain	67%	48%	16%
Contribution to employment	73%	51%	24%

Indicators and sub-indicators	Relevant indicator to differentiate Local from Global?	Comparison about performance of Local and Global	Comments
Net Income	Yes	Global chains>Local chain	• In 2012 Languedoc wine producers income was € 18,000 per year per worker. This is lower than the national average income in the wine industry, about 40 000 €. Current economic context is more favourable to the PGI bulk market. Red wine PGI price reach € 100 / hl and can be produced through a yield, between 80 and 100 hectolitres per hectare that means an income between € 19,000 and € 24,000 per worker. • The global bottled wine market generates higher variability in farm incomes, than in the case of global bulk chain. Costs are higher and yield lower (up to 50 hectolitres per hectare in the case of PDO wine). Average income can be estimated between € 15,000 and € 22,000 € per year per worker. Nevertheless some successful wine domains exceed 30 000 €. • Income proceeding from the local chains are close to the preceding case, i.e. between € 15 000 and € 20 000. The cost and time induced by direct marketing is often higher than the gain provided by the better prices, which are proven for on farm selling, but not for purchase to restaurants. • Incomes are impacted by high indebtedness due to recent investment in equipment for production and marketing.

Sensitivity to subsidies	No	Local chain>Global	• Average subsidy in Languedoc wine sector is about 20% of the farms turnover, that is low in the French agriculture context (FranceAgriMer, 2013) • Different kinds of subsidies are mentioned. Pillar 1 (wine CMO), 2nd pillar and specific national or regional subsidies mainly for export marketing, equipment and recently irrigation. Wine tourism projects or Cooperative cellars benefit from specific aids; • Some wine growers have chosen not to benefit from subsidies in order to keep autonomy (financial, energy, decision).
Distribution of added value across the chain	Yes	Local chain>Global chains	• In both local and global chains the final price includes material and immaterial inputs (costs) and the sum of added values captured by the direct actors of the chain (workers, state and owner of production factors). The distribution of value between costs and added value (at each step), and then between direct actors according to their location is not always easy. We evaluated the main points, following experts and case study references. • In the local chains the added value is captured i) by the wine producer family (about 40% of final price, low investment in logistics, labour intensive), and ii) by local and national government (22% of final price). • In the global bulk chain, the strategy "cost / volume" is developed by stakeholders. The added value is mainly captured by actors controlling logistics, marketing and retailing (about 30%) and by taxes (22%). Grape growers (10%) and cooperative (5%) have lowest parts (referring to final wine volume). Operational margins of traders are also low comparing to other companies (5%). • In the global bottled wine chain, the variability of added value distribution is high, according to price negotiation process. Reputation results from a long process of investment, networking, communication and can provide market opportunities and improve product value. • The location of bottling has impact on the distribution of added value.
Contribution to employment	Yes	Local>Global	• The local chain is labour-intensive, including family labour and permanent or temporary employees. High Indirect impact on employment in service providers (production, winemaking, bottling) and tourism. • Cooperatives and wine growers mainly work with local traders and mobile bottling chains. • In the global chain wine in is sale in bulk from cooperatives: Half of the volume of bulk wine production is based on a significant level of mechanization, in production (mechanized harvesting), pruning and irrigation. One man and one tractor, are expected for 25 hectares, leading to increase the labour productivity in volume; • Indirect jobs (related to mechanization, maintenance, service providers…) have been created, but in a more extensive way of production

Figure 9 : Chains Performances according to the attribute creation and distribution of added value



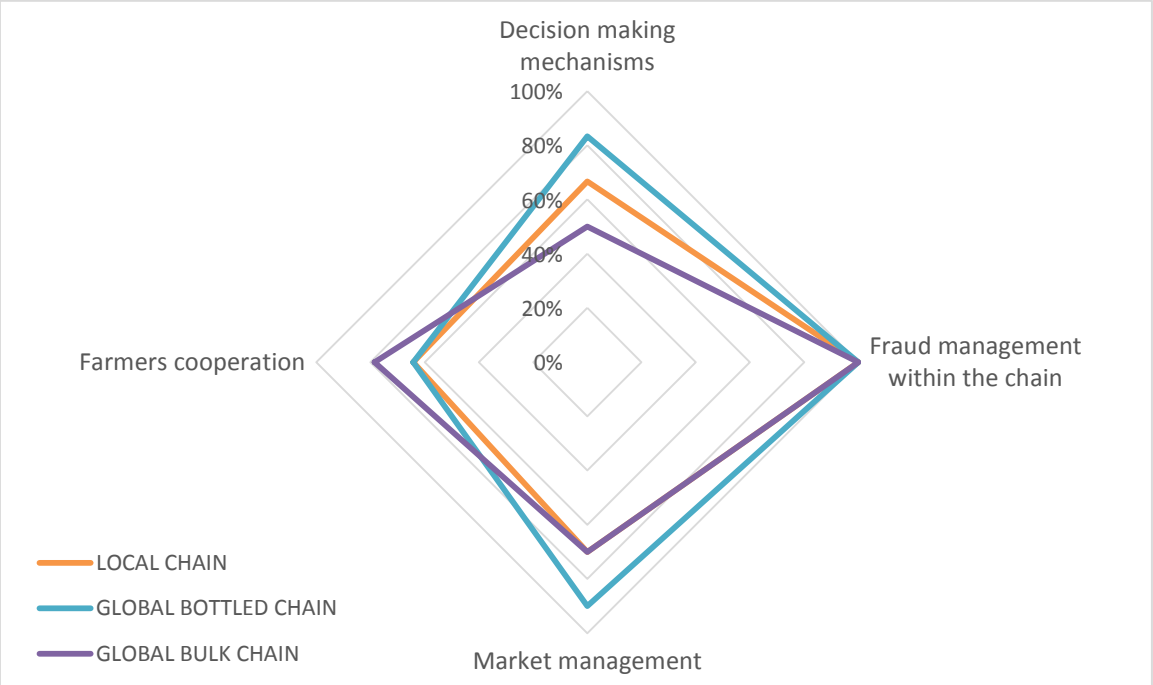
5.2. Attribute Governance (Social and Economic Dimensions)

Indicators and sub-indicators	Local bottled wine chain	Global bottled wine chain	Global bulk wine chain
Decision making mechanisms	67%	83%	50%
Fraud management within the chain	100%	100%	100%
Market management	70%	90%	70%
Farmers cooperation	64%	64%	79%

Indicators and sub-indicators	Relevant indicator to differentiate Local from Global?	Comparison of Local vs Global performances	Comments
Decision making mechanisms	Yes	Global bottled chain>local chain>Global bulk chain	• The global bottled wine chain is driven by the local wine producer, who progressively built his portfolio of buyers.) 80-90% of the wine production is bottled. Diversity marketing strategies are observed, combining contracts with importers, participation to international fairs, e-marketing… In fact we observe in these domains different ratios local / national / international distribution channels (diversification of chains) • The global bulk wine chain: is dominated by 3 large buyers in Languedoc (Castel, LGCDF and Val d'Orbieu). "These biggest buyers make the price" and wine cooperatives face difficulty to manage their own chain in the bulk market. • To reach the international mass market the wine supply must be regular and offering sufficient volume (basic and premium wine). • About 50% of the wine cellars (mainly coops, but also some private) specialized in bulk wine Traders can be independent or salaried of one the biggest buyers. Their efficiency relies on their capacity to build network and trust. Trading takes 5-10% of the wine price. traders / buyers need volume, anticipation in March / April and discussion with coop on wine quantity and quality; • Negotiation with the buyers is complicated, but the rules are respected".
Fraud management within the chain	No	Local equivalent to Global	• Fraud on the origin and the quality are very rare, because of strong controls, and collective interest in building local reputation of wines (long term strategies). 4 kinds of controls are coexisting: i) internal (coop), ii) collective by the wine producer's organisations (PDO or PGI association), iii) by a third (private) part that allows the official guaranties for the labels, iv) by the States (specific agency working on fraud control). Some fraud cases have been discovered, less than one per year for the large frauds (fi importing wine from Spain and selling it as Languedoc wine, one case 4 years ago)
Market management	Yes	Global bottled chain>Local chain=Global bulk chain	• Languedoc wine domains combine at least two different distribution channels. The higher profitability is observed in the domains that sell about 25-30% of their production at the cellar, and more than 30-40% in export markets. That means a more complex market management • The evolution of exchange rate and the price volatility affect the competitiveness of global chains (better situation for one year). • Local chains are also innovating in their differentiation strategy, combining different ways of communication, often supported by local community (fi wine routes).

			• Competition on local (regional) market is strong: referencing building a regular clientele, selling off the stock, and negotiations with restaurant… are very difficult and time consuming. The Languedoc local market covers about 2 million hectolitres (including tourists) over 12-14 million.... • The peri-urban producers benefit from the proximity of the city in accessing to local markets. Local government also support export of wines. • Importance of VISIBILITY: clients / consumers do not have time to search. Communication in the local press, websites, fairs…are useful for building customer loyalty.
Farmers cooperation	No	Global bulk chain >Global bottled chain>Local chain	• In the local chain, different ways and intensity of cooperation between producers. Researcher and experts noted the importance of exchanges between peers, ad hoc / specific cooperation with producers from other sectors (olive, cereal, livestock), involvement in collective projects oriented to wine promotion, innovative practices (i.e. new variety or organic) or local cultural events Involvement in local institutions. Individual strategy, promotion of the private domain and search of autonomy are also very present • In global bottled chain, we found limited differences with the local chain: wine producers (or managers) are less involved in local associations, but more involved in wine unions, /professional associations, such as the Languedoc AOC association. • In the global bulk chains, involvement in cooperative administration and Interprofession-PGI. (In large coop. Cooperation is not systematic) • We note that the highest density of interaction/cooperation can be found in small wine cooperatives oriented to both local and global quality wine chains (case of Montpeyroux).

Figure 10 : Performances of the chains for Governance attribute



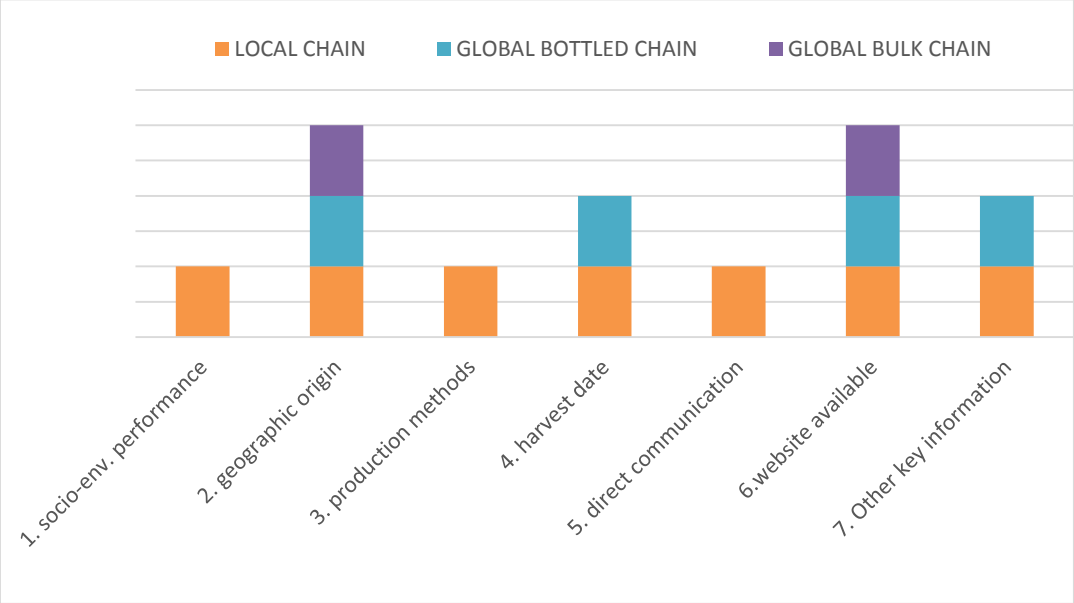
5.3. Attribute Information and Communication (Social and Economic Dimensions)

Indicators and sub-indicators	Local bottled wine chain	Global bottled wine chain	Global bulk wine chain
Availability of information	88%	50%	25%

Indicators and sub-indicators	Relevant indicator to differentiate Local from Global?	Comparison about performance of Local and Global	Comments
Availability of information	Yes	Local chain>Global bottled chain>Global bulk chain	• Local chains: 80 % of buyers live in the region, 20% are tourists. Direct communication between consumers and producers is taking into account many purposes, including environmental practices and know-how. This is a "co-learning process". The repetition of the transactions and the embeddedness in the same local (regional) community generate trust. • Global bottled wine chain: The geographic distance between producers and consumers is "reduced" by the information carried by AOP labels but also by web site, expert assessment, press reports, tourism information… • Global bulk chains: Information to consumers is basic, close to those of agro-industrial products. Information on

			the production steps are limited to technical and legal requirement.

Figure 11 : Key information given to consumers



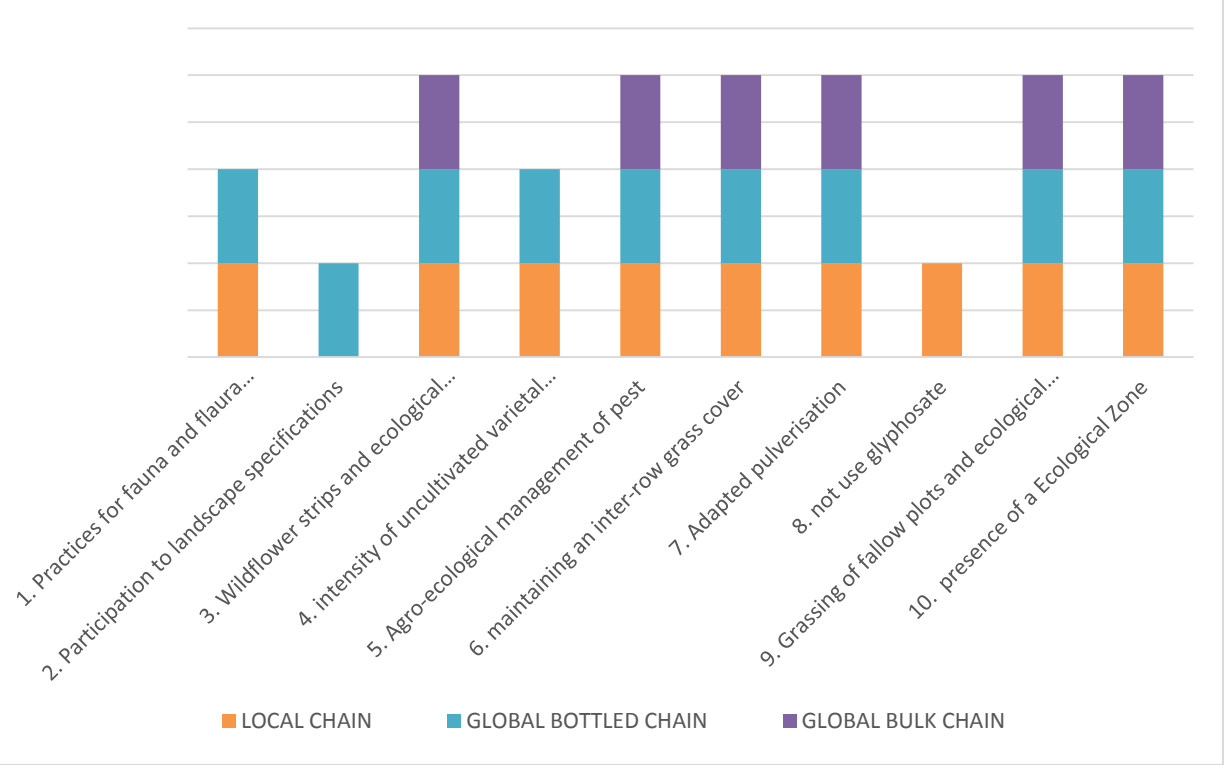
In local chains, consumers can access to various information on wine, by directly asking the winemaker. In the global bulk chains, the product is designed by few information: the brand (JP Chenet), the price, the "vin de pays d'Oc" label and some limited information on variety and contents (alcohol, sulphites…). In the global bulk chains, the AOC label can be connected with numerous information about the wine and its terroir, history, landscapes, producers…

5.4. Attribute Biodiversity (Environmental Dimension)

Indicators and sub-indicators	Local bottled wine chain	Global bottled wine chain	Global bulk wine chain
Species Conservation practices	64%	64%	43%
Cultivars diversity	100%	100%	50%

Indicators and sub-indicators	Relevant indicator to differentiate Local from Global?	Comparison about performance of Local and Global	Comments
Species Conservation practices	No	Local chain>global bottled chain>global bulk chain	• Local and global bottled wine chains are promoting environmental approach, with specific information. • Local and global bottled wine chains implement similar practices in the management of biodiversity, such as keeping the production of "traditional" vine varieties or preserving the floristic diversity. • Grape growers involved in bulk chain are also changing their production practices. Wine cooperatives have adopted code of practices including environmental friendly measures. • The three chains have seven common criteria on a total of 10.
Cultivars diversity	No	Local equivalent to global bottled > global bulk chain	• Global chains tend to reduce the number of cultivated varieties in order to adapt the production to the international demand in mass market (BIG 5). The "global ideal chain could promote 5-6 varieties resistant to diseases". • Local chains tend to maintain traditional vine varieties. In some local wine organisations the willingness to create a wider range of ancient and recent varieties. • Local and global bottled wine chains are linked to the same practices, resulting from the application of PDO rules which recently include the opportunity to add "old varieties".

Figure 12 : Distribution of environmental practices within the chains



The degradation of biodiversity at local scale is linked to the intensification of agricultural practices, the use of high amount of pesticides, the fragmentation of habitats (Le Roux et al. 2008). Plots and surrounding areas account for up to 90% of the biodiversity in wine production areas. On the cultivated area, impact on biodiversity depends more on the adoption of integrated, organic or biodynamic practices than on the choice of local vs global chains. Discussion with producers in local and global chain indicate that a reflection on biodiversity is engaged in both cases.

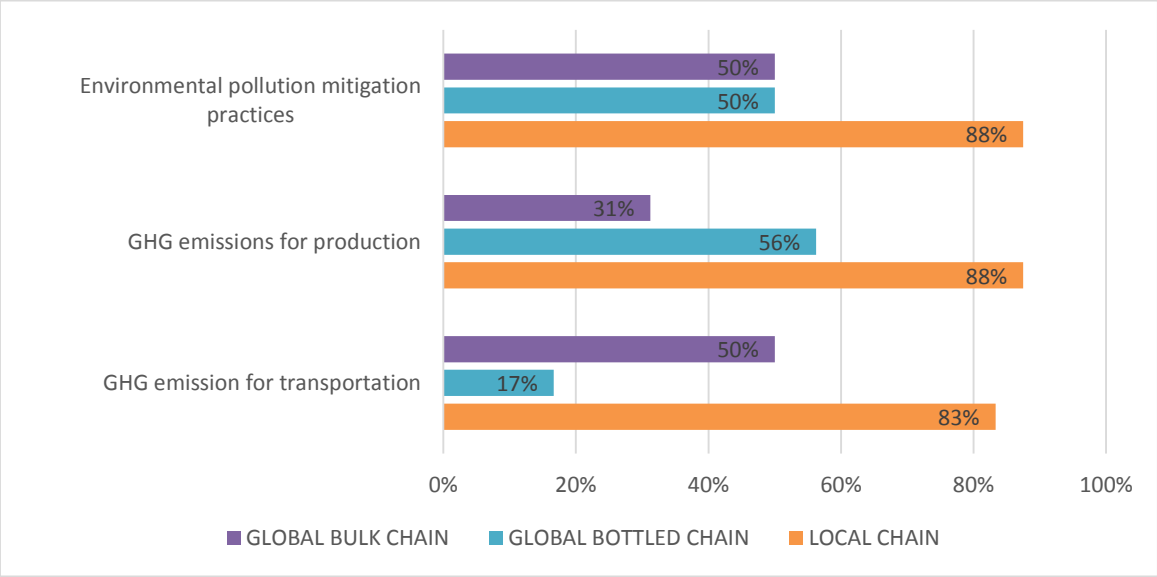
5.5. Attribute Pollution (Environmental Dimension)

Indicators and sub-indicators	Local bottled wine chain	Global bottled wine chain	Global bulk wine chain
GHG emission at transport stage	83%	17%	50%
GHG emissions at production stage	88%	56%	31%
Environmental pollution mitigation practices	88%	50%	50%

Indicators and sub-indicators	Relevant indicator to differentiate Local from Global?	Comparison about performance of Local and Global	Comments
GHG emission at transport stage	Yes	Local>Global bulk chain>Global bottled chain	• In local chains, the willingness to reduce negative impacts on environment is emphasised and the use of hydrocarbons is low, resulting from limited logistic operations, even if GHG emission by consumers can be higher than in the other chains (wine tourism could be questioned on this point).. • In global bulk chains, transport in bulk reduces GHG emissions, but it depends on i) the location of the bottling operation (bottling in Bordeaux and then exporting to Swiss strongly reduces the mitigation), ii) the distance between production and consumption, iii) the weight/type of the bottles (lightweight bottles); • In the global bottled wine chains, the distance could be shorter than in the bulk chain (this is the case in our study with Switzerland), but the transport of small volume by truck is less sustainable.
GHG emissions at production stage	Yes	Local>Global bottled chain>Global bulk chain	• In local and global bottled wine chains the winemakers tend to implement organic agriculture, more concerned by mitigation, soil management. • The most discriminant criteria is the rate of mechanization, for production and harvest stages. Global bulk chains focus on mechanization, while local chains develop manual practices. We note that global bottled wine chains have intermediary position for the use of pesticides and the rate of mechanization. • All chains are using local and regional input sourcing, for instance for vine plants. Some producers, from local and global wine chains are importing input from Spain or Italy.

Environmental pollution mitigation practices	Yes	Local>Global bulk chain=Global bottled chain	• Environmental pollution refers to the impacts of local and global chains on soil, water and air. On the 8 criteria assessed, limitation of chemicals and fertilizers use and soil's protection practices are differentiating local and global chains. • Organic or Biodynamic practices (and labels) have been adopted in both local and global chains, contributing to the reduction of pollution. • In global chains, more precisely in cooperatives cellars, the implementation of organic agriculture at a large scale is complex and less coherent with the "cost/volume" strategy.

Figure 13 : Performances of the chains for attribute Pollution



Viticulture is one of the crops which consume the highest volume of pesticides (Aubertot et al., 2005). Vaporisation of chemical products spread out in the atmosphere, loosing from 25%to 90% of applied pesticide (Bedos et al., 2002). Nevertheless the wine industry has limited impact on GHG emission and has started to implement mitigation measures, notably in Bordeaux, Bourgogne and Champagne vineyards (CIVB, 2014). Kerner and Rochard (2007) highlight that grape production produces half part of the farm GHG emissions (44 to 53%). These emissions are mainly due to employees' displacements, agro-chemicals and tractor fuel. Rochat et al. (2009) implemented LCA methodology on a bottle of Bourgogne wine sold in Switzerland. The study shows that one bottle generate 350 g de CO2 eq, with 100 g coming from field practices.

5.6. Attribute Resource Use (Environmental Dimension)

Indicators and sub-indicators	Local bottled wine chain	Global bottled wine chain	Global bulk wine chain
Water Use Practices	67%	50%	43%
Material Use practices	86%	29%	57%

Indicators and sub-indicators	Relevant indicator to differentiate Local from Global?	Comparison about performance of Local and Global	Comments
Water Use Practices	Yes	Global bulk chain<Global bottled chain<local chain	• In Languedoc several big wine cooperatives selling wine in bulk for global chains are developing large project of irrigation (about 4 000 ha). This project will impact water resource. Nevertheless vine doesn't need high volume of water (complementary input in order to maintain quality and yields) and the irrigation projects are promoting better water use practices (fi drip and optimization tools, control by public institution and the cooperative…). • PDO wines (in local and global chains) are not irrigated (but could be in the future) and PDO associations rather promote other agronomic practices in order to manage water use and control water stress in the vineyard : soil management, adapted pruning, reduction of foliage and yield, control of grass, plantation of varieties adapted to dryness… These practices and issues are often presented and discussed with on-farm buyers (local chains).The vine water need depends on i) quality and volume goals, ii) location and soil, iii) agronomic practices and… evolution of climate.
Material Use practices	Yes	Local chain>Global bulk chain>Global bottled chain	• Performances of both Local chain and global bulk chains are similar for material use. However this performance rete results from different strategies. • Global bulk chain dispose of high level technology at the cooperative level, developing the recycling of effluents, waste (stalkes, marc…) or metal stakes Grape growers also share materials and machinery. • Farms oriented to global bottled wine chains, develop more individual strategies (according to interviews). Part of the material seems to be "under used", recycling strategies are planned and not always explicit… • Wine producers oriented to local markets are involved in

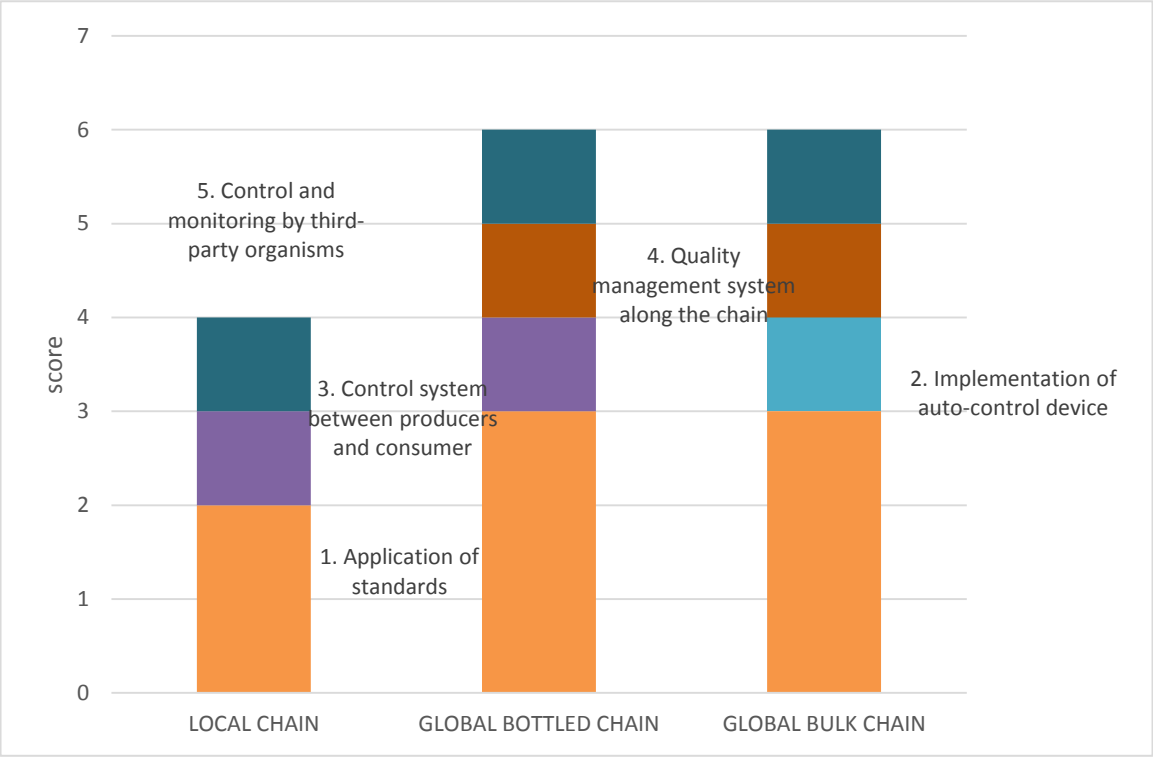
			technical and social innovations, including "circular economics", practices that are presented as new ways of differentiation and assertion in local community (but some of them are also exporting bottles in global markets…).

5.7. Attribute Food Safety (Health, Economic and Social Dimensions)

Indicators and sub-indicators	Local bottled wine chain	Global bottled wine chain	Global bulk wine chain
Food safety standards and controls	50%	75%	75%
Artificial additive	81%	73%	69%

Indicators and sub-indicators	Relevant indicator to differentiate Local from Global?	Comparison about performance of Local and Global	Comments
Food safety standards and controls	Yes	Global>Local	• Actors in global chains have to perform in the application of food safety standards, due to client's requirements and normalisation processes. Some export market, such as Switzerland or Japan, are asking for very precise and controlled sanitary conditions (fi component analysis, pesticide, toxins…) • Local chains do not push for normative r framework for food safety management. In local chains standards are substituted by be to be interactions between consumers and producers. These interactions and discussions motivate producers to improve wine quality and adapt product characteristics to client's preferences. The balance between i) the efficiency of local informal interactions and ii) the compliance to standard is not clear, but on average more favourable to global chains
Artificial additive	No	Not significant	• We choose to estimate the quantity of sulphites in the wines sale in the different chains. Results show that wine making practices are very specific to each producer (know-how, willingness to innovate, awareness on natural vs artificial nature of wine, risk aversion…).

Figure 14 : Food safety standards and controls practices within the chains



All chains implement at least one quality referential, linked to code of practices and control mechanism. Both, local and global bottled wine chains have direct feedback from clients. Global chains have developed supply chain management tools and standards, with specific practices and norms, according to firm's strategies and requirements of export markets.

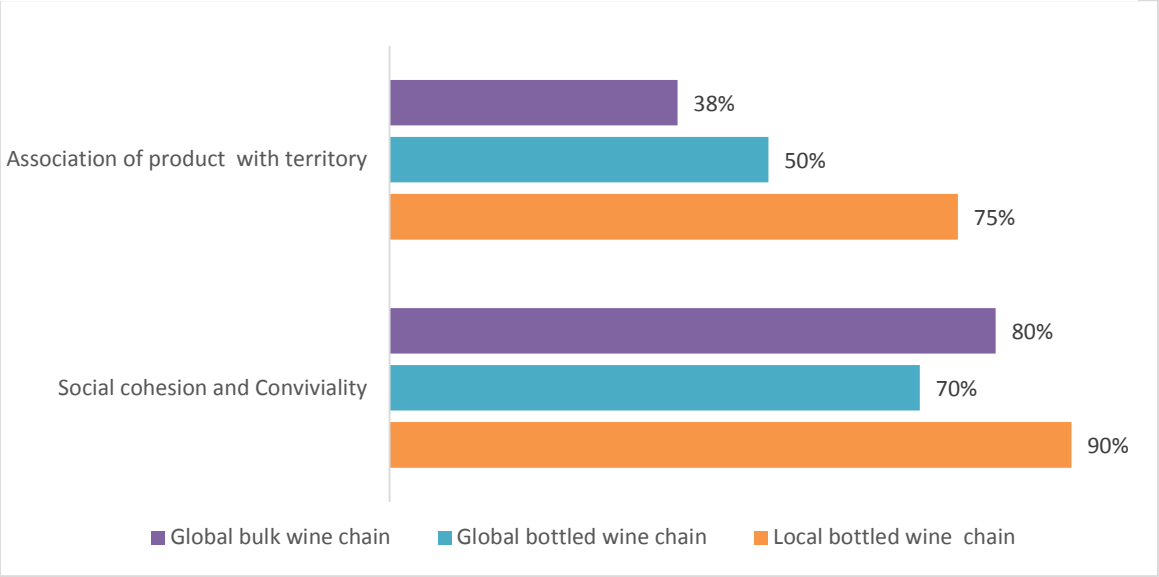
Other discriminant criteria on food safety may be found, but the data collection on the components quantities or the non-respect of rules/norms, requires a specific research.

5.8. Attribute Territoriality (Social Dimension)

Indicators and sub-indicators	Local bottled wine chain	Global bottled wine chain	Global bulk wine chain
Social cohesion and Conviviality	90%	70%	80%
Association of product with territory	75%	50%	38%

Indicators and sub-indicators	Relevant indicator to differentiate Local from Global?	Comparison about performance of Local and Global	Comments
Social cohesion and conviviality	Yes	Local chain>Global bulk chain>Global bottled chain	• Local chains better perform social relationships in local community through farmer's participation in local events, local initiative connecting consumers, cultural activity, or tourism project. "These events do not directly performed incomes and added value creation, but they are long term investment, allowing to be more visible and to reach new clients". • In many cases, cooperatives participate in local projects and events, even if their wine is mainly sale in bulk. The wine cooperative plays a specific social role by integrating small grape growers and retired people (who couldn't develop their own cellar). Cooperative generally are inclusive organisations.
Association of product with territory	Yes	Local chain >Global bottled chain> Global bulk chain	• Local chain: location of wine transactions in local market, wine promotion by offering opportunity to tourists and local consumers; strong link with the local culture, involvement in many projects dealing with landscape and preservation of local resources. • Global bottled wine chain: the PDO label connected with the domain presentation (including on website) contribute to shape the identity of the territory. Export includes value from outside in the territory ("base activity" and improve the attractiveness of the territory. Contribution to creation of a territorial quality rent. • Bulk chain: formal association with the territory is weaker with final (Swiss) consumers, but many cooperatives are also playing a positive role in the territory, including by establishing educational tour through the vineyards, planting vines, maintaining vines and small producers, limiting the risk of fire in summer, allowing the control of a firm by local investors….

Figure 15 : Chain performances for the attribute "Territoriality"



Local and global chains cover a large area of territorial performances. They complement in environmental management, contribution to employment, involvement in territorial projects, partnerships and location of added value in the territory (local community).

Conclusion

In France, one of the main environmental policy objective is to divide a half the use of pesticides in agriculture and viticulture before 2018 (but recently revised to… 2050!), to promote organic production and to develop new environmental standards (but recently weakening of some of these proposals). Global chains may be more concerned by this measure than local ones, because of highest yields and input consumption. In all chains, actors are taken into account the climate change issue (growing water stress and need), and advocate for a "smart management" of water in viticulture

The land occupation strategy is organized between the bulk and wine for the local market and export bottle. The bulk occupies a large part of surfaces and strongly impacts on the landscape. The wine for the local market is often associated with wine tourism. Efficiency of controls on food safety is different but lead to similar performance all chains. It results from the high level of organization and control of the wine industry (historically due to alcohol issue, but also to the need of quality control and guarantee). A large number of winemakers and wine cooperatives in the Languedoc-Roussillon combine the three models of wine commercialisation presented in this study case. Diversification of market strategies could be considered as allowing, a better adaptation to market fluctuations and demand, and building links with the territory.

The market access in global chains is based on criteria of quality / price ratio, traceability, flexibility and responsiveness. The Languedoc wine supply offers different ratios of quality / price, corresponding to different segments. In the lowest price segments (at least 2/3 of the whole wine production), the price volatility is important and margins are low. In the highest quality segments, including the local and global bottled wine chains, price are more stable reflecting the impact of the territorial governance. This study case shows that chains performances are closely linked with their governance organization: following Gereffi typology of governance models (2005), the global bulk chain considered in this study case appears to be based on the 'captive' model, driven by customers. Local chains can be analysed as hybrids between the 'market' and the 'relational' models.

On local market, wine value is attached to the Terroir specificities, to proximity to consumption places. The analysis of chains contribution to local social externalities show that both local and global chains have positive and complementary impacts on territorial project, territorial identity, territorial economy, territory attractiveness.

Local and global market of PDO wines require from the producers to search visibility for their products and to invest on oenology and marketing capabilities. The development of markets opportunities mobilize organization from local to regional scale. Interprofession and producers associations play a role in the definition of a collective strategy to access to global market. In the Gereffi typology, governance of global bottled PDO wines correspond to the "modular" governance model.

Remuneration of actors specialized in the bulk wine production depend on their ability to produce important wine quantities and to correspond to clients specifications. The mechanization of production and harvest process are a way for grape growers/cooperatives to reduce production costs and intensify production. The creation of added value in the bulk chain is not based on wine "Terroir", but on the ability of producers organizations to organize themselves and propose a standardize offer. Market management is driven by customers, principally international firms.

Performance assessment through attributes and indicators remains a static approach even if the sub-indicators we chose are mainly qualitative and focused on practices, thus are a way to highlight strategies. Nevertheless, the final report makes little place for a more comprehensive approach of performance, in which factors, drivers of good results are detailed. The main critics at the current stage may concern the definition of benchmarks as far as those ones appear as different according to previous works or experts. For a large part of indicators, we have not been in a

position to assess all the chains and focused on the farm level, and data on touchy issues have been difficult to collect, especially in the global chain we little knew before.

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ANNEXES

Annex 1 : Final matrix for wine chains performance assessment

Attribute	Indicator	Unit	Sub-indicators	Benchmark	Benchmark ranking
Creation and distribution of added value	Gross Income	EUR/FTE	Compare the net income of local farmers to the national average for the same crop system	average gross income per farmer between 18,000 and 20,000 € (Agreste, 2013)	High: 100% Medium: 50% Low:25%
	Reduction of direct subsidies	%	Amount of direct subsidies collected for grape and wine production (equipment, investment)/turnover Key actors : farmers and cooperatives	Average of subsidies in Languedoc-Roussillon for wine sector : about 20% in cooperatives. (FranceAgriMer, 2013)	High: 100% Medium: 50% Low:25%
	Distribution of added value along the chain	%	Difference in the share (%) of the final selling price between wine producers, and traders/retailers/intermediaries.	Comparison between the wine prices paid to the farmers or the cooperatives and the price paid by the consumer.	High: 100% Medium: 50% Low:25%
	Contribution to employment	FTE/ha	Direct employment created at the stage of wine production.	Comparison to the average per ha of vine in Languedoc: about 0,1 (Agreste, 2013)	High: 100% Medium: 50% Low:25%
			Both salaried and non-salaried workers have been included		
			(Full Time Equivalent)		
			1 FTE = 229 working days/year, 1 607hours		
Governance	Decision making mechanism	Ordinal 5 criteria	1. access to relevant information for pricing	1. yes/no (yes = 1 point)	High: 6 Medium: 3 Low: 0
			2. capacity to fix or negotiate the sale price	2. yes/no (yes = 1 point)	
			3. protection against a decline in sales prices	3. yes/no (yes = 1 point)	

	s		4. long-term commitment with an agreed minimum price	4. yes/no (yes = 1 point)	
			5. availability of mediation systems for negotiating prices and contracts	5. score between 0 and 2 yes/no (yes = 1 point)	
	Fraud management within the chain	Ordinal 5 criteria	Check the level of control production step		High: 5 Medium: 3 Low: 0
			1. qualitative harvest control;	1. yes/no (yes = 1 point)	
			2. quantitative harvest control;	2. yes/no (yes = 1 point)	
			3. cellar control;	3. yes/no (yes = 1 point)	
			4. tasting session;	4. yes/no (yes = 1 point)	
			5. Commercialization control.	5. yes/no (yes = 1 point)	
	Market management	Ordinal 10 criteria	1.score degree of market competition in the chain	1.score between 0 to 4 (0 4 high competition to 4 no competition)	High: 14 Medium: 7 Low: 0
			2. Implementation of strategies to enter the market (reducing device and risk sharing: Engaging consumers, producers' organization around a logistical platform, resource pooling, long winter crop cycles)	2. score between 0 and 2	
			3.relation chosen by the producer	3.yes/no (yes = 1 point)	
			4. diversification of business opportunities	4. yes/no (yes = 1 point)	
			5. ease of trading partner change	5. yes/no (yes = 1 point)	
			6. Customer relationship formalized by a contract	6. yes/no (yes = 1 point)	
			7. access to relevant information for pricing	7. yes/no (yes = 1 point)	
			8.capacity to fix or negotiate the sale price	8.yes/no (yes = 1 point)	
			9.long-term commitment with an agreed minimum price	9.yes/no (yes = 1 point)	
			10.availability of mediation systems / communication between farmers and clients	10.yes/no (yes = 1 point)	
	Farmers cooperatio	Ordinal 4 criteria	1. number of collective agricultural actions involving producers	1.score between 0 and 4	High: 14 Medium: 7

	n		2. existence/regularity/usefulness of advice relations with peers	2.score between 0 (no advice relations) and 4	Low: 0
			3. implication of farmers in cooperative or collective actions management	3. score between 0 and 4	
			4. number of territorial actions involving producers and promoting their meeting	4. score between 0 and 4	
Information and communication	Availability of information	Ordinal 7 criteria	1. environmental or social performance	1. yes/no (yes =1t)	High: 8 Medium: 4 Low:0
			2. geographic origin	2. yes/no (yes =1)	
			3. production methods	3. yes/no (yes =1)	
			4.harvest date	4. yes/no (yes =1)	
			5. direct communication between producer and consumer	5. yes/no (yes =1)	
			6.website available	6. yes/no (yes =1)	
			7. In addition 1 point if other key information is given to consumers: nutritional quality, ingredients…	7. yes/no (yes=1)	
Biodiversity	Species Conservation practices	Ordinal 10 criteria	Check application of practices at the production stage		High: 14 Medium: 6 Low: 0
			1. if participating to voluntaries schemes or projects for fauna and flaura conservation (partnership with research, public bodies, environmental NGO…)	1. yes/no (yes = 1 point)	
			2. other practices like participation to Landscape specifications (Natura 2000, MAET, TerraVitis)	2. yes/no (yes = 1 point)	
			3. keeping wildflower strips and ecological infrastructures	3. yes/no (yes = 1 point)	
			4. intensity of uncultivated varietal diversity	4. yes/no (yes = 1 point)	
			5. doing agro-ecological management of pest (e.g. Implantation nesting boxes, Introduction of auxiliary fauna)	5. yes/no (yes = 1 point)	
			6. maintaining an inter-row grass cover: (Permanent - Temporary)	6. yes/no (yes = 1 point)	
			7. using adapted pulverisation (dose reduction / ha + applications located on the areas to treat)	7. yes/no (yes = 1 point)	
			8. use of glyphosate	8. yes/no (no = 1 point)	
			9. Presence of grassing of fallow plots and meadow,	9. score between 0 and 5 yes/no (yes	

			ecological surfaces present on farm (composite hedges / bush; isolated trees; pond / ditch)	= 1 point)	
			10. Presence of a Ecological Zone - ZER, Forest or agro-forestry area.	10. yes/no (no = 1 point)	
	Cultivars' diversity	Ordinal 3 criteria	1. specialized or diversify agricultural system	1. diversify = 1 point	High: 4 Medium: 2 Low: 0
			2. n° of different cultivars in the farm	2. 0 point if =< 5 wine varieties; 1 point if >5 , =<10 wine var.; 2 points if >10 wine var.	
			3. if presence of traditional/local varieties (Carignan, Aramon, Cinsaut, Mourvèdre)	3.yes/no (yes = 1 point)	
Pollution	GHG emission for transportation	Ordinal 3 criteria	Distribution Step		High:6 Medium: 3 Low:0
			1. Mode of transport: no transport for distribution, tanker-truck, private cars	1. no transport (2 points)>tanker-truck of liquid foods (1 points)>personal car(0 point)	
			2. Packaging	2. bulk(1 point)>bottle(0 point)	
			3. number of annual kilometres between production stage and consumption	3. if 0<d<100 km (3 points), if 100<d<500 (2 points, if 500<d<1500 (1 point), if d>1500 (0 point)	
	GHG emissions for production	Ordinal 6 criteria	1.Number of agricultural machinery (Nm)	1.if 0<Nm<5 (3 points), if 5<Nm<10(2 points), if 10<Nm<20 (1 point), if Nm>20(0 point)	High: 16 Medium: 8 Low:0
			2.Rate of motorization of production process (Rp)	2.if 0<Rp<20%(3 points), if 20<Rp<40(2points), if 40<Rp<60(1 point), if Rp>60%(0 point)	
			3.Rate of mechanization of harvest process (Rh)	3.if 0<Rp<20%(3 points), if 20<Rp<40(2points), if 40<Rp<60 (1 point), if Rp>60%(0 point)	
			4.use of chemical inputs (Qc)	4.No chemical inputs (3 points), less than 30%(2 points), 30<Qf<60%,(1 point), >60% (0 point)	

			5.quantity of fuel used for production and process (Qf)	5. if Qf<100 l/ha (2 points), if 100<Qf<150 l/ha (1 point), if Qf>150l/ha (0 point)	
			6. geographical preference for sourcing	6. local preference (2 points), regional preference (1 point), national-international preference (0 point)	
	reduction of pollution, mitigation practices	Ordinal 8 criteria	Sum of the following practices applied:		High: 16 Medium: 8 Low:0
			1. Limitation and rationalisation of chemicals products (herbicide, insecticide, fungicide)	1. yes/no (yes = 1 point)	
			2. Limitation and rationalisation of fertilizers	2. yes/no (yes = 1 point)	
			3. Use of organic amendment (compost…)	3. yes/no (yes = 1 point)	
			4. Soils' protection practices: e.g. grassing	4. yes/no (yes = 1 point)	
			5. GHG mitigation practices	5. yes/no (yes = 1 point)	
			6. preference for local-regional sourcing	6. yes/no (yes = 1 point)	
			7. Effluent recovery equipment	7. yes/no (yes = 1 point)	
			8. preference for wine recyclable material	8. yes/no (yes = 1 point)	
Resource use	Water use practices	Ordinal 4 criteria	1. technology and equipment used for irrigation	1. choice : drip (1pt), sprinkler (0 pt), hose pipe (0 pt)	High:6 Medium: 3 Low:0
			2. technology and strategies for water preservation [sprinkler, mulching, watering in the evening / morning tighter crop hoeing]	2. yes/no (yes=1 point)	
			3. Dosing spray (drip irrigation or flood irrigation) + taken into account of climate conditions	3. yes/no (yes=1 point)	
			4. selection of adapted flora	4. yes/no (yes=1 point)	
			5. optimization of the pressure and tubing's diameter	5. public network (1 point), river, rain water pumping ground water (1 point), water from a desalination plant(0 pt), no control of water use (0	

				pt)	
	Material use practices	Ordinal 5 criteria	1. Material for production: Recycling of chemical products, metal stake or wire	1. yes/no (yes=1 point)	High:8 Medium: 4 Low:0
			2. Oenology : reduction of components added during winemaking process (yeast, sulfites, coagulants)	2. yes/no (yes=1 point)	
			3. Packaging		
			3.a. glass bottles compatible with recycling	3.a. yes/no (yes=1 point)	
			3.b. BIB	3.b. yes/no (yes=2 point)	
			3.c. recycling plastic bottle	3.c. yes/no (yes=1 point)	
			3.d. bulk	3. d. yes/no (yes=3 point)	
			4. Caps		
			4. a. screw cap	4.a. yes/no (yes=2 point)	
			4.b.synthetic corks	4.b. yes/no (yes=1 point)	
			4.c. cork	4.c. yes/no (yes=0 point)	
			5. use of cartons :	5. yes/no (yes=0 point)	
			6. type of measured applied to reduce use of material consumption:		
			6. a. use of more efficient machines;	6. a. yes/no (yes=1 point)	
			6.b. share of machines between producers;	6.b. yes/no (yes=1 point)	
Food safety	Food safety standards and controls	Ordinal 5 criteria	1. Application of standards on products [Organic Farming, Compliance Certification, Distributor specifications]	1.score between 0 and 4 [number of different standards]	High: 8 Medium: 4 Low:0
			2. Implementation of auto-control device	2. yes/no (yes=1)	
			3. Existence of control system between producers and consumers	3.yes/no (yes =1)	
			4. Existence of quality management system along the chain [HACCP, ISO…]	4. yes/no (yes =1)	

			5. Control and monitoring by third-party	5. yes/no (yes =1)	
	Artificial additive	mg/L	For red wine we consider the E220 (sulphur dioxide)alimentary additive	benchmark min: 0 g/hl benchmark max: 160 mg/l	High: 160 Medium: 80 Low: 0
Territoriality	Association of product with territory	Ordinal 5 criteria	1. Environmental actions (landscape management, improvement of biodiversity)	1. score between 0 and 2	High: 10 Medium: 5 Low:0
			2. Economical	2. score between 0 and 5	
			2.a. Direct employment contribution	2.a. production contribution yes/no (yes= 1), packaging and distribution yes/no (yes = 1)	
			2.b. Creation and distribution of added value for territory	2.b. creation yes/no (yes=1), distribution yes/no (yes=1),	
			2.c.Involvement of farms/firms in territorial project (Agrotourism , gastronomy or cultural events, heritage conservation)	2.c. yes/no (yes=1)	
			3. Cooperation	3. score between 0 and 3	
			3.a. Creation of partnership in the territory	3.a. yes/no (yes=1)	
			3.b. Diffusion of knowledge in the territory	3.b. yes/no (yes=1)	
			3.c. Local diffusion of technology and innovations	3.c. yes/no (yes=1point)	
	Social cohesion and Conviviality	Ordinal 2 criteria	1. Implication of chain actors in local community	1. score between 0 and 4	High: 8 Medium: 4 Low:0
			2. Local social externalities: funding of social activities, social innovation…	2. score between 0 and 4	

Annex 2 : Data Quality check matrix

Indicator	LOCAL WINE CHAIN		GLOBAL BOTTLE WINE CHAIN		GLOBAL BULK WINE CHAIN	
	Total DQD	Quality class	Total	Quality class	Total	Quality class
Gross Income	0,2	A	0,2	A	0,2	A
Reduction of direct subsidies	0,2	A	0,2	A	0,2	A
distribution of added value across the chain	0,2	A	0,2	A	0,2	A
Contribution to employment	0,4	A	0,4	A	0,4	A
Decision making mechanism	0,2	A	0,2	A	0,2	A
Market management	0,4	A	0,4	A	0,4	A
price decision making	0,4	A	0,4	A	0,4	A
Farmers cooperation	0	A	0	A	0	A
Availability of information	0,2	A	0,2	A	0,2	A
Cultivars diversity	0,2	A	0,2	A	0,2	A
Species Conservation practices	0,2	A	0,2	A	0,2	A
GHG emission for transportation	0,2	A	0,2	A	0,2	A
GHG emissions for production	0	A	0	A	0	A
Water Pollution Prevention Practices	0,2	A	0,2	A	0,2	A
Environmental pollution mitigation practices	0,2	A	0,2	A	0,2	A
Water Use Practices	0	A	0	A	0	A
Energy Use practices	0,4	A	0,4	A	0,4	A
Material Use practices	0,2	A	0,2	A	0,2	A
Food safety standards and controls	0,2	A	0,2	A	0,2	A
Artificial additive	0,2	A	0,2	A	0,2	A
Social cohesion and Conviviality	0,4	A	0,4	A	0,4	A
Association of product with territory	0,2	A	0,2	A	0,2	A