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INNOVATION SYSTEMS AND THE COMPETITION BETWEEN REGIONAL VINEYARDS.

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Abstract — This paper presents a first overview of the evolution of institutions and networks that drive innovation processes in the French wine industry. The notion of "Systems of Innovation" (SI) is discussed and proposed as an analytical tool, contrasting two approaches : i) an interactionist approach, taking into account relations, actors and institutions involved in concrete changes observed in the vineyards ; ii) an institutional approach, assessing the evolution of the set of institutions formally dedicated to research, education, training and innovation oriented toward the wine industry. The study is based on previous empirical works in four regional vineyards and on a first national inquiry concerning research and innovation centres. Initial findings demonstrate that the national wine SI tends to develop at regional levels, becoming a crucial factor influencing competition between regional vineyards.

Key words : innovation systems, wine, research, clusters, vineyards, regional development

Résumé — La communication présente une première synthèse sur l'évolution des institutions et réseaux qui accompagnent les innovations dans le secteur du vin en France. La notion de Système d'Innovation (SI) est discutée et mobilisée comme outil analytique en confrontant deux approches : i) une approche interractionniste prenant en compte les acteurs, réseaux et institutions impliqués dans les changements observés dans les vignobles ; ii) une approche institutionnelle analysant l'évolution des institutions dédiées à la recherche, l'enseignement, l'apprentissage et les transferts technologiques dans le secteur. L'étude s'appuie sur des travaux antérieurs de recherche dans quatre vignobles et sur une première enquête nationale au niveau des institutions de recherche et de développement du secteur. Les premiers résultats montrent que le SI national vitivinicole tend à se redéployer aux échelles régionales, devenant un facteur clé dans la concurrence entre vignobles régionaux.

Mots clés : Système d'innovation, vin, recherche, cluster, vignobles, développement régional

INTRODUCTION

Climatic changes, economic crisis, new consumer preferences, concerns about health and environment, worldwide competition… The French wine industry is facing a set of new challenges that is fundamentally questioning the ways of producing, marketing and drinking wine. In this context, « innovation» appears as a key issue, giving rise to controversy among professional debates : "Conservative" positions, refering to « tradition and terroir », try to restrain the legal use of technical innovations, which are suspected of harming the cultural image of wine (no chips, no GMOs...)... "Liberal" positions, speaking about modernity, new technologies and brands, promote an open use of innovations and argue that conservative positions are responsible for the current wine crisis... These debates are deeply questioning the institutions dedicated to research, education and technical advice in this sector (CST, 2007). Nevertheless, no study has recently assessed the role of innovation and science in the French wine industry, and evaluated the evolution and impacts of these institutions.

The aim of this paper is thus to present a first overview of the evolution of institutions and networks that are driving innovation in the French wine industry. For this purpose, I propose to use the notion of "System of Innovation" (SI) (Lundvall, 1992) as an analytical and heuristic tool, contrasting two approaches : i) an interactionist and bottom-up approach, taking into account relations, actors and institutions involved in concrete changes observed in the vineyards ; ii) an institutional and top-down approach, assessing the evolution of the set of institutions formally dedicated to research, education, training and innovation transfer in the wine industry. Previous empirical works on four regional vineyards are utilized to engage both approaches and to generate new questions for further research. The main idea is that the former national wine SI is restructuring at the regional level, becoming a crucial factor of competition between regional wine clusters.

The first section of this paper outlines the publications on innovation in the wine industry, pointing out the lack of a global approach in France. The second section presents the theoretical and methodological framework of SI, combining both interactionist and institutionalist approaches. The third section describes the main characteristics of recent innovation processes, refering to empirical studies carried out in four regional vineyards. The fourth section presents initial results of an evaluation on sectoral and regional institutions dedicated to research and innovation in this industry. The conclusion opens debates and suggests an agenda for further research.

1. ASSESSING INNOVATION IN THE FRENCH WINE INDUSTRY

1.1. Literature review on innovation in French wine industry

Research has taken into account innovation issues in the French wine industry, but it has mainly treated only one component of the whole process of innovation :

i) Institutional and sectoral analysis have pointed out the influence of technology and institutions on economic changes in this industry (role of policies, labeling, mechanization, professional organization…), mostly refering to Economic History, Regulation Theory or New

Institutional Economics (Bartoli, Boulet, 1990 ; Touzard, 2000 ; Rousset, 2004). These approaches distinguish innovation trends or cycles, which have contributed to build economic regimes and major conventions of quality (table wine vs AOC wine). But in these works, public and private organizations dedicated to research and innovation have never been investigated as a specific system of institutions ;

ii) Increasing number of studies have been focusing on one innovation project, such as launching of a new wine, adoption of a new technology by farms or cellars…. Following management perspectives (Masson et al., 2008), carrying out economic evaluation (Montaigne, 1998), or using "actor network theory" (Chiffoleau & Touzard, 2010), these works analyze conditions, forms and effects of elementary innovation in the industry. Positive effect on economic results is generally confirmed (Couderc, 2005), as well as the role of researchers, technical advisers, providers, purchasers… But these actors, their organizations and their relations are not analysed as a component of a whole SI ;

iii) Following networks analysis, wider empirical studies have explored local interactions influencing the whole set of changes in a vineyard (Chiffoleau et al., 2007 ; Compagnone, 2006 ; Ditter, 2005). These works show combinations between different "objects of innovation" shared by local producers. They reveal how networks (or forms of social capital) and institutions could favour localized innovation. Organizations dedicated to innovation are mentioned, but without extending the analysis to the SI : no reference on actors driving innovations outside direct connection to winegrowers ; no information on relations between institutions ; no analysis of the strategies that build and change these structures ;

iv) Sociological and political research have also focused on public controversy and political interactions that influence the legitimacy of innovations in the wine sector. In particular, the case of varietal creation and GMOs has been analysed by sociologists through participative methodology, focus groups (Joly et al, 2004) or inquiry and observations (Teil and Hennion, 2004 ; Costa et al., 2007)... But attention has been focused more on discourses than on the relations that connect scientists, technicians and producers...

This heterogeneous literature provides an overview of the current research on wine innovation, as well as a basis for theoretical discussions. Nevertheless, apart from INRA forward study (Sebillotte et al. 2003), no recent work has proposed a global and systemic approach of innovation in this industry...

1.2. New research on innovation in the new worlds of wine

On the other side, a new set of systemic research have been carried out on innovation in the wine industries of the so-called "new world countries". Initiated by Porter's analysis on the Californian wine cluster (1997), these studies have successively explored the conditions of innovation in emerging wine sectors of Australia (Roberts, Ingram, 2002), Chile (Giuliani, 2005), Argentina (McDermott, 2007), Brasil (Fensternseifer, 2007) or South Africa (Lorentzen, 2009). Robust empirical works have been done refering to cluster analysis, management studies or Innovation economics, and leading to a specific international workshop on January 2009 in the university of Novarra (Italy).

i) These works underline the major role of innovation networks in the emergence of new world countries in the international wine market. The huge growth of their wine production and export since the beginning of the 1990s relies on many factors, but among them the construction of networks between firms, universities, research centers and government agency have proove to be so crucial. These networks have connected entrepreneurs (farmers, firms managers) open to technological and marketing innovation, with national universities and research centers capturing foreign knowledge from Northern traditional wine

countries, and with professional and public institutions providing knowledge bridge between different professional communities (Giuliani, Rabelloti, 2009). Networking and sharing information are thus essential components in the innovation and learning processes that have lead to a "catching up" effort of the new world countries in the international wine competition. Contrary to many simple analysis explaining the succes of the new world of wine by liberal policy, the recent works on innovation are stressing the importance of public investment in research and education institutions and of their connection to firms and professional organizations.

ii) These recent studies mostly refer to the notions of clusters and / or Sectoral Systems of Innovation (Malerba, 2004), in order to assess the relationships between actors (and/or between organizations) rather than the role of a "driving actor" in the industry. Both cluster analysis and Sectoral Systems approach offer conceptual framework for describing and interprating complex interactions between farms, firms, research centers, universities and government or professional organizations (Lorentzen, 2008). Cluster analysis give more emphasis on regional factors and local networks, when sectoral system approach of innovation better integrates market and public policy influence. The two approaches suggest to combinate institutionnal analysis and network analysis, but research that really integrate these two analytical tools is still scare...

iii) At the same time, this new trend of research in the new world of wine highlights the lack of a renewed approach on innovation and clusters in the traditional European wine countries. Many factors have been suggested in order to explain their decreasing market share (Touzard, 2008), but researchers seem to have forbiden to question the relations between firms and organizations dedicated to research and innovation. If these networks have played such a crucial role during the development of the new world of wine, they also have to play a role in the current crisis of the French wine industry. First comparison between italian wine regions and Chilean or South-African wine clusters have been initiated (Morrison, Rabelloti, 2009), suggesting that emerging countries are now driving the international process of technological and marketing innovation.

New research on innovation in the new world of wine is thus questioning the old research on innovation in the old world of wine. In the case of France, several regional vineyards are competing on national and international market, calling for a new question : are national sectoral or regional SI playing a role in this interregional competition ?

II. A "TWO SIDED APPROACH" FOR THE WINE SYSTEM OF INNOVATION

In order to initiate a sistemic approach to innovation in the French wine industry, I propose to mobilize the notion of SI, following a "two-sided" approach suggested by previous works (Lundvall, 1988 ; Amable, 2001). Innovation is considered as a localized process of change, developed by concrete interactions between actors (Hatchuel et al., 2006), controlled by networks, knowledge and institutions. These mechanisms of control (White, 1992) are built through those interactions and embedded in relational, cognitive and institutional wider structures, which could be explicitly dedicated to support these innovations (or not). So, from the "interactionist and productive side", we consider a concrete set of changes carried out by producers, by selecting the relevant interactions that connect these actors with their relational, cognitive and institutional framework ; from the "institutionalist and organisational side" we analyse the evolution and the impacts of a set of institutions that are intended to orient technical and organisational changes in the sector. This two-sided approach could be considered as an integration of "bottom-up" and "top-down" analyses of innovation

processes, but without accepting the linear and diffusionist assumptions. Combining these two heuristic approaches in the "real life of changes" suggests at least the following points :

i) The need of conceptual and methodological coherency between the two approaches requires a specific attention on the nature of the social ties we consider from each side. Network analysis starting from producers must take into account a wide range of ties, from advice exchanges about innovation decisions, to their formal belonging to organizations and collective actions (Degenne, Forse, 1994 ; Chiffoleau, Touzard, 2007) ; at the same time, the analysis of institutions dedicated to research and innovation must engage formal links and actions (partnerships, projects and their members...) by assessing personal interactions of their members (e.g. researchers) who often develop their strategic influence outside the formal actions of their organizations (Favereau, Lazega, 2003 ; Giuliani, Rabelloti, 2009).

ii) A SI is essentially constituted by the "interlocking" of two systems, one constructed (by the analyst) from innovative interactions, the other built from dedicated institutions. These two systems could have weak or dense connections, which can converge or diverge. A key question is to evaluate the nature of this connection (e.g. research institutions with few or selective impacts on vineyards vs integration of these institutions in a regional wine cluster) ;

iii) The scope and boundaries of the SI cannot be defined *ex ante*, but result from the analysis. It could reveal a national, regional or sectoral SI (Malerba, 2004), but many SIs could be represented as evolving combinations of national, sectoral, corporate, regional and local systems. This recurrent boundary issue deals with the question of the specialization and coherency of the SI. Did interactions analysed from the producers side connect with specialized wine institutions or with actors and institutions outside the industry ? Did research formally dedicated to wine industry really impact wine producers or actors outside this industry ? Another key question is to assess which key actor and (topological and institutional) space seems to be strengthening and driving the SI.

iv) An initial description of the functioning and evolution of the SI may be completed by an evaluation of economic regime and its performance in the associated industry. What kind of innovations have economic effects on wine firms (growth rates, diferenciation…) and which set of institutions, networks and knowledge is concerned ? How does SI contribute to intensive and extensive economic regimes, generally coexisting in the sector ? Does SI viability really depends on economic results ? Is it influenced by political interactions ?

v) Assessing the role of innovation and science in French wine industry appears as a very ambitious research program, which has to be implemented. In order to start this exploration, we assume a first pragmatic methodology by using previous empirical studies completed by a specific assessment of the main research institutions oriented towards wine industry.

III. THE INTERACTIONIST SIDE OF THE SI : LESSONS FROM EMPIRICAL STUDIES IN FRENCH VINEYARDS

The "Interactionist approach" of the SI in the French wine industry starts with the characterization of innovation processes observed in different regional vineyards, investigating the relevant relations and institutions involved in these processes. In this paper, empirical information come from case studies and network analysis we carried out in Languedoc (Montpellier), and from three similar researches made by colleagues in Bourgogne (Dijon), Aquitaine (Bordeaux) and Loire Valley (Angers) (table 1).

Table 1 : Studies on innovation process in four French regional vineyards

Vineyard	Languedoc	Bourgogne	Aquitaine	Loire valley
References	Touzard, 2002 Chiffoleau, 2004 Chiffoleau et al. 2007	Compagnone, 2004 Willis et al. 2005	Saint Ges, 2006 Belis & Cazals, 2006 Couret 2006	Burgeon, Sarrazin, 2008
Material and method	- census of 360 Languedoc wine coops - advice network analysis in a cluster (65 coop managers) - many case studies	- network analysis 25 winegrowers from 3 villages - cases studies - network of wine tecnical advisers	- 2 Phd : inquiries (Email) on 700 and 723 wine growers - 17 case studies in wine coops	- network analysis 55 grapegrowers in 10 villages - 2 wine coops - many case studies
Main domains and objects of innovation	- grape classification - new varietal, plot and harvest management - oenological process and equipment - new wine range - selling points and marketing practices	- practices oriented to environment (pest management...) - organisational changes in coops - wine tourism	- practices oriented to environment - grape classification and organisational changes in coops - marketing practices	- differenciation of wine (and grape) - control among the productive chain - environmental practices - terroir and tourism
Features of innovation	Radical innovation pushed by technical changes	Incremental changes oriented toward environmental issues	Incremental changes oriented toward environmental issues	Intermediar. changes pulled by market and environmental issues
Sources of information for innovation	1. peers 2. technical organis. 3. private providers 4. professional press	1. peers 2. private providers 3. wine unions 4. professional press 5. technical org.	(1. peers ?) 1. Professional press 2. Private providers 3. wine unions 4. technical organis.	1. peers 2. wine union 3. professional press 4. technical organis. (5. providers ?)
Economic impact of innovation	combination of technic and organisational changes explain the distribution of revenue. High impact	economic impacts are mentioned for building niche markets	Few effects excepting the cases of organic wine and organisational innovation in coops	No economic evaluation

These empirical evaluations refer to different methodologies but give convergent conclusions, mostly illustrated in this paper by our research on Languedoc wine industry :

i) In each vineyard, innovations concern a wide range of domains and objects, including technical and organisational changes in grape and wine production (e.g. new rules for grape grading in cooperatives), marketing, communication, environmentally friendly practices, management tools, tourism... Developing quality wines implies the enlargement of the "domains of action" and calls for a major diversification and openness of interactions (Chiffoleau, Touzard, 2010a). Nevertheless, several remarks may be done :
- higher diversity of interactions doesn't mean higher density of interactions. On the contrary, longitudinal case studies suggest a decrease in the global relational density, that means less interactions (but more strategic) covering more domains (Chiffoleau, 2004).
- in each vineyard the density of interactions differs acording to the domain of innovation, but it does not always fit with the strategic importance accorded to each domain. In Languedoc we noted high density for technical issues and weak density for marketing innovation, considered by producers as more strategic (but also as more confidential for this reason).
- importance of each domain (evaluated by density of interaction or by expert analysis) is different according to each regional vineyard (see qualitative comparison in table 1).

ii) Combinations of technical and organisational changes have positive effects on economic results in farms and wine cooperatives. In Languedoc, where innovation follows a radical process, the impact of the set (and number) of innovations adopted in the firm is higher than the effect of its size or its former quality of wine. In Bourgogne and Bordeaux vineyards, the

portfolio of wine appellations remains as primary factor in economic growth and profit (Couret, 2006), but some combinations of innovations have procured positive gains, in the case of organic producers or organisational changes in cooperative (Belis, Cazals, 2007).

iii) Innovations and performance could be linked to specific forms of social capital (networks). Efficient networks seem to combine a) local interactions between peers (grape growers in a cooperative, cooperative managers in a cluster, winegrowers in neighbouring villages) mostly oriented to technical adaptations and to the management of local public goods, with b) "far interactions" capturing more strategic informations (Chiffoleau et al., 2007). This assumption is clearly confirmed in the case of adoption of "environmental friendly practices", assessed by researchers in the four regions. In Languedoc, the advice network analysis in Beziers wine cluster also shows that the relational structures of the cooperative directors are evolving acording to the position of each firm in a trajectory of innovation (Chiffoleau et al., 2007). Cooperatives with low score of innovation have a dual relational structure and behaviour : intense interactions, questing for adoption of innovation in "urgent domains" vs autistic behaviour ; cooperatives with the highest score of innovation also present a dual network structure : interactions are mainly oriented outside the cluster (and contribute weakly to the cluster) vs "altruistic behaviour" (interpreted as a process of prestige building) ; cooperatives with intermediary scores are the most involved in interactions, mostly on technical issues.

iv) Interactions are globally giving priority to peers, to specific professional institutions (wine unions, professional press, agricultural chambers, oenological associations…) and to private providers. These categories of actors are mentioned in each vineyard, with variation in their importance as source of strategic information (table 1). Other institutional components of SI are mentioned in fewer interactions : they refer to technical meetings or exhibitions, web sites, credit projects and (in few cases) technical and research centres (INRA).

v) Even if the interactionnist approach of the wine SI marginally refers to technical centres, education and research institutes, these institutions are mentioned by wine growers and cooperative managers. References are coming from public events (researcher contributing to a professional meeting), professional press, partnership projects, intermediation of a technical adviser (agriculture chamber), qualification of concrete objects (INRA varietal, technologies, reports, formula used for grape clasification...) and in few cases personal relationships (Chiffoleau et al., 2001). Specific effects of these institutions on technical and organizational changes in vineyards are obviously difficult to evaluate through the methodology we used. It questions ex-post and quantitative networks analysis, which cannot measure the relevance of each interaction (convergent with Granovetter remarks on the "power of weak ties").

vi) Apart from these common points, innovative interactions and their "associated institutions" constitute different social structures according to three main dimensions :
- Farm cellar vs cooperative cellar. Cooperative structures and gouvernance lead to specific object of innovation (such as grape grading rules or dedicated technology) and to specific collective actions features and problems (Touzard et al., 2008);
- Major "convention of quality". We confirm the coexistence of two opposite incremental trajectories (AOC/terroir wines vs. Basic/table wine) and two trajectories influenced by radical innovations (new technological varietal wines, organic wines) involving new actors and institutions in the process (Chiffoleau, Touzard, 2010) ;
- Regional conditions. These conditions are combining many factors such as specialisation and reputation of the vineyard (and wine), natural local conditions (resource or constrain for innovations), institutional path dependancy (e.g. development and orientation of local/ regional professional wine organisations..), but also cognitive basis and relational structures which have to be specified.

	Terroir wine	Basic wine	Technological varietal wines	Organic wine
Legal sign of quality	AOC (AOP) + Several « vins de pays »	« vin de table » « vin de pays de département »	"vin de Pays" IGP and brand several generic AOC	AB certification
Economic regime Before 2003	Intensive growth (price) based on area and volume control Territorial rent	Progressive decrease in volume and price Cost reduction	Extensive growth based on new plantations and external demand	Intensive(labour) and extensive (land) growth.
Type of market	Quality differentiated markets	national commodity market	Innovative export market	Emerging niche markets
Evolution since 2003	Crises according to previous reputation	continuation of previous crisis	Continuation of extensive growth with lowest price	Continuation of growth
Main sectorial institutions	- Local wine unions - regional interprof. organisation - CNAOC / INAO	National ANIVIT	Regional interprof. unions (Inter'Oc)	- ITAB, AIVB associations - specific exhibitions - dedicated chains
Domains of innovation	Agronomic practice oenological control oenoturism	mechanization thermovinification Low alcohol wine	mechanization, irrigation, grape grading, chips, packaging	New agronomic and oenological practice
General feature of innovations	Incremental	Incremental	Radical	Radical

IV. THE INSTITUTIONALIST SIDE OF THE SI : FIRST RESULTS FROM INRA EVALUATION

The "institutionalist approach" of the French wine SI can be based on INRA reports aiming at defining research agenda for this institution. Information has also been collected from professional press and regional councils reports (in Languedoc-Roussillon, Aquitaine, Pays de Loire, Bourgogne). In this paper a first structural analysis of these institutions is proposed, suggesting several assumptions for their evolution :

i) French institutions dedicated to research, education and innovation have been marked by the historical confrontation between the centralized State and the regional dimension of the wine industry. The evolution of political negociations between the Ministry of Agriculture and coalitions of regional unions of wine producers has remained crucial in order to understand the French SI construction and transformation (Touzard, 1998). The feature of a national wine SI has been established after the second world war, following linear and top down conception of innovation, and expressing the domination of a national and public project. National Institute for Agronomic Research (INRA), created in 1946, has developed a specific wine department carrying out research in genetic, oenology, agronomy, machinary... and progressively localized in Montpellier, Bordeaux, Angers, Colmar (Alsace) and Dijon. Specific national public institutions have also been created for "development and innovation transfer" : ITV (agronomic and oenology technology), ANTAV (varietal management and control), agricultural public schools (with specialisation in vine and wine)... During the same period producer's associations created their own organizations for development and extension, at departmental level (then merging at regional level since the 1980s): chambers of agriculture (not specialized in wine), ICV (oenological advice for wine cooperatives), local associations for experimentation. During the 1960s, these professional organizations took control of the official role of extension, when national institutions were developping "upstream" activities for innovations.

ii) During the last decade, we note both weakening and reorganization of this public national system of innovation and research dedicated to wine.
INRA had kept important involvement in wine research (genetic, agronomy, wine processing…), distributed in 5 centres with specialised research units. Nevertheless, the INRA "forward study" on vine and wine research (Sebillote et al., 2003) pointed out that the agenda of these research units tend to keep out their specific wine issues and become more academic and generic (i e. specialised on one biological domain concerning various agrifood production). Individual and collective long-term research projects are becoming more academic, and vine and wine issues are now promoted by multi-disciplinary and multi-unit research projects founded for limited period (3 years) by the National Research Agency.
At the same time, two main national institutions dedicated to vine and wine "innovation transfer" (ENTAV and ITV) have merged in IFV (2007), and globally receive a lowest public funding. IFV is still controled by both Ministry of Agriculture and wine producers delegates, but the new organisation is now facing difficulty in maintaining its national agenda, and has to adapt to new conditions of innovation process (reactivity, multiplexity of relations, iterativity...) and to new private "competitors" in the market of extension and development for wine industry.

iii) The strengthening of regional institutions dedicated to wine innovation is a major recent evolution, resulting from the convergence of four main strategies:
- In addition to national reorganization (see above), French State is improving the "regionalization" (transfer of power and resources from the state to regional councils). This evolution has been amplified by the creation of "competitiveness regional clusters" and by founding "regional projects" joining universities and research centers.
- In this context, regional councils are progressively developing their own formal "regional innovation strategy" and try to promote connections between local firms and universities. Each wine region offers technological transfer centres with actions towards its wine sector.
- Each main French regional vineyards is now represented by "interprofessional wine organisation", improving the regional wine governance. These organisations are still oriented to political and marketing issues, but progressively evolve towards "research development" actions. This involvement in innovation processes does not depend on the size of the vineyard. For instance, the interprofessional organisation for the Rhône Valley (Interhône) appears as a pionneer in developing applied research joined with professional masters, international conferences and both economic and technical advice to the producers.
- Firms and firms alliances (federated wine coops, private wholesalers…) tend to maintain a regional strategy, at least as a "basis camp" for their supply chain strategy (Touzard, 2008). Each vineyard presents an evolving game of economic and political interactions between firms, professional organisations, regional council and local public organisations (INRA, University, scholls, IFV)

Table 2. Main institutions dedicated to research and innovation in the wine regions
First evaluation in workers (researchers, executives) per year 2009 Do not mention

Region	**Languedoc**	**Aquitaine**	**Pays Loire**	**Bourgogne**	**Champagn**	**Alsace**	**C. d Rhône**
Main city	**Montpellier**	**Bordeaux**	**Angers**	**Dijon**	**Reims**	**Colmar**	**Avignon**
INRA research centers	++++ 80	+++ 40	+ 8	+ 12	0	++ 20	4
Agronomic Ing. School	Sup'Agro +++ 15	ENITAB ++ 9	ESA +++ 12	AgroSup + ENSBANA			
University and CNRS	Montpel U 15 ESC	Bordeaux 52 Business S 5	Angers . 4 Nantes . 6	IUVV 23 ESC Dijon 5	Reims U. 17 +++	UDS 4 UHA 1	Avignon U 4 Suze la R.
Oenol diplom	2	1		1	1		1
Institute	IHEV	ISVV	UMT Vinitera	UnescoChair	"vigne vin"		Univ. du vin
Masters	4	3	1: Vintage	2	1		2
Competitivity Pole	Qualimed	Vin 2020	Pole Vegetal	Vitagora			
Private Research	++	+++	+	+++	++++	++	++
Oenology center	ICV : 53 Private :	Private	Private	Private	Private	Private	ICV : 12 Private
Technical centre IFV	3 sites 18	Pôle VV 9	3 sites 12	3 sites, BIVB 8	Pôle ITC 3	Site Inra 4	2 sites 2
Agriculture Chambers	60	82	22	13	10	10	15
Specific technic center	Pech Rouge Vinseo	PVVBA		CTIVB, Crecep	ITC		AREDVI
Regional council	SRI +++	SRI +++	SRI ++	SRI +++	SRI +	SRI +	SRI +
Other local institution	CG34, 11, 66 +++	CG33 +	CG49, 45 +	CG58, 21 +	CG10, 51	CG67, 68	CG84 +
Interprofession Comitees	CIVL, CIVR, InterOc, rem	CIVB	Interloire	BIVB	CIVC	CIVA	InterRhône
Professional Exhibitions	Vinisud SITEVI Millesime Bio	Vinexpo Vinitech	SIVAL Salon Vins de loire	Salon des vins Macon	VITEFF	Salon prof du vin	Bouquet de vins
Professional press, media	Pays du Midi *PAV*	*Avenir Agric. et viticole Un. girond. vi*	*Anjou Agricol Vigneron du vl de Loire*	*Terre de Bourgogne*	*Champagne viticole*	*Vins Alsace*	*Agric proven vigner. CdR*

Source Touzard 2010. To be completed

iv) This movement of regional strengthening leads to build SIs that present similarity and differences, in their forms and in their relations to local vineyard. From the early 90s, each wine region has tried to implement and enhance a centre for wine high studies linking research and training issues : IHEV in Montpellier and ISVV in Bordeaux present the most important opportunity for high degree education, mobilizing powerful agronomic engineering schools with local INRA research teams ; behind these two leading institutions, two other centres have emerged to try to capture international prestige : Jules Guyot Institute at Dijon university, collaborating with ENESAD and Dijon INRA centre, driving an "Unesco chair" on vine and wine ; Catholic University ESA in Angers, now collaborating with local INRA unit and IFV (through UMT "Vinitera") and delivering a European Master "Vintage". Rhône Valley vineyards present a specific and active "professional university", strongly connected with interprofessional wine organisation (Interrhône). In Champagne vineyards, Reims University tries to develop an ambitious project, through far-reaching agreements with public research

institutions (Paris) and more partnerships with private research. All of these university and collaborative research projects benefit from regional council strategies and try to connect their projects with emergent "technological transfer" organizations or regional policy supporting local innovators. But the role of professional organizations, the nature of promoted innovations, or the concrete relations with wine farms and firms are different from one region to another. We suggest different models of regional SI :
- The rivals Montpellier (Languedoc-Roussillon) and Bordeaux (Aquitaine) wine SIs present similarities in their structure and importance. The Languedoc wine SI can be described as the most open and diversified in term of experimentation and international links, but the connections with regional wine producers and wine organizations remain split and relatively weak… In Bordeaux, regional integration of institutions seems to be stronger with professional organisations and firms (not yet well established), but the range of innovations seems to be more restricted by professional control…
- Loire Valley and Bourgogne emergent SIs are part of wider agrifood regional SI and benefit from new international opportunities of "outsider" projects.
- Rhône valley and Champagne vineyard are examples of local SIs driven by professional structures and private research projects.
In all cases, regional wine SI appears as a new resource for a stronger competition between French regional vineyards.

v) Nevertheless, the "regionalization" of SI in the French wine industry is not a simple fragmentation of a national SI, opening the way for various bottom-up projects. It is complemented by inter-regional and international inter-actions, both formal and informal (e.g. bridging researchers). Research projects are more and more connecting actors from different universities and research centres over the world. Nevertheless, each "call for research projects" leads to the confrontation of coalitions between regional SIs. National or European issues are also rebuilding cooperation link between different wine regions (e.g. recent negotiations on wine CMO) ; other interregional connections are constructed through the media (press, web, political institutions, associations…), leading to different "communities of debate and knowledge"… In the set of interactions coming from these wine institutions, are we observing the re-construction of a "national wine cluster" where regional vineyards are both collaborating and competing ?

vi) Economic evaluation (cost – benefit) of institutions involved in wine SIs appears difficult. Several attempts have been done (Montaigne et al. 2003), but without any econometric tests. Direct costs could be calculated, compared to the value produced by the sector and compared between vineyards ; institutional forms can also be associated to regional economic growth or evolution of wine average price, but they generally cannot be isolated as a separated factor. As a first evaluation we note a paradox : the most important regional wine SI (at least in term of employement) corresponds to the Languedoc vineyard which is facing most difficulties, lowest price, decrease in volume and value of production. On the other side the most profitable vineyard, Champagne, is associated with one of the less dense regional SI, benefiting from less public investment (no Inra center). Does-it mean that the links between SI and economic growth, seen in the new world, are not avalaible for the French wine Industry ? Several assumptions may be proposed to overpass this apparent paradox :
- inherited reputation and quality of the wine have prooved to be the major factor of the price level, whatever the scope of current investment in research and innovation…
- the weight of institutions could be linked to the demographic and political weight of the industry, still major for Languedoc, even if it is strongly decreasing ;
- the radical transformation of Languedoc vineyard (expressing technological similarity with the transformations in the new world) calls for a more important involvement of institutions…
- caracteristics of firms and actors may also influence the economic growth and the demand for innovation : small producers and village cooperatives, still dominant in Languedoc, have few means, thus legitimating public investment, but also face difficulties concerning marketing issues (Chiffoleau et al., 2007) ;

- institutionnal choices are at issue. For instance, professional organizations are divided and conflictive in Languedoc, when they shape a federative entity in other regions, often managing numerous research-development project (30 contracts in the case of CIVB) ;
- the coexistence of economic dynamic with institutional framework is not sufficient for the assessment. The concrete nature and forms of the interactions between actors from the productive side and those from the institutional side is at stake. That calls for investigations on concrete networks, remaining in the core of the SI (Malerba 2004).

CONCLUSION

After contrasting the two (first) approaches of SI, our initial conclusions are the following :
- In the French context of historical centralization with regional specialization of the wine industry, we confirm the current movement of "regionalization" of SI, combined with new features of national and international interconnections (an other illustration of "glocalization", "small worlds", "clustering in globalization"…). Different forms of "Regional SI " have been noted and may be assessed through further comparative studies…
- Following a "two-sided approach" of SI calls for a focus on the key connections between the two systems constituting the SI, i.e. between networks, knowledge and institutions mobilized in concrete technological changes… and those that are formally supposed to favour theses changes (including INRA research centres). We noted convergences and divergences between regional vineyards. Comparison between Bordeaux/Aquitaine SI and Montpellier/Languedoc SI outlines the lack of coordination in the second case, instead of the high potential recognized by all observers (Chiffoleau, Touzard, 2009).
- Economic evaluation of SI could benefit from the two-sided approach. By the interactionist side, a relevant set of innovations and connected institutions can be identified according to their direct economic effects ; by the institutionalist side, the cost of institutions can be calculated and referred to regional wine economic indicators. The contrasting of these two (attempts of) economic valuation leads to strategic questions for policy makers and firms. Our assumption is that research and university programmes could be more useful for building social capital, social status or attributes of high reputation wine, instead of for the implementation of concrete technological changes with short terms economic gains.
- In the wine sector, both innovation processes and institutions which are supposed to support them remain embedded in cultural and political interactions. This embeddedness concerns professional knowledge of innovators, legitimacy of innovations, social motivations of producers, technical experts, researchers... These relations could have negative or positive influences on innovations.
- This first exploration on the French wine industry SI calls for further studies. It gives the opportunity for launching a new research program, developing the methodological proposal through a comparative study between French vineyards. At the same time this research could be integrated in international comparisons between wine regions and their SI.

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