



Specialized suppliers in the innovation process in wine clusters in Maule Region, Chile

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Abstract

In wine clusters, Olavarría et al., (2006) have shown that in Chile's Colchagua Valley, important information sources for innovation are mainly universities and technology suppliers of inputs and services. 70% of wine firms state that they receive some information from these sources, but is the relevancy and insensity of this information is unknown. The majority of specialized suppliers are geographically distant (250 kms) to the wine cluster in Maule, and suppliers argue that no incentives exist for them to move close to the winemaking firms. The research also indicates that the network for the exchange of knowledge between the valley and vineyards suppliers of products and services reaches a very low-density value of only 0.03. The value is similar to the value of 0.036 found in Chile's Colchagua Valley by Olavarría et al. (2006). These results indicate that in wine valleys in Chile, there is a less effective knowledge-sharing network between wineries and suppliers than is verified among other wineries within clusters. This may be because the suppliers are more geographically distant than wineries. However, the forces of clustering do not create external economies that may encourage supplier relocation.

Key words: wine clusters, technological suppliers, cluster performance.

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1. INTRODUCTION

Many economic geographers, economists, international business and strategy scholars have seen agglomeration economies theories as a starting point for contemporary academic research. However, the concept of agglomeration economies is far from recent. Traditional authors like Von Thünen (1842), and Marshall (1920) are noteworthy for their roles in the development of agglomeration economies theories. Marshall (1920) introduced the early concepts of co-partnerships, social elements of proximity and cooperation among industries. He combined the concepts of industrial districts, town development and marketing. This indicates that the “soft” elements of personal contact between traders, customers and producers, as well as the exchange of information, the circulation of new ideas and the diffusion of innovation (Bellandi, 1987, 2001), were the main ideas considered to be Marshall’s contribution to agglomeration theories. Marshall also introduced the concept of external economies or externalities as the economies of scale benefits derived from industrial location. This implies that the economies of scale are not internal to the firm, and that occurrences lie beyond its control, having an impact on the firm’s internal production or performance (Brown and McNaughton, 2002).

It is clear that Marshall influences some of our ideas about marketing in industrial clusters with the concept of “mutual discovery” as a key advantage of co-location. Consequently, Marshall’s work on industrial districts can be considered as the starting point for many conceptual considerations of what has become the broad concept and literature of clusters. Some authors (Martin and Sunley, 2002; Olsen, 2002) suggest that Marshall had little to say about how the process of industrial localisation actually starts, why it starts in certain places and not in others, or exactly what “local” meant. However many economic geographers and international business scholars still take Marshall’s work as the basis for explaining agglomeration, economies and industrial districts (Parr et al., 2002).

It is well known that there is no single definition of a cluster. Porter (1998) defined clusters as a set of industries related horizontally and vertically having different kinds of interactions leading to greater levels of productivity. However, Porter’s theories do not fully explain why and how the first firms set up in a particular location. Taking this idea, Brown and McNaughton (2002) explain that the initial catalyst for a cluster may have been an ‘accident of history’, but once it is established, the accumulative causation based on increasing returns and positive externalities, led to the attraction of new firms. Then, the concept of “lead firms” was the focal point for the initial cluster and network development work of Martin (1999).

In general terms, there are many sources of innovation for companies, such as the relationship with customers, employees, the extra-and intramural research and information from R&D centres and other firms. However in this research, we focused in the role of suppliers of products and services that incorporate various levels of technology into their processes. Supplier contribution is very important, because it can allow buyers (firms that are in clusters) to innovate, achieving greater competitiveness through cost reduction or process improvement. Song and Jeff (2009), describe the availability of information held by firms through providers, and these are a fundamental link to the development of product and process innovations. Several authors mention the role of suppliers in innovation within the company, for example Wagner (2009) described the existence of two types of providers, with some providers only offering products and services and suppliers which incorporate

innovation in final products, where the former seek cost reduction and the latter an increase in innovative processes and products that require a company.

In industrial clusters, technological suppliers (or specialized suppliers)¹ are important sources of innovation (Marshall, 1890; Porter, 1998, *interalia*). Industrial clusters must be in geographical proximity to technology providers, since they are necessary in order to develop a better supplier-customer relationship. Industrial cluster companies that provide products interact with information to providers, in both directions giving them ideas for the production process and receiving good productive inputs. Through interactive innovation (Kline and Rosenberg, 1986) suppliers provide products and services better-tailored to the clustered firms. Geographical proximity also helps them to become more competitive.

In wine clusters, Olavarría et al., (2006) have shown that for Chile's Colchagua Valley, important information sources for innovation are mainly universities and technology suppliers of inputs and services. 70% of wine firms declare that they receive some information, but we do not know how much is relevant and how intense that information is. The wine firms (?) argue that this is not relevant since (1) suppliers are not always in geographical proximity and (2) the knowledge network between wineries and suppliers is very weak (density of 0.03). It appears that the distance is not a problem in the studied clusters or in other words, so what is the rationale for the distance of suppliers? Why they are not close to the cluster firms? This study aims to explore the reasons for the geographical distance of suppliers to the wine clusters. According to the literature and in the case of Maule Valley, it is an element that affects innovation, and so it is interesting to know what the main reasons for geographical distances are.

2. METHODOLOGY

For the purpose of this study, the relationship among technological suppliers and wine cluster in Maule region were studied from 2009-2010. A questionnaire about several aspects of suppliers was distributed in order to collect company data, technology innovation information, and product and processes improvements implemented during the last 3 years. The empirical part was to gather information with respect specialized suppliers in the wine industry located in Maule. This survey was applied *in situ* to all the firms selected and 6 facets, which asked 34 questions, which comprised the questionnaire. An explanation of this survey is presented in Table 1, presented in the annexes. The instrument compiled a set of structured questions to 28 executives from technical suppliers to the wine industry. In the second part of the questionnaire, social networking information among wineries in the clusters and their suppliers was collected. The relational data was obtained by conducting a survey of the main players of the regional innovation system in which they were asked about the established links among other participants in the field. The objective of this part of the research is to determine the main features that characterize wine provider firms, in order to establish the structural profile of firms to subsequently observe the behaviour of determined variables that affect the innovation process in wineries, and a complementary social network analysis was implemented. In terms of the social network methodology, the objective of the study was to identify and analyze the knowledge networks formed by the existing links

¹ The definition of the specialized or technical suppliers are those provider which offer products that are considered by-products with a certain level of technology and in the context of this study, those that are specifically designed for the wine production.

between wine providers outside Maule and wine suppliers located in the Maule Valley and outside that area.

The relational information collected was then processed using UCINET software to analyze networks based on predetermined indicators and the graphs were generated as visual representations of social networks. This information was analyzed through social network theories and from the literature in the field about social networks and innovation. Within the links generated among these parties, there is an interchange of goods, services and knowledge. From that perspective, it is particularly interesting to study how the networks structure affects the flow of information. Within this framework, the specific points of analysis of social networks were: a) analyzing the general structure of links among linked entities within the regional system of innovation and b) analyzing the position and sphere of influence of each of the linked entities within each valley.

In order to achieve the first objective we chose to examine the characteristic referred to as “cohesion”. In general terms, “cohesion” indicates the level of overall interconnectedness of the nodes of the network. This is measured through relational density and through *cliques*. Density¹ is understood as the proportion of links present in the web compared to the maximum proportion of possible links (Rodríguez, 2005). In the case of *cliques*, **this is a measure** used to name cohesive subgroups within networks, which in term of graph theory are classified as a subgraph: “a grouping of points within the universe together with the curves that join them” (Herrero, 2000). Using this criteria, a *clique* is the most complete subgraph possible, and is a subgroup of nodes in which every pair of nodes are directly linked by a line and is expressed as a subgroup which is at least three nodes which are directly interconnected. It is a measure of local cohesion, which, in terms of information flow, takes into account the high density of interchange of this resource between the nodes that comprise this network subgroup.

For the second objective, the relational property is called centrality. Centrality as a concept analyzes the power, understood in this case almost as a relational property (micro) that exists in a social network. Power is determined depending on the advantageous positions that actors have in their relational networks. Those who have more advantageous positions are those that have more opportunity to access and transfer resources especially in terms of information flow (Kilduff y Tsai, 2003). Centrality is defined as the degree of centrality and betweenness indicators. It was particularly interesting to study how networks as flow structures relate to the level of linkages between suppliers and wine firms.

3. RESULTS AND DISCUSSIONS

3.1 Location of suppliers with respect Maule wine cluster

In reviewing the geographical position of each specialized supplier of the wine cluster, we found that the majority are located in Metropolitan Area of Santiago (250 km to the North) and only 22% of suppliers are located in the Maule region, mainly in cities such as Talca or Curicó, so the geographic remoteness of those suppliers with respect the wineries becomes a

¹ The formula to compute density is $D = L/n(n-1)/2$, where L is the number of links and n is the number of nodes. It is expressed as a variable with a value between 0 and 1 where 1 indicates maximum density, in which case all the nodes are connected to one another directly (all points are adjacent to one another).

point of study to determine the effects of this in the flow and knowledge transfer.

Wineries do not receive information from one of the main actors in his generation of innovation and in the technology transfer as specialized suppliers. This can be overcome with the geographical and relational proximities with other wineries close to them.

3.2 Innovation

Perceived innovation capabilities. How innovative are technological suppliers? 9 out of 10 suppliers interviewed considered themselves to be innovative, however the information brochures, directories and websites, show that only 5 of 10 companies are innovative. That means that only 50% show that they have specialized structures for R & D that allow them to carry out research for innovation in products and processes. On the other hand, this revealed that innovation is understood in different ways, such that even companies that do not have these centers may consider themselves to be innovative because they innovate in terms of mixing active ingredients and product formulations.

In relation to the obstacles presented by the innovation, 3 of 10 suppliers mentioned that there are no obstacles to innovation because innovations are made primarily in the headquarters of companies located outside Chile, and cited for example Germany or the US. The remaining 7 companies stated that if there are indeed obstacles, where one of them is the cost of innovation. They express that they do not see client interest in paying for innovation.

Technology transfer. The research indicates that the relationships with suppliers and wineries not only produce commercial transaction but also generate transfer of tacit and codified knowledge. One of the most-used methods to perform this exchange of knowledge is in meetings where experiences using different products are evaluated and discussed. Other methods of transferring knowledge are lectures or seminars during which winemakers and wine suppliers meet. Suppliers use this opportunity to market their products and services. Another type of knowledge delivered is codified, which is supplied through technical literature and pamphlets explaining use of products and their characteristics. Distance is not an obstacle in the transfer of this type of knowledge.

Innovation performed by wineries. This is considered as a perceived level of innovation capabilities in wineries from the suppliers' perspective. The empirical research shows that 45% of respondents considered that wineries have an intermediate level of innovation and only 30% of suppliers mentioned that the innovation among Maule wineries is high. According to the suppliers (?), there is a high correlation between firm size and propensity to innovate, so it is expected that large companies will innovate to meet the requirements of target markets. Therefore, innovative companies are generally larger and they prefer to conduct innovation in secret.

With respect to the interest of wineries in innovation that suppliers provide in their products, the majority of providers respond that they are interested in innovations offered by them, but are not willing to pay extra for these developments. According to suppliers, wineries are interested in the search for alternatives in reducing production costs, improving the quality of the winemaking process, saving time in the process and increasing the quality of the final product as main economic benefits.

Also, wineries are seeking differentiation through innovation. In order to generate unique features within a valley, differentiation creates the response to end markets, which include modifications such as: new blends, new labels, type of closure of the bottles, or mode of presentation or delivery such as the Bag in Box.

3.3 Social network between wineries and suppliers

Density. According to the previous study by Olavarria et al. (2006) network of knowledge sharing among the vineyards in Maule and Colchagua have density values among 0.15 and 0.18. In this research, the network for the exchange of knowledge between the valley and vineyards suppliers of products and services reaches a density of only 0.03. The value is similar to the value of 0.036 found in Colchagua Valley by Olavarria et al. (2006). These results indicate that in wine valleys in Chile, there is a more effective knowledge transfer among the wineries than between wineries and suppliers. This may be because the wineries are closer together in contrast with suppliers (Figure 1).

Cliques. The analysis of cliques confirms that the suppliers are not well connected with wineries. The networks are made up of many subgroups that are cohesive with few actors directly connected. In networks with cliques, these are small, and composed of the minimum number of nodes directly linked (3). In the knowledge sharing network among wineries and suppliers, they can be separated into 2 cliques of 5 members each. This is shown in Table 2 in the Annexes. It is important to note that the more cohesive cliques exchange network among vineyards and others, is also integrated with vineyards of the valley, the actor 530ag, which is the Chilean Wine Corporation.

What is relevant is that cliques are formed, in this case, mainly by geographic proximity. Therefore for the exchange of knowledge producers need players who are with a geographical and relational closeness to them. As only one supplier is part of the clique, this implies that generally suppliers do not establish as effective a relationship with wineries in the knowledge exchange as they argue. Only a supplier which is an industry association organization (530ag) is part of a clique to be a trade association formed especially by producers and industry participants, confirming the closeness. A technical service provider coded 530ag and winery 113 are found in both cliques, it suggests that both actors play an important role in the transfer of knowledge within the wine cluster. In analyzing the cliques formed, we found that they are generally located in Talca or geographic proximity, indicating that these cliques geographical proximity plays an important role in the formation of relationships that facilitate the exchange of knowledge and the geographical distance of suppliers and wineries, and have an impact in the relational proximity.

Position of suppliers and wineries in the knowledge-sharing network

Centrality. In each of the networks actors in contrast, which have fewer connections were identified and linked. Both types are presented below. The central actors in networks are relevant for their degree centrality and intermediation. This reveals a concentration of useful links for access to resources in a few members of the network. This is shown in Figure 2 of the Annexes. A more central actor is defined as having more ties with the other actors. In this case, the transfer of knowledge in most of the vineyards is related to the provider 530ag, an actor previously recognized as being part of a clique of knowledge transfer.

On the other hand, the analysis shows that more central actors in a cluster are the wineries and not the suppliers, so that knowledge transfer to wineries tends to be produced peer-to-peer, rather than seeking help from suppliers. The more central actors are winery 124 and supplier 530ag. Those have greater numbers of bonds, and therefore, are better positioned relationally in the network than the rest. This also allows them greater intermediation in relations to the others. Are in this case, both actors possess the largest brokerage, so they have the "power" to manage information flows between network actors that are connected in the field.

4. CONCLUSIONS

Suppliers to the wine clusters are not as innovative as they believe. They do not always have the infrastructure of R&D, usually they carry out informal research from direct experience with the products and services they offer. The commercial relationship between suppliers and wineries brings two forms of technology transfer: tacit and codified knowledge. From suppliers' perspective, innovation is important to wineries but they do not want to pay for it.

In this study the density of linkages between vineyards and suppliers of the Maule Valley is 0.03. Comparing with previous studies among wineries in Maule and other valleys, where the values were 0.15 and 0.18, it shows that the exchange of knowledge among the vineyards will be preferable instead to deal with suppliers. This can be explained, as with suppliers there is a major obstacle is the geographical distance compared with the distance between the vineyards themselves.

In the formation of cohesive cliques between wineries and suppliers, there is only one supplier. This provider has the distinctive feature of being a non-profit industry association that is made up of individuals and companies that are part of the regional wine sector. There is more relational proximity to the sector. Suppliers neglect the idea than being in geographical proximity will bring them economic benefits in the future.

Managers from Chile and from other wine producing countries can take our findings to support specialised suppliers relations with other clustered firms. On the other hand, managers need develop more trust among firms to enhance their inter-firm relationships and interaction with suppliers and other industry service providers, like research institutions and universities. Maybe this cannot be done without strong public national and regional support, and the right cluster strategy or cluster facilitators as it occurs in other developed nations like New Zealand, Australia or France.

For future research the challenges are to analyse other meso elements (such as consults, research centres, more wineries, universities, etc) that may serve as incentives for suppliers to establish branches or centres to enable them to achieve greater geographical proximity to producers and also to test if this brings prosperity to clusters in terms of innovation capabilities.

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APPENDIX

Table 1: List of surveyed firms

Company	Interviewee Position
Analab Chile	Wine area supervisor
Indura	Product manager
DICTUC	Business manager
COTACO	Sales supervisor
Lafitte Chile	Marketing and sales manager
Industria Corchera	Deputy commercial manager
Empack	Sub industrial projects commercial manager
Juvenal Chile	Commercial support business
Hanna Instruments	Consultant agriculture and vineyards
Tecnología de procesos industriales	Devision manager wines and juices
Della Toffola	General manager
Nadalie Sudamérica	Commercial manager
Veto y Compañía	Sales supervisor
Dilaco	Supervisor oenologist
Equilab	Sales representative
Laboratorio agroenologico UCM	Manager
Arquimed	Product manager
Tonelería Nacional	International marketing manager
Alcan Packaging Enocap	Product manager
Alfa Laval	Food manager
Basf Chile	Regional technical coordinal
Industrias Vínicas	Marketing manager

Table 2: Explanation of the questionnaire

Items
1. Identification of the interviewees
2. Identification of the technological wine provider
3. Relationship providers-winery
4. Strategy and competitiveness of suppliers
5. Perception of innovation performance in wineries
6. Self-assessment of innovation performance in suppliers

Table 3: Cliques in technological knowledge sharing network among the wineries and suppliers of products and services in Maule Valley.

Type of network	Cliques
Technological knowledge sharing network among the vineyards of the Maule valley and suppliers of products and services.	1. 530ag, 113, 119, 231, 124
	2. 530ag, 113, 230, 119,231

Figure 1: Geographic distance between suppliers and wineries

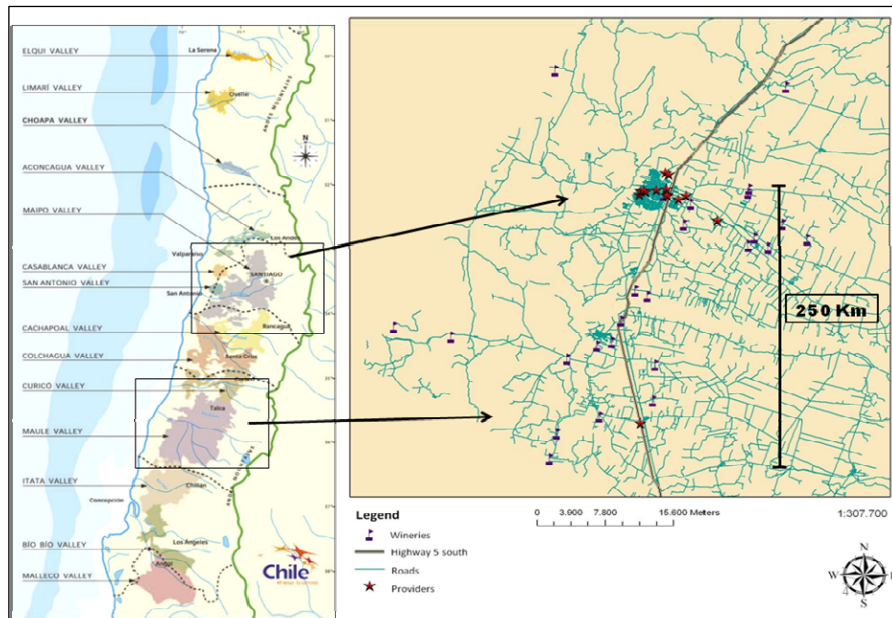


Figure 2: Social network draw

