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Triple Helix influence on competitiveness factors: comparison between wine clusters in Brazil and Chile

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ABSTRACT

The performance of clusters has been linked in several studies to their historical and geographical contexts as well as to the drivers that shape the competitive strength of nations. Among these drivers, the human factor and universities play a key role in the competitiveness of nations, as well as that of industries, regions, and firms. In the new knowledge economy, the Triple Helix model is a mechanism of coordination that brings together government, industry and universities. The main objective of this paper is to analyze the Triple Helix influence on the competitiveness factors of clusters as proposed by Zaccarelli, Telles, Siqueira, Boaventura, and Donnaire (2008). An analysis has been performed to verify how the Triple Helix axes influence the competitiveness factors of wine clusters by comparing the Chilean Valle del Maule to the Brazilian Serra Gaucha. The theoretical framework is that of the Triple Helix, coupled to Zaccarelli et al.'s (2008) model. The method employed was the multiple case study and data was collected from secondary sources. The main results indicate that only four out of Zaccarelli et al.'s (2008) eleven model factors of competitiveness are influenced by the three axes of the Triple Helix. The main contribution of this paper is to bring together the Triple Helix and competitiveness. There are nevertheless analytical and methodological constraints.

1. INTRODUCTION

The subject matter of this paper is the competitiveness of clusters, and more specifically its origin. The research problem approached in this paper relates to the influence of the Helix elements on the competitiveness factors of the clusters. This was undertaken through the analysis of two clusters from the same industry (wine) in two different South American countries, Brazil and Chile. Since Marshall's study (1890), researchers have been analyzing business clusters and have suggested that their performance cannot be detached from the historical and geographical context in which they flourish. Porter (1990) pointed out that the competitiveness of countries was linked to the existence of business clusters and developed the Diamond model, in which several forces define the ability of a country to compete within an industry. Among these forces, we can name the government, correlated and supporting industries, along with production factors related to the activity. One important production factor is the presence of highly qualified people. Workforce training is linked to the level of educational development within the given country; that is, the quality of its universities (Etzkowitz & Leydesdorff, 2000; Etzkowitz & Zhou, 2007; Ranga & Etzkowitz, 2013). The definition of competitiveness is related to the capacity of a firm, or a business cluster in this paper, to maintain and expand its share in international markets (Fajnzylber, 1988). The present

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paper neither investigates the competitiveness of a country nor employ it as a variable. It rather investigates those factors that support the competitiveness of clusters.

In today's knowledge economy, the main institutions are the government, industry and universities (Etzkowitz & Leydesdorff, 1995). This model is known as the Triple Helix. This is the coordination tool within the knowledge economy. The Triple Helix model is thus herein employed because we recognize its use when conducting a deep investigation regarding the Chilean wine cluster's superior competitiveness level, as compared with the Brazilian one. Tri-party networks, as defined by Knocke (2014), of government agencies, private sector research and development (R&D), university technology, and technology creation, represent heterogeneous systems that cut across industries, regions, firms, stakeholders, innovation actors and brokers, or intermediary organizations that facilitate connectivity within the cluster system (Todeva, 2014). The relationship between technological development and innovation at firm level, especially in small and medium enterprises (SMEs), is driven by that between the university sector, industry and government (Etzkowitz & Leydesdorff, 2000). One difference observed in the literature is that the influence of universities in the knowledge economy is now higher than before. (Etzkowitz & Ranga, 2010).

Although we agree that the model proposed by Zaccarelli, Telles, Siqueira, Boaventura, and Donnaire (2008) adequately identifies aspects of the cluster that can be improved to increase competitiveness as undertaken by Sarturi, Vargas, Boaventura, and Santos (2016), this latter study can be complemented by shedding light on what influences these competitiveness factors. We believe that the Triple Helix model is useful in this task, as it has been used to analyze cluster competitiveness, even successful ones such as the Silicon Valley (Etzkowitz, 2013). The Triple Helix model can be applied to understand how sectors are organized at regional level (Lawton Smith & Bagchi-Sen, 2010). Although the Triple Helix model is related to innovation (Etzkowitz & Leydesdorff, 2000), there is evidence in the literature that it also influences competitiveness. (Cunha & Neves, 2008).

Sarturi et al. (2016) have verified that the Chilean cluster is more competitive than its Brazilian counterpart and have thus comparatively studied both wine clusters by employing Zaccarelli et al.'s (2008) competitiveness model. We use as premise the fact that competitiveness factors originate at least partially due to differences in Triple Helix elements. The helices of the model (academia, business and government) distinctly influence the competitiveness factors. These differences occur in distinct businesses clusters, even if they belong to the same industry, due to the context in which they exist. Wine clusters have been chosen based on the conclusion of Sarturi et al. (2016), in which Zaccarelli et al.´s (2008) model is employed to explain the difference in competitiveness levels. There are thus advantages to employing the comparison procedure in the present paper. The premise on which this paper is based can be shown in three dimensions as follows: (a) Cluster competitiveness factors are influenced by the three helices (academia, business and government). (b) This influence is not the same in every cluster even if they belong to the same industry. (c) Cluster competitiveness is distinctively influenced by each one of the helices.

This study adds to existing literature because it goes beyond those that assess clusters competitiveness without considering the environment in which they are employed. On the other hand, the Triple Helix literature seems adequate to this effort because it has organized the dimensions of this environment in a manner suitable to this study. Also, it is noteworthy to observe that the model developed by Zaccarelli et al. (2008) uses an uncommon viewpoint from which to analyze cluster competitiveness - the Resource Based View (RBV) approach. It may be more powerful if complemented by a structure such as the Triple Helix, which helps to explain its competitiveness factors. On the empirical side, studying clusters in emerging countries may help both in terms of guiding their strategy and setting their policies.

The aim of this paper is to analyze the Triple Helix influence on the competitiveness factors of clusters proposed by Zaccarelli et al. (2008). This analysis is conducted through an examination of how Triple Helix elements influence the competitiveness factors of the wine clusters by comparing the Chilean Valle del Maule with the Serra Gaucha in Brazil. A list of the article's specific objectives follows: (a) Indicate the differences between the influence of the helices on the competitiveness of both clusters. (b) Indicate the differences between the influence of the helices on both analyzed clusters. The main research question of this article is: How does the Triple Helix influence

the competitiveness factors proposed by Zaccarelli et al. (2008)? This article does not aim to investigate the interaction of the three helices.

2. THEORETICAL FRAMEWORK

The Triple Helix literature has herein been used. This theoretical background proposes that phenomena such as business competitiveness are analyzed from the perspective of academic, business and governmental influence. This research uses the competitiveness factors of clusters proposed by Zaccarelli et al. (2008), and applied by Sarturi et al. (2016) to two wine clusters located in Brazil and Chile.

2.1. Model developed by Zaccarelli et al. (2008)

Etzkowitz and Ranga (2010) explain that the use of the Triple Helix may be useful to drive the evolution of less developed regions. The model details the path of that evolution, allowing for the adaptation of successful practices to the circumstances of such regions. Thus, there is support for comparing both the Brazilian and Chilean clusters, which is the procedure employed in this research effort. The Triple Helix structure is also useful in order to analyze the emergence of innovation and the development of regions and businesses. In this matter, Ranga and Etzkowitz (2013) observe that innovations do not come from the dyad business-government, as occurred in industrial societies, but from a triad within the current knowledge economy.

Zheng and Harris (2007) conclude that the Triple Helix model is relatively recent and more research required to fully understand the consequences. Yuwawutto et al. (2010) point out to its importance to developing countries, emphasizing its power to bring efficiency and competitiveness to firms. Cunha and Neves (2008) have applied the Triple Helix in a cluster in Brazil and concluded that joint actions among academia-business-government are already yielding positive results to competitiveness.

There exists a set of institutions that can be classified as hybrid. They bring together elements of industry, academia and government and may or may not be engaged in R&D. Some examples in this category include multidisciplinary research centers, the consortia between industry and academia toward research, university offices that work on technology transfers, research labs that belonging to firms, support institutions such as science parks and incubators, institutions that provide financial support to start-ups, angel investor networks and funds that supply capital to start-up companies (Etzkowitz & Ranga, 2010).

Papagiannidis, Li, Etzkowitz, and Clouser (2009) have reached a conclusion about the convenience of the Triple Helix model regarding the analysis of business alliances and clusters. As universities become progressively more engaged in entrepreneurial activities in addition to their existing research and teaching role, they have become resource providers to businesses. The role of government has been changing as well: in addition to its regulatory action, it has been promoting innovation, facilitating greater flexibility within the legal setting via tax breaks, loans and grants.

Lundberg (2013) and Todeva (2013) confirm the importance of the government in supporting innovation and entrepreneurship through the facilitation of investments in activities that generate knowledge. Additionally, in the studied cases, the rotation of roles between government, industry and the university sector has been confirmed. This situation is the apex of cooperation among the helices.

The importance of the Triple Helix model to innovation, entrepreneurship and development is recognized by Carayannis and Campbell (2012). They proposed a model that extends the Triple Helix to a Quadruple and Quintuple Helix model, also comprising media, culture and civil society, as well as the dimension of the natural environment, respectively drawing on the ideas of Etzkowitz and Leydesdorff's (1995, 2000). Although we acknowledge this evolution, the preferred option was to use the Triple Helix as it has been further consolidated and thus possesses greater operational viability than Carayannis and Campbell´s (2012) proposition.

We also acknowledge the existence of criticism regarding the Triple Helix model; for example, Power and Malmberg (2008) view as inappropriate the emphasis placed on scientific aspects in Triple Helix accounts of innovation systems over social and economic processes operating within global knowledge frontiers. Even traditional Triple Helix model authors have suggested that globalization erodes local university-industry-government relations and thus can be expected to have had an increased differentiation in national systems since

the mid-1990s. This globalization effect is more pronounced in developed countries than in developing ones (Ye, Yu, & Leydesdorff, 2013).

Recently there have been publications that have further developed ideas regarding the Triple Helix model, such as that by Etzkowitz (2012), in which the importance of permeability across academic–industry–government boundaries is discussed. The present paper has not employed such advanced notions of the model.

2.2. Model developed by Zaccarelli et al. (2008)

Zacarelli et al.'s (2008) model aims at explaining the origin of cluster competitiveness through the presence and respective intensity level of 11 factors that are explained in the following sections. To each one of these factors a metric is proposed. This metric indicates whether each factor is present in the cluster and its intensity.

The 11 competitiveness factors.

Zaccarelli et al.'s (2008) model proposes 11 factors in order to analyze business cluster competitiveness: (1) Geographic concentration; (2) Scope of viable and relevant businesses; (3) Firm specialization; (4) Balance without privileged positions; (5) Complementarity due to by-product utilization; (6) Cooperation among cluster firms; (7) Selective substitution of firms; (8) Uniformity in technological prowess; (9) Community culture adapted to the cluster; (10) Evolutionary character through new technology introduction; and (11) Result-oriented strategy originating in the cluster. The existence of the nine first factors is viable only with self-organization. However, for factors (10) and (11) to occur, the cluster must have its own governance. Table 1, elaborated by Sarturi et al. (2016), displays the operational definition of Zaccarelli et al. (2008) for the 11 competitiveness factors employed to study the wine clusters in Brazil and Chile and Zaccarelli et al.'s (2008) explanation regarding the relationship of each competitiveness factor in relation to cluster competitiveness (Sarturi et al., 2016).

The business cluster model proposed by Zaccarelli et al. (2008) has its strategic approach based on the conception of supra-enterprise governance, in which the cluster is understood as "the exercise of the strategy-oriented influence of supra-enterprise entities, facing the vitality of the cluster, composing competitiveness and the aggregate result and affecting all of the organizations comprising the supra-enterprise system" (Zaccarelli et al.,2008, p. 52). Although this model has mostly been used in studies published in Brazil and in business clusters located within the country, it has proven useful (Siqueira, Gerth, & Boaventura, 2011; Santos, Boaventura, & Telles, 2012; Pereira, Sarturi, Boaventura, & Polo, 2014). Sarturi et al.'s. (2016) study shows that it can be useful in comparing business clusters in different countries.

The explanation for the existence of business clusters is presented in three steps: (a) Comprehension that clusters are self-evolving systems, capable of having a strategic orientation; (b) The understanding that the constitution of such systems is based upon strategic thinking; (c) Comprehension that the basis for the existence and operation of a cluster reflects observable evidence of the competitive advantage that exists over firms operating outside the cluster.

According to Zaccarelli et al. (2008), two ideas are key to understanding the model: (a) Self-organization; (b) Supra-enterprise governance. The first one, self-organization, has an evolving and spontaneous nature. It results from the systemic effects that arise from the relationships established within a supra-enterprise entity, characterized by the development of increasingly complex connections over time. The second one, governance, works as the supra-enterprise entity, adopting a strategic nature in business clusters.

Cluster competitiveness is based on the 11 aforementioned factors in this article. These, in addition to showing the specific effects generated by the system, suggest that there is a cluster competitive advantage. The factor which is key in characterizing the existence of a cluster is the geographical concentration of firms within the same industry in a contained area. Without this concentration, there is no evidence of the cluster's existence. Factors 10 and 11 only occur with the presence of supra-enterprise governance and thus possess a strategy-oriented nature.

Fensterseifer and Rastoin (2013) adopt a resource-based multidisciplinary perspective to analyze clusters, as they embody several factors that influence resources and hence their internal process of competitive advantage creation. One of the several research directions that emerge from this work, on the empirical front, is the comparative analysis of

Tab. 1
Operational definition of each competitiveness factor and its relationship to competitiveness.

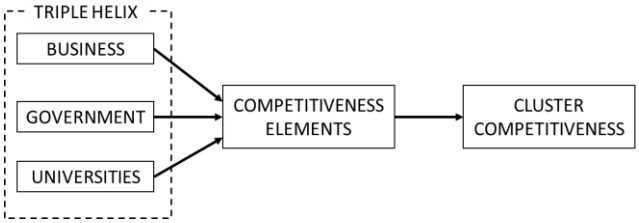
Competitiveness factor	Operational definition	Relationship to competitiveness
(1) Geographical concentration	Geographical concentration is the basic element for the identification of a cluster. This factor refers to the geographical proximity of companies and institutions within the group and the ideal concentration is the largest possible one. In addition, the authors highlight that a cluster must preferably be located within only one city.	This factor is related to the competitiveness of the cluster with regard to customer attraction since geographical concentration of companies and institutions influence customer perception in terms of superior variety, greater supplier choice and competitive prices
(2) Scope of viable and relevant businesses	This factor refers to the degree of activities and operations integrating the cluster, which ranges from processing activities to the selling of a product or categories of products.	This factor may have a significant influence on the cost of supplies and, therefore, on the cost of the final product. Furthermore, the scope relates to the competitiveness of the cluster once it can reduce procurement costs and access to customers, in addition to reducing the need for large inventories or replenishment terms due to the supplier proximity
(3) Firm specialization	Specialization refers to the level at which companies within the cluster are focused on certain products and solutions. Developed clusters are usually comprised of small specialized companies dedicated either to a single operation or to a few.	Specialization is associated with the efficiency of companies and the superior quality of the products. Thus, the competitive advantage stems from the speed of company development with lower investments and costs because specialization can reduce the aggregate operational expenses and volume of investment required
(4) Balance without privileged positions	This factor analyzes whether there are companies that, in a privileged manner, monopolize steps of the production process or access to raw materials. The existence of a monopoly company, for example, would yield a negative impact on the competitiveness of the cluster.	Although a privileged position may be appealing to shareholders, it can result in the reduction of the margins of other companies or raise the prices paid by customers, thus reducing the competitiveness of the cluster as a whole
(5) Complementarity due to by-product utilization	This factor analyzes the presence of activities aimed at reusing leftovers from the production process that are no longer usable, such as waste or material for recycling.	Complementarity affects competitiveness, as it offers alternatives of cost recovery and the possibility of new sources of revenue for the company. In addition, it favors the presence and establishment of new businesses that use by-products as raw materials
(6) Cooperation among cluster firms	Relating to the level of cooperation among cluster firms. This collaboration has a voluntary and spontaneous nature and is rarely considered by executives.	This factor increases the competitiveness of the cluster in an integrated manner due to the transfer and development of shared competencies
(7) Selective substitution of firms	The selective replacement of companies is a natural consequence of the opening and closing of firms, in which the most competitive companies survive. In other words, there is a process of exclusion and subsequent entry of new companies due to high competition and limited conditions for sustaining unique competitive advantages over time.	The selective replacement of companies affects the competitiveness of the cluster, as it ensures the effective and permanent presence of efficient firms
(8) Uniformity in technological prowess	This factor is related to the degree of homogeneity of the technologies in use within the cluster. The homogeneity of technological level is evaluated by considering the most outdated technology in use, the major technological differences of which would not strengthen the cluster's competitiveness	The lack of uniformity of the technological level affects competitiveness because companies with superior technology can result in increased prices to customers; consequently, reducing the overall competitiveness of the cluster
(9) Community culture adapted to the cluster	The culture adapted to the cluster refers to the social behavior of the region, naturally integrated with the presence, operation and improvement of the cluster, forming a cohesive system of values, authority at work, status, etc.	The competitive advantage of this factor is associated with the sense of belonging and pride of company employees operating within the cluster. Consequently, there is an increase in employee motivation and satisfaction
(10) Evolutionary character through new technology introduction	This factor refers to the existence of a competence focused on the development, identification, adaptation and adoption of new technologies by the cluster	This factor requires a tactic of intervention, such as the adoption of strategies that bring about innovation. The competitive advantage resulting from innovation may include cost reduction, maintenance or market expansion, extension of supply, etc.
(11) Result-oriented strategy originating in the cluster	The result-oriented cluster strategy is related to the effective and deliberate presence of guidance toward the actions and decisions of the companies participating in the cluster, aiming at achieving a market leadership position	As in the previous factor, a strategy that is focused on results includes intervention tactics, such as the adoption of strategies to combat opponent clusters. This competitiveness factor affects overall competitiveness because there is an expansion in the capacity to compete and increase the cluster aggregate profit

Source: Adapted from Sarturi et al. (2016); Zaccarelli et al. (2008).

wine clusters in different regions and countries. Grimstad (2011) also compares clusters and points to an obvious weakness in the resource-based theory (RBV) through the omission of some important issues for businesses in the future as the basis for gaining competitive advantage will increasingly be based on such socially complex and tacit capabilities not observed in most RBV based competitiveness models.

2.2 Conceptual model proposed

Fig. 1
Examined relationship among Triple Helix elements, competitiveness factors and business competitiveness.



Source: Prepared by the authors

3. METHOD

This article has an exploratory character because it has not previously been possible to define the Triple Helix configuration in the studied clusters. It is also possible to assert that this article adopts a simplified perspective of the Triple Helix, which may be useful to facilitate the model's applicability (Ranga & Etzkowitz, 2013).

The multiple case study method is herein employed. The variables used are qualitative. This choice is anchored in the fact that strategic variables are less measurable than other. Most strategic variables can only be measured by their effects (Dunning, 1995). Yin (1994) sees as a mistake the understanding that case study is a poor choice among the available variables. Furthermore, it is not always qualitative, and is much more than a description of individual habits and behaviors (Yin, 1994). Patton (1990) suggests other reasons for utilizing case studies: there are scenarios in which the researcher finds specific situations – uncommon successes or failures – and this technique may generate useful information. Yin (1994) notes that the case study may be the most appropriate method to analyze complex organizational phenomena. We understand that this is the main reason for justifying the method choice in this research.

Among the reasons for selecting the case study method is the idea that it is the intimate connection with the empirical reality that permits the development of testable, relevant, and valid theory (Eisenhardt, 1989). Regarding the application on wine clusters, the reasons are as follows: (a) The Sarturi et al. (2016) article, which undertook a comparative study of the two wine clusters, in Brazil and Chile using the model developed by Zaccarelli et al. (2008), seemed adequate for a deeper examination of competitiveness factors. (b) Beebe, Haque, Jarvis, Kenneyy, and Patto (2013) contend that the wine industry is particularly suited as an ideal type (to study clusters), among other issues because of the existence of business associations and the availability of wine ratings which enables measurement of the cluster's visibility. (c) Applications of cluster competitiveness models, such as Porter's (1990) to this profile of business agglomeration, is highlighted by Centoze (2010), citing Porter (1998), along with several other studies applied to wine clusters in Australia, Chile, France and Canada.

Cusmano, Morrison, and Rabellotti (2010, p. 1588) also cite that "…the wine industry is of particular interest because it provides evidence on how emerging economies have been able to acquire significant shares of the international market within a dynamic sector". Emerging countries with diverse institutional models and innovation strategies have actively participated in the process of technological modernization and product standardization (Cusmano, Morrison, & Rabellotti, 2010, p. 1588). These newcomers to the wine sector have responded particularly effectively to changes in demand, aligning emerging scientific approaches with institutional building efforts, with spectacular performance in terms of both exported volumes and values. In this regard, Chile is mentioned as a rapidly growing latecomer, although less developed (Cusmano, Morrison, & Rabellotti, 2010, p. 1588). The wine case provides empirical ground for assessing how emerging economies can take advantage of windows of opportunity opening up in agro-food sectors, combining technology adoption with original market-oriented research and engineering consistent organizational change (Cusmano, Morrison, & Rabellotti, 2010, p. 1588). There are other studies that also mention Chile as one of the New World countries that have stood out, raising participation in the world market in production and commercialization and on sale levels, citing the

technologies applied in the production of wine among other reasons (Monticelli, Garrido, & Vasconcellos, 2017).

Cases studied by Sarturi et al. (2016) are interesting because: (a) Valle del Maule is one of the three most important wine regions in Chile (Felzensztein & Deans, 2013), while (b) Serra Gaucha – Vale dos Vinhedos in the state of Rio Grande do Sul constitutes the largest viticulture area of Brazil (Fensterseifer & Rastoin, 2013).

3.1 Data collection

Data was collected from secondary data sources. The source used herein is the research work of Sarturi et al. (2016), which has comparatively examined the competitiveness of wine clusters in Serra Gaucha in Brazil and Valle del Maule in Chile.

Zaccarelli et al. (2008) propose metrics to analyze cluster competitiveness. Sarturi et al. (2016) use these metrics to state that one of their own paper's contributions is a methodological one, as they propose metrics for the analysis of the competitiveness in agribusiness clusters. The metrics suggested in the Zaccarelli et al. (2008) model serve as guidelines or suggestions, but they may require adaptation or even replacement depending on the specific characteristics of the cluster studied. The results achieved by Sarturi et al. (2016) using these metrics are employed to analyze the influence of Triple Helix factors, as proposed in the objectives of this research.

Sarturi et al. (2016), aiming at the operationalization of their own study, have analyzed the metrics proposed by Zaccarelli et al. (2008), which meet the peculiarities of the study objectives. It is worth noting that, for the analysis of some competitiveness factors, two metrics have been used, such as for competitiveness factor 9. In this case, the result is the average of the cluster performance in both metrics. The metrics used in the analysis are described in the paragraphs that follow. Sarturi et al. (2016) analyzed metrics used by Siqueira et al. (2011) and Santos et al. (2012) in order to propose their own.

Geographical concentration. For this competitiveness factor, Sarturi et al. (2016) used two metrics: the demographic density of the companies and the number of municipalities involved in the cluster. The metric "demographic density of companies" is measured by dividing the number of companies in the cluster by the city area, which had already been applied by Siqueira et al. (2011) (cited in Sarturi et al., 2016). This metric was used to meet the theoretical proposition of Zaccarelli et al. (2008) that the ideal geographical concentration is the largest possible. It is worth noting that, for this study, the metric was adapted to the context of the cluster, and hence the calculation is made by dividing the number of wineries by the total cluster area (Sarturi et al., 2016).

The metric "number of municipalities involved" was used by Santos et al. (2012) and is in line with the theoretical proposition that a cluster must preferably be located in only one municipality (Zaccarelli et al., 2008). In this case, the cluster with the highest demographic density and situated in the fewest municipalities is considered to have the highest level of competitiveness for this competitiveness factor (Sarturi et al., 2016).

Scope of viable and relevant business. To study this competitiveness factor, Sarturi et al. (2016) used the model developed by Fensterseifer (2007), which presented a mapping of the activities involved in the Serra Gaucha wine cluster. This mapping was adopted to analyze the presence of production chain actors, as it is specific to a wine cluster, that is, it meets the peculiarities of the clusters under study, which would not be possible through the use of another classification. According to Fensterseifer (2007), the companies that make up a wine cluster are grape growers, winemakers, producers of seedlings, fertilizers, pesticides and herbicides, barrels, bottles, caps and corks, labels, machinery and equipment, educational and research bodies, funding, regulatory, inspection and coordination entities, specialized public relations companies, specialized trade publications, tourism offices, and food facilities/restaurants. The cluster with the highest level of competitiveness for this competitiveness factor will be that with the largest number of activities in the winemaking chain, as proposed by Fensterseifer (2007, cited in Sarturi et al., 2016).

Specialization of companies. To analyze this competitiveness factor, Sarturi et al. (2016) sought to identify the stages of the wine production chain that companies outsource, since it is understood that the more the activities that are outsourced, the greater the company specialization. A similar metric to this

proposal was used by Santos et al. (2012); the difference is that these authors have analyzed the percentage of companies that outsource part of their production. For the identification of the activities, Sarturi et al. (2016) used the classification of Ferreira, Rosina, and Mochiutti (2010), which consider the production wine chain one of the most complex in agribusiness, containing 11 steps after grape-growing (input). To collect this information, Sarturi et al. (2016) visited the websites of the firms that compose both clusters, which, in most cases, provide information about the winemaking process and indicate any outsourced activities. As a result, the cluster that exhibits the largest number of stages within the production chain that are outsourced is considered the cluster with the highest level of competitiveness for this competitiveness factor plea (Sarturi et al., 2016).

Balance with no privileged positions. The evidence of the balance between companies in a cluster is that there are no significant differences in the size of companies (Zaccarelli et al., 2008). Santos et al. (2012), for example, used as a measure of this competitiveness factor the degree of homogeneity of the company size within the cluster. Sarturi et al. (2016) understand that the measure of size for the clusters of agribusiness may be the area for the growth of raw material, in this case grapes. Because of this Sarturi et al. (2016) use as a metric the coefficient of variation of hectares planted by the companies in order to determine whether there is equilibrium among the companies within the clusters. Therefore, the smaller the coefficient of variation of hectares planted, the greater is the balance between the companies in the clusters and consequently the higher the level of competitiveness. Thus, the cluster that presents the lowest variation coefficient will be considered as having the highest level of competitiveness. The data for this competitiveness factor was collected from company websites.

Complementarity through the use of by-products. To analyze this competitiveness factor, Sarturi et al. (2016) investigated the destination of winemaking leftovers by the firms. The winemaking process generates waste such as stalk, grape left overs and seeds (Makris et al., 2007, cited in Sarturi et al., 2016). As a result, the cluster with the highest level of competitiveness is that with the largest number of initiatives to recycle these leftovers.

Cooperation among companies. As the metric for this competitiveness factor, Sarturi et al. (2016) adopt the number of wine cooperatives in the cluster, with the requirement that these consist of members of the cluster itself and that they concentrate their efforts on selling their products, as opposed to cooperatives and associations that focus on local development. This qualification aims at meeting the theoretical proposition of Zaccarelli et al. (2008) that the cooperation among companies consists of the level of spontaneous and voluntary collaboration practiced within the cluster. It is understood, therefore, that the presence of this type of cooperative indicates the existence of relationships of cooperation among the companies comprising a cluster. The cluster that contains the largest number of such cooperatives will be considered that with the highest level of *competitiveness for this competitiveness factor.*

Selective replacement of firms. For this competitiveness factor, Sarturi et al. (2016) used as a metric the percentage of new businesses in the sector. This metric is similar to that one used in the study by Siqueira et al. (2011). The difference is that the latter study used the absolute number of companies, while Sarturi et al. (2016) applied the percentage of new companies because it is understood that a relative metric can more reliably reflect the competitive difference between both clusters for this competitiveness factor. As in Siqueira et al. (2011), the lack of information regarding the closure of companies made the metric employed in the study more simple than that proposed by Zaccarelli et al. (2008). The cluster with the highest percentage of new companies will be considered to achieve a higher level of competitiveness for this competitiveness factor.

Uniformity of the technological level. To analyze this competitiveness factor, Sarturi et al. (2016) used the metric originally proposed by Zaccarelli et al. (2008), that is, "the presence of inferior technologies," but with some adaptations. The first adaptation in the Sarturi et al. (2016) study it was not possible to quantitatively analyze the percentage of inferior technologies within the clusters, as proposed by Zaccarelli et al. (2008), given the absence of information in this regard. Considering this absence, Sarturi et al. (2016) have qualitatively analyzed only the presence or absence of inferior technologies. The second adaptation was to divide the analysis of the technologies used into two categories. The first category refers to technologies used in grape-

growing activity, while the second refers to the technology used in the winemaking process. In this competitiveness factor, the cluster that indicates the greatest uniformity in these two categories was considered to have the highest level of competitiveness.

Community culture adapted to the cluster. For the analysis of this competitiveness factor, Sarturi et al. (2016) adopted two metrics: the percentage of individuals in the region associated with the cluster and the earliest date of grape-growing activity in the area. The first metric had already been used by two previous studies: Siqueira et al. (2011) and Santos et al. (2012). The second metric was proposed in order to consider the peculiarities of an agribusiness cluster because, as in the case of this study, the wine culture in both clusters has developed due to the process of colonization. For this competitiveness factor, the cluster with the highest percentage of individuals associated with it and the earliest date of grape-growing activity will be considered as having the highest level of competitiveness.

Evolutionary nature due to the introduction of new technologies. The metric used to analyze the competitiveness factor was the number of institutions that operate in the cluster supporting technological research and development. This metric was adopted because it was understood that these institutions may contribute to the development and performance of governance. For this competitiveness factor, the cluster with the highest number of institutions of this nature will be considered as that with the highest level of competitiveness.

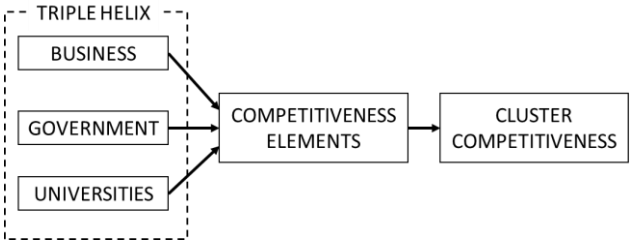
Cluster-oriented result strategy. For this analysis, Sarturi et al. (2016) used two metrics: first the registration of the geographical indication (GI), and second the number of exporting firms. The first metric attempts to measure the effort to differentiate products developed within clusters, because the use of geographical indicators offers a strong suggestion of a potential differentiation of products from a specific region (Skuras & Vakrou, 2002, cited in Sarturi et al., 2016), and the second metric refers to efforts regarding market expansion. According to the Ministry of Agriculture (2012), cited in Sarturi et al. (2016), GI registration is assigned to products or services that are characteristic of their place of origin, assigning them reputation, intrinsic value and identity, which distinguishes them from similar products or services available on the market. There are two modalities of the GI: "indication of origin" and "denomination of origin (DO)." The cluster with the highest level of competitiveness in this competitiveness factor will be that with the oldest record of GI, the largest territorial coverage and the greater number of exporting companies.

3.2 Analysis

The analysis is qualitative. Each one of the competitiveness factors proposed by Zaccarelli et al. (2008) is analyzed in terms of how they are influenced by universities, industry and government. To analyze this influence, the results obtained by Sarturi et al. (2016) results are examined in detail with the objective of understanding which helix is influencing the competitiveness factor. How each helix influences the factor is also examined in the terms proposed in the study objectives. The present study uses logical validity (Gibbert, Ruigrok, & Wicki, 2008; Yin, 1994) in analyzing the causal relationships between variables and results. Thus, we endeavor to present a plausible causal argument with logical reasoning that is both powerful and compelling enough to defend the research conclusions.

The analytic effort conducted in this research is presented in a scheme in Figure 2 as follows. It is important to note that there are two levels of analysis: The First Level compares how each one of the helices influences the competitiveness factors of each cluster. The Second Level compares the clusters in terms of how they are influenced by the helices.

Fig. 1
Examined relationship among Triple Helix elements, competitiveness factors and business competitiveness



At the first level of analysis we selected those factors that are clearly influenced by the three helices. The competitiveness factors were subsequently categorized into two groups: Group A includes those factors influenced by one or two helices, while group B is comprised of factors influenced by the three helices. Such a classification was implemented by taking into consideration episodes and institutions

that might have suggested the influence of a particular helix on the competitiveness factor.

The first analyzed element for examining the influence of helices on competitiveness factors was the presence of episodes and institutions that might suggest such influence. Diverse sources that may or may not confirm it have also been consulted. Our paper has attempted to go beyond Sarturi et al.´s (2016) observations on competitiveness factors by introducing the use of the Triple Helix theory. However, found evidence should not be considered conclusive and thus represents a methodological constraint in this paper. Such constraints however do not invalidate the study since it possesses an exploratory nature as a result of the aforementioned reasons.

Once the presence of episodes and institutions was verified, the existence of the influence exerted by helices on the analyzed competitiveness factor was consequently observed. Each competitiveness factor in group A was then analyzed regarding the influence coming from the helices and their respective explanations are listed. A similar procedure was carried out in group B. Then, the analysis once again explored the competitiveness factors and the influence from the helices was compared to the results of Sarturi et al. (2016) about which cluster (Brazilian or Chilean one) shows higher competitiveness for that factor. An attempt, based on these results, was made to explain how each helix influences the competitiveness factor.

The presence of episodes and institutions has been discussed in the literature even when it has not been corroborated by other sources (triangulation). Sarturi et al. (2016) mention Marshall (1890), who suggests that the presence of episodes such as the concentration of firms specialized in different steps of the production process would allow for the occurrence of externalities. They also mention the presence of activities related to by-product reutilization to point out the existence of complementarity within the cluster; a similar observation to that of Zaccarelli et al. (2008), who cite the movie industry in Hollywood as evidencing complementarity due to the presence of business ventures. Sarturi et al. (2016, p. 200) also state "that the presence of this type of cooperative indicates the existence of relationships of cooperation among the companies in the cluster".

Other published studies may also be highlighted, such as that undertaken by Asheim and Coenen´s (2005), which agrees with the idea that a top-level university and scientific parks are essential foundations for the growth of a cluster. Albino, Carbonara, and Giannocaro (2006) also use the presence of specialized services to point to the occurrence of learning processes in the area. There is also the work of Affuso, Capello, and Fratesi (2011), which discusses the lack of opportunity to obtain any direct measure of the industrial competitive strategies, an indirect approach is adopted with the presence of certain factors that may be observed.

In order to help understand of the status of the analyzed wine clusters, Table 2 follows, on both one located in the Valle del Maule (Chile) and the other in the Serra Gaucha (Brazil).

Tab. 2
Main data on the studied wine clusters.

Data	Serra Gaucha, Brazil	Valle del Maule, Chile
Exports in 2011 (wine liters)	705,000	732,000,000
Exports in 2011 (US$)	3.06 million	1.04 billion
% of country production	90%	47%
Area dedicated to growing wine grapes	31,363 ha	50,574 ha
Number of vineyards	12,037	5,396
Average area of each vineyard	2.6 ha	9.37 ha
Production in 2011 (millions of liters)	279.6 (100%)	479.8 (100%)
Fine wine production (millions of liters)	46.8 (17%)	455.3 (95%)
Table wine production (millions of liters)	232.8 (83%)	24.5 (5%)
Number of municipalities in the cluster	18	30
Number of start-up firms	43 (2004 to 2006)	29 (2000 to 2010)
Total population of the region	769,617	991,542
Number of people related to the cluster	57,752 (7.5%)	67,000(6.7%)
Number of exporting firms	23 firms	70 firms
Starting year of grape growing	1875	1548

Source: Elaborated with data from Sarturi et al. (2016).

4. RESULTS

In order to help understand of the status of the analyzed wine clusters, Table 2 follows, on both one located in the Valle del Maule (Chile) and the other in the Serra Gaucha (Brazil).

4.1 Analysis

It is possible to group into two different categories the 11 competitiveness factors proposed by Zaccarelli et al. (2008): (a) Group A, which includes those factors influenced by one or two helices; (b) Group B, comprised of factors influenced by the three helices.

Triple Helix influence on
each one of the competitiveness factors –
Factors influenced by one or two helices.

The following list outlines the factors which are influenced by one or two helices - (1), (3), (4), (5), (7), (8) and (9) – with the respective explanations.

(1) Geographical concentration: in addition to the clear presence of industry-related issues, such as the existence of firms and the presence of business associations in both clusters, that are considered important in the literature (Beebe et al., 2013), it is possible to argue that the presence of research and teaching institutions contributes to intensify the geographic concentration even further. However, it is not possible to assert that the presence of government contributes to the existence or reinforcement of this factor. Of course, there is always the possibility of indirect influence of government through funding research and teaching institutions, as can be observed in the literature (Cusmano, Morrison, & Rabellotti, 2010). Incentives from the municipalities through the offering of tax breaks to business is one such example. Nevertheless, for the present study, there is not enough information to characterize that the possible tax breaks offered were relevant to geographic concentration.

(3) Firm specialization: in terms of this factor, the government extends its influence in the larger context as seen in the number of different existing businesses. This can occur in either a form of taxation that may inhibit or spur new firm creation and/or activities in the value chain that can be vertically integrated. In the literature, in Chilean clusters the occurrence of vertically disintegrated firms in Chilean clusters mean more specialized was more often observed in the case of subsidiaries (Giuliani & Bell, 2005).

(4) Balance without privileged positions: it is not possible to assert government and academic influence in the existence and intensity of this factor. Thus, only the presence of industry is evident here. It was observed in the literature, that in one Chilean cluster innovation-related knowledge is transferred within clusters in a strikingly uneven and selective way (Giuliani, 2013).

(5) Complementarity due to by-product utilization: again, for this factor it is not possible to assert a government presence. In addition to the industry, there could be an argument in favor of academic presence – through the creation of new winemaking processes and techniques – that could spur new firm creation. However, in the context of the present study, no information confirming the presence of academia could be obtained.

(7) Selective substitution of firms: this factor seems to be exclusively industry-related, because neither the presence of government or academia was verified here. The university sector can influence the creation of new firms, but not their replacement.

(8) Uniformity in technological prowess: this is another factor on which there seems to be only the influence of industry. Academia can influence in the opposite direction, because often new technologies are created in the university environment which can instead lead to a technological imbalance instead. As mentioned in factor (4), in one Chilean cluster innovation-related knowledge is transferred in clusters in a strikingly uneven and selective way (Giuliani, 2013).

(9) Community culture adapted to the cluster: this factor could only be positively verified in the presence of industry.

As all of Zaccarelli et al.'s (2008) competitiveness factors require self-organization to occur, industry is likely to be involved in all of them.

Triple Helix influence on
each one of the competitiveness factors
Factors influenced by the three helices.

The factors influenced by the Triple Helix are: Factor 2, Scope of viable and relevant businesses; Factor 6, Cooperation among cluster firms; Factor 10,

Evolutionary character through new technology introductions; and **Factor 11**, Result-oriented strategy originating in the cluster. A brief explanation of each Triple Helix influence on these four factors follows.

(2) Scope of viable and relevant businesses: in terms of this factor, the influence of the Triple Helix is justified by the fact that, in addition to the evident need for industry influence, government contribution facilitates or impedes new firm creation. Academia is required to educate the workforce for a variety of activities.

(4) Cooperation among cluster firms: in addition to lack of cooperation viability in the absence of business, the creation of cooperatives cannot exist without facilitation from government. Often, the creation of cooperatives brings together the university and/or local teaching institutions. In truth, there is a second dimension of academic influence because these entities are state-owned or, even when private, receive resources from government as indicated in other factors.

(10) Evolutionary character through new technology introduction: new technologies are often created within universities which then transfer knowledge to industry. Thus, there is industry involvement because for this factor to be present, self-organization and supra-enterprise governance are needed. Here, the indirect influence of government can be highlighted, as in factor 6, because universities and teaching institutions, even when private, receive resources from government.

(11) Result-oriented strategy originating in the cluster: in addition to the self-organization and supra-enterprise governance needed to make the presence of this factor viable, the metrics proposed to this factor – geographic indication and number of export firms – depend upon government involvement. In the case of the former, government must set the rules, while for the latter government bodies are required support the promotion of exports. The university sector is involved in both cases, indicating the parameters for regulation and supplying a qualified workforce to firms that export.

Triple Helix influence
in the proposed levels of analysis.

At the first level of analysis, the industry element of the Helix influences not only all the factors but its effect has been felt more strongly on those that are simultaneously influenced by all three helices. This is especially true for factors 6, 10, and 11. The influence of industry is also most recognizably observable on competitiveness factors 2 and 10, and especially so in the latter due to the presence of teaching and research institutions, as can be observed in the Table 3.

In the case of government, its influence is more evident in factor 10. Some of the institutions are state-owned in Brazil, for instance IFRS, EMBRAPA, and FEPAGRO. At the second level of analysis, which compares how the two clusters are influenced by the helices, the results are as follows: (a) the Brazilian cluster has an advantage in factors 1, 6, and 7; while (b) the Chilean cluster sees an advantage in factors 2, 4, 10, and 11 (Sarturi et al., 2016).

From these results, it is possible to discuss the cause of the advantages evident in the Brazilian cluster in factor 6 and the Chilean cluster in factors 2 and 11, as well as factor 10 where both clusters are tied. All of these factors - 2, 6, 10, and 11 - are influenced by the Triple Helix. In the case of factor 6, the advantage of the Brazilian cluster is due to the existence of a higher number of cooperatives than found in the Chilean cluster. A larger number of

Tab. 3
Presence of teaching and research institutions in the analyzed clusters

Valle del Maule	Serra Gaucha
1. CTVV (Centro Tecnológico de la Vid y el Vino), 2. CEVIUC (Centro del Vino UC), 3. LECCC (Laboratorio Enológico de Certificación y Control de Calidad (UC del Maule) 4. CEVID (Centro de Estudio de la Vid (U de Chile)) 5. GIE (Grupo de Investigación Enológica (U de Chile) 6. CITRA (Centro de Investigación y Transferencia en Riego y Agroclimatología) 7. CTSyC (Centro Tecnológico de Suelos y Cultivos)	1. FTSG - Faculdade de Tecnologia da Serra Gaucha 2. IFRS - Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul. 3. EMBRAPA Empresa Brasileira de Pesquisa Agropecuária 4. EMATER (Associação Riograndense de Empreendimentos de Assistências Técnica e Extensão Rural), 5. Fepagro - Fundação Estadual de Pesquisa Agropecuária 6. ICTA - Instituto de Ciência e Tecnologia de Alimentos

Source: Adapted from Sarturi et al. (2016).

cooperatives is thus understood as representative of a higher level of cooperation.

In the Valle del Maule, there is the Loncomilla cooperative that is concentrated with more than 100 associates, mostly small- and medium-sized producers. At Serra Gaucha, cooperatives with a similar profile were found. One of the examples is Nova Aliança, with approximately 800 associated families; Aurora, with more than one thousand associated families, and Pompeia, with approximately 260 associated families (Sarturi et al., 2016).

Thus, the Brazilian cluster tends to show a higher level of cooperation than its Chilean counterpart once it is comprised of a larger number of cooperatives (Sarturi et al., 2016). The existence of cooperatives is mostly influenced by industry, allowing for the conclusion that the influence of this Helix element on this factor is stronger in the Brazilian cluster than in the Chilean.

In the case of **factors 2 and 11**, in which the Chilean cluster has an advantage, and in **factor 10**, in which there is a balance between both, the following was observed:

Factor 2. Scope of viable and relevant businesses. The Chilean cluster seemed to be more competitive in this factor, since there are no makers of bottles and corks at Serra Gaucha (Sarturi et al., 2016). Wilks (2006) and Sarturi et al. (2016) highlighted in a previous investigation that there are only two large-scale bottle suppliers in Brazil, with the beer industry as the main customer. In the case of corks, these are supplied by five Brazilian makers which produce them using raw material imported from Portugal and Spain. This item accounts for a large cost outlay for Brazilian wineries.

Factor 10. Evolutionary character through new technology introduction. Chart 4 contains a list of institutions that run activities related to research and technological development. Both clusters are assessed as similar for this item, although the Chilean may be considered superior due to the slightly larger number of institutions involved (seven versus six for the Brazilian).

Factor 11. Result-oriented strategy originating in the cluster. In both metrics utilized to analyze this factor, the Chilean cluster has an advantage over the Brazilian one. The Valle del Maule cluster has had its origin denomination since 1995, according to the decree 464 (Decreto 464, 1995, cited in Sarturi et al., 2016), which encompasses the cluster as a whole. On the other hand, the geographic indication initiatives for the Brazilian cluster seem isolated, because the origin denomination dates from 2012 and is restricted to the Vale dos Vinhedos and not to Serra Gaucha as a whole. In the same fashion, for the second metric, Valle del Maule seems to be more competitive, because the number of firms that export their products is larger than seen in the Brazilian cluster. It should be observed that the internationalization process of Brazilian wine firms is recent (Sarturi et al., 2016), although exports have recently increased (Instituto Brasileiro do Vinho (IBRAVIN), cited in Bouças, 2016). Brazilian wineries export numbers in 2016, up to October, show an increase of 33% compared to the previous year in the same period. The United States of America and United Kingdom are two of the top three export destinations.

The Table 4 presents the competitiveness factors in relation to the Triple Helix by comparing the Brazilian and the Chilean clusters.

Tab. 4
Competitiveness factors in the Brazilian and Chilean wine clusters in relation to the Triple Helix.

Factor	Cluster in advantage	Triple Helix Element with highest influence level
Factor 2. **Scope of viable and relevant businesses**	Chilean	Mainly industry but government and academia as well.
Factor 6. **Cooperation among cluster firms**	Brazilian	Mainly industry but also government and academia.
Factor 10. **Evolutionary character through new technology introductions**	Balanced	Mainly academia, but government and industry as well.
Factor 11. **Result-oriented strategy originating in the cluster**	Chilean	Mainly industry but also government and academia.

Source: Elaborated by the authors with data from Sarturi et al. (2016).

In the case of **factor 2**, industry is the predominant Helix element, since new business creation is dependent upon it. However, the role performed by government and the university sector is relevant because the former can incentive business creation through policies, and academia is key in new technology creation due to the fact that it drives new business creation when new technology is transferred to start-up firms. In **factor 6**, once again industry is the predominant Helix element. However, such initiatives have governmental support and involve the university sector in many instances. Regarding **factor 10**, the predominant Helix element is academia, with its role in creating and introducing new technologies. Industry plays an important role here as well because it introduces innovation within business processes. Government obviously also plays a role as a regulator in this factor. Industry is once more the predominant Helix element in **factor 11**. In relation to the metrics for this factor, industry plays a key role in the initiatives of denomination of origin, with the government playing a meaningful role, and the university sector only a supporting one.

3. FINAL CONSIDERATIONS

The objective of this study was to analyze the influence of the Triple Helix on the competitiveness factors of clusters proposed by Zaccarelli et al. (2008). It was found that the three helices influence only four out of the 11 factors of cluster competitiveness proposed by Zaccarelli et al. (2008). The factors simultaneously influenced by the three helices are: **(2)** Scope of viable and relevant businesses; **(6)** Cooperation among cluster firms; **(10)** Evolutionary character through new technology introduction; and **(11)** Result-oriented strategy originating in the cluster. Table 5, below, shows the presence or absence of Helix element influences on competitiveness factors.

In relation to the differences in the influence of helices, it was verified that in factor 6, industry seems to be decisive in the Brazilian advantage. In the case of factor 2, where the Chilean cluster has an advantage, it also seems that industry is key to this result. For factor 10, in which was found that both studied clusters are balanced, with eventual advantage to the Chilean one, both academia and government are decisive in this result. Finally, for factor 11, the influence of industry and government seem to be key to the Chilean cluster advantage. Table 6 compiles these results.

The main contribution of this study to the literature is a more explicit proposed link between the Triple Helix and competitiveness factors of business clusters. The relevance of comparing equivalent clusters from the same industry in different countries enhances the strength of that link and reinforces the role of helices on competitiveness.

In terms of the theoretical contribution to Triple Helix literature, it may mean a new avenue in terms of its use no longer being confined to the innovation field. As to the literature on competitiveness of clusters, it goes deeper into a model, that of Zaccarelli et al. (2008), that has not been used extensively such as Porter's (1990). In more precise terms, it shows that Zaccarelli's competitiveness factors are influenced by their context. But, more than that, it uses a Triple Helix model that has already been used in the literature and tested in the field. With regard to the practical contribution, it may help researcher's to understand in more detail where competitiveness of clusters originates, and drive less developed

Tab. 5
Competitiveness factors of clusters influenced by the Triple Helix.

Competitiveness factor	Industry	Academia	Government
1. Geographic CONCENTRATION	**Yes**	No	No
2. SCOPE of viable and relevant businesses	**Yes**	**Yes**	**Yes**
3. Firm SPECIALIZATION	**Yes**	No	No
4. BALANCE without privileged positions	**Yes**	No	No
5. COMPLEMENTARITY due to by-product utilization	**Yes**	No	No
6. COOPERATION among cluster firms	**Yes**	**Yes**	**Yes**
7. Selective SUBSTITUTION of firms	**Yes**	No	No
8. UNIFORMITY in technological prowess	**Yes**	No	No
9. Community CULTURE adapted to the cluster	**Yes**	No	No
10. EVOLUTIONARY CHARACTER through new technology introductions	**Yes**	**Yes**	**Yes**
11. RESULT-ORIENTED STRATEGY originating in the cluster	**Yes**	**Yes**	**Yes**

Source: Elaborated by the authors.

Tab. 6
Differences between influence of helices in the studied clusters.

Competitiveness factor	Cluster in advantage	Helix element determining the result
Factor 2. Scope of viable and relevant businesses	Chilean	Industry
Factor 6. Cooperation among cluster firms	Brazilian	Industry
Factor 10. Evolutionary character through new technology introduction	Balance with possible advantage of the Chilean	University sector and government
Factor 11. Result-oriented strategy originating in the cluster	Chilean	Industry and government

Source: Elaborated by the authors.

regions to improve their competitiveness and standards of living.

Stating that the role of academia in this issue has become more meaningful over time is impossible, since it would be necessary to compare the current situation of clusters to their *status quo* previous to the existence of the knowledge economy. It is nevertheless possible to assert that the roles of industry and government are still more meaningful, respectively being the first and second most decisive helices.

There are, nevertheless, analytical and methodological constraints to this paper, that may lead to distortions. In terms of analytical constraints, the influence of each of the helices on the 11 competitiveness factors was not analyzed. The analysis was restricted to the four factors simultaneously influenced by the Triple Helix. Another constraint is the subjective character of the analysis. Another analytical constraint that must be noted, as concluded by Guimaraes (2009) who comparatively studied wine clusters in Brazil and Portugal, is the fact that it is very difficult to precisely understand the origin of competitiveness, whether it comes from being in a cluster or participating in global value chains. The main methodological constraint is the use of secondary data sources due to possible complications during their collection and analysis.

Regarding suggestions for further investigation, it is possible to replicate the present research by employing primary data sources and engaging clusters from other industries and countries. This would allow for a broader comparison basis among results and countries, between developed and developing areas, as well as the possibility of new conclusions on the influence of the Triple Helix on competitiveness factors within clusters.

One proposition to be tested in future studies is the relative contribution of each helix to the competitiveness of clusters, comparing clusters in the same country that clearly show the strength of each helix in the region. This approach may be helpful in assessing the usefulness of government policies. In Brazil, for example, clusters in the same industry located in different geographical areas may show different levels of competitiveness. Comparing clusters in different countries, as undertaken in the present study, may cover other sources of competitiveness not focused on by models like that proposed by Zaccarelli et al. (2008) or the Triple Helix.

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Influência Triple Helix sobre fatores de competitividade: comparação de clusters de vinho no Brasil e Chile

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RESUMO

O desempenho de clusters tem sido associado em vários estudos aos seus contextos históricos e geográficos, bem como os drivers que moldam a força competitiva das nações. Entre esses drivers, o fator humano e as universidades desempenham um papel fundamental na competitividade das nações, bem como nas indústrias, regiões e empresas. Na nova economia do conhecimento, o modelo Triple Helix é um mecanismo de coordenação que reúne governo, indústria e universidades. O objetivo principal deste trabalho é analisar a influência da Triple Helix sobre os fatores de competitividade dos clusters proposto por Zaccarelli, Telles, Siqueira, Boaventura e Donnaire (2008). Uma análise foi realizada para verificar como os eixos da Triple Helix influenciam os fatores de competitividade dos clusters de vinhos, comparando o Valle del Maule chileno com o Serra Gaucha brasileiro. O quadro teórico é o da Triple Helix, acoplado ao modelo de Zaccarelli et al. (2008). O método empregado foi o estudo de caso múltiplo e os dados foram coletados de fontes secundárias. Os principais resultados indicam que apenas quatro dos fatores do modelo de competitividade de Zaccarelli et al. (2008) são influenciados pelos três eixos da Triple Helix. A principal contribuição deste trabalho é associar a Triple Helix e a competitividade. No entanto, existem restrições analíticas e metodológicas.

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