Triple Helix Influence on Competitiveness Factors: comparison of wine clusters in Brazil and Chile

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Introdução

Since Marshall's study (1920), researchers have been analysing business clusters and suggested that their performance cannot be detached from the historical and geographical context in which they flourish. More recently, Porter (1990) pointed 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 in an industry.

Problema de Pesquisa e Objetivo

The research problem is related to the influence of the helix parts in the competitiveness factors of clusters. The problem is studied through the analysis of two clusters in the same industry, wine, in two different South American countries, Chile and Brazil. The aim of this paper is to analyse the Triple Helix influence on the competitiveness factors of clusters proposed by Zaccarelli et al (2008). This analysis is conducted through examining how Triple Helix parts influence competitiveness.

Fundamentação Teórica

The Triple Helix literature is used. This theoretical background proposes that events as business competitiveness are analysed from the perspective of the influence of university, business and government. This research uses the competitiveness factors of clusters proposed by Zaccarelli et al (2008) and applied by Sarturi et al in two wine clusters localised in Brazil and Chile.

Metodologia

This article has exploratory character, because it's not possible to define previously the Triple Helix configuration in the studied clusters. It's also possible to assert that this article adopts a simplified perspective of the Triple Helix, that may be useful to facilitate the applicability of the model (RANGA & ETZKOWITZ, 2013). The multiple case study method is employed. The variables used are qualitative. Strategic variables are less measurable than other ones. (DUNNING, 1995, p. 96).

Análise dos Resultados

It's possible to group the 11 competitiveness factors proposed by Zaccarelli et al (2008) in two different categories: (1) The ones that clearly are influenced by the three helices; (2) The ones that there isn't enough evidence of receiving influence of the three helices.

Conclusão

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 influenced by the three helices are: (2); (6); (10); (11). Regarding the factors that aren't influenced by the three helices, industry influences all the factors, university influences only factor 2 and government, factor 4. The main contribution of this study is linking in more explicit way Triple Helix to competitiveness.

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1. Introduction

Since Marshall's study (1920), researchers have been analysing business clusters and suggested that their performance cannot be detached from the historical and geographical context in which they flourish.

More recently, Porter (1990) pointed 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 in an industry. Among these forces, we can name the government, correlated and support industries and also the production factors related to the activity. One important production factor is trained people. People training comes from how good education in a country is, that means, the quality of its universities

The definition of competitiveness is related to the capacity of a firm, a business cluster in this paper, to maintain and expand its share in international markets. (FAJNZYLBER, 1988).

In other words, in today's knowledge economy, the main institutions are the government, the industry and the universities. (ETZKOWITZ & LEYDESDORFF, 1995). This model is known as the Triple Helix. The Triple Helix is the coordination tool in the knowledge economy.

The relation between technological development and innovation at the firm level, specially to small and medium enterprises (SMEs), is driven by the relationship among university, industry and government. (ETZKOWITZ & LEYDESDORFF, 2000).

The helices of the model, university, business and government, influence distinctly the competitiveness factors. These differences not only occur in different businesses clusters, even if they are in the same industry, due to the context in which they exist, but along time as well. One difference observed in the literature is the influence of universities, now in the knowledge economy is greater than before. (ETZKOWITZ & RANGA, 2010).

2. Research problem and objectives

The research problem in this paper is related to the influence of the helix parts in the competitiveness factors of the clusters. The problem is studied through the analysis of two clusters in the same industry, wine, in two different South American countries, Chile and Brazil.

The aim of this paper is to analyse the Triple Helix influence on the competitiveness factors of clusters proposed by Zaccarelli et al (2008). This analysis is conducted through examining how Triple Helix parts influence the competitiveness factors of the wine clusters, comparing the Chilean Valle del Maule with the Serra Gaucha in Brazil.

Although the Triple Helix model is a model related to innovation (ETZKOWITZ & LEYDESDORFF, 2000), there is evidence in the literature that it influences competitiveness. (CUNHA & NEVES, 2008).

Follows the list of specific objectives of this article:
1. What are the differences in the influence of the helices in the two clusters' competitiveness?
2. What are the differences in the influence of the helices in the two analysed clusters?
The main research question of this article is: How does the Triple Helix influence the competitiveness factors proposed by Zaccarelli at al (2008)?

Figure 1, that follows, illustrated this article proposal:

Figure 1 – Examined relationship among Triple Helix parts, competitiveness factors and business competitiveness
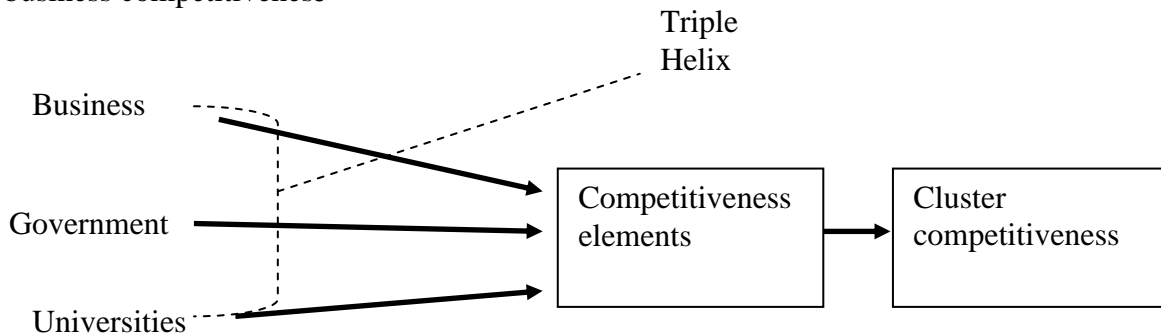
Regarding the premise on which this study is based on, this can be presented in three dimensions, as follows:
1. Cluster competitiveness is influenced by the three helices, university, business and government
2. This influence is not the same in every cluster, even if they are in the same industry.
.
3. Cluster competitiveness is distinct influenced by each one of the helices.

This article doesn't aim to investigate how the three helices Interact. However, when analysing the influence of the Triple Helix factors on the competitiveness factors proposed by Zaccarelli at al (2008), it could be observed the interaction among the three helices. Overall, the collaboration among the helices is recognised as important, although many times it occurs in an unstructured fashion. (BRUNDIN et al, 2008).

The wine cluster was chosen based on the conclusion of Sarturi et al (2016) that the Triple Helix parts influences both, Brazilian and Chilean, and their competitiveness level differ.

Also in terms of justifying this study, Etzkowitz and Ranga (2010) explain that using Triple Helix may be useful to drive the evolution of less developed regions. The model details the path, allowing adapting what is successful to the circumstances of the less developed. Thus, there is support for comparisons, which is the procedure used in this research effort.

Thus, there are favourable arguments to comparing, that is the procedure utilised in this study.

Zheng and Harris (2007) conclude that the Triple Helix model is relatively recente and there is still need of more Research fully understand how the interactions among university, business and government occur. Yuwawutto et al (2010) point to the importance to developing countries, emphasizing its power to bring efficiency and competitiveness to firms. Cunha and Neves (2008) applied the Triple Helix in a cluster in Brazil and concluded that joint actions university-business-government are already bringing positive results to competitiveness.

Sarturi et al (2016) verified that the Chilean cluster is more competitive than the Brazilian one. The Triple Helix model is used, thus, because we understand it's useful to go deeper in the reasons of the superior competitiveness of the Chilean wine cluster, compared to the Brazilian.

3. Literature review

The Triple Helix literature is used. This theoretical background proposes that events as business competitiveness are analysed from the perspective of the influence of university, business and government. This research uses the competitiveness factors of clusters proposed by Zaccarelli et al (2008) and applied by Sarturi et al in two wine clusters localised in Brazil and Chile.

3.1 – The Triple Helix

The Triple Helix structure is useful to analyse the emergence of innovations and the development of regions and businesses. In this matter, Ranga and Etzkowitz (2013) observe that innovations don't come from the dyad business-government, as it was in the industrial society, but from a triad in the current knowledge economy.

3.1.1– The actors

According to Etzkowitz and Ranga (2010), the Triple Helix is a set of components, relations and atributes. Actors can be classified as the ones that are involved with research and development (R&D), as an example, those ones that are in the universities, as research groups, those that are in business, as R&D departments and those that are governments as research institutes.

There are actors that are not involved with R&D, as for example, those involved in design, production, marketing, sales, technology adoption, incremental change, that combine knowledge in new forms, Interact with users and handle the commercialization of patents and licenses.

There are a set of institutions that can be classified as hybrid. They bring together factors of industry, academy and government, that may be involved with R&D or not. Some examples of this category are the multidisciplinary research centres, the consortiums between industry and university aiming research, university offices that work on technology transferences, Research labs that belong to firms, Support institutions, as Science parks and incubators, institutions that provide financial Support to start-ups, angel investor networks and funds that supply capital to start-up firms.

3.1.2 – Model usefulness and the role of the actors

Papagiannidis et al (2009, p. 233) conclude about the convenience of the Triple Helix model to analysing business alliances and clusters. As universities are each day more involved with entrepreneurial activities, in addition to its research and teaching role, they transform themselves in resource providers to businesses. Government role has been changing as well: beyond its regulatory action, it has been promoting innovation, making the legal setting more flexible and through tax breaks, loans and grants.

Lundberg (2013) and Todeva (2013) confirm the importance of the government in supporting innovation and entrepreneurship through facilitating investments in activities that generate knowledge. Also, in the studied case, it was confirmed the rotation of roles among government, industry and university. This situation is the apex of cooperation among the helices.

3.1.3 – Relations among the helices

Regarding relations among the helices, there can be identified two profiles of relations as social evolution mechanisms. The first profile is the collaboration and conflict mediation one. The benefit of this configuration is inherent of its formation, compared to the dyad – industry and government – that tend to confrontation. The second profile involves substitution, which means one helix can take the place of one of the other two when the later isn't capable or willing to perform the role. (ETZKOWITZ & RANGA, 2010).

Etzkowitz e Ranga (2010) also observe the spatial dimension where the helices interact relatively to **three dimensions**: (**1**) **Wealth creation**, which isn't a business function solely any longer; (**2**) **Innovation generation**, which isn't dependent on universities alone in the contemporaneous world; (**3**) **Normative control**, not a government only activity, but result from consensus among the three helices.

3.2 Zaccarelli et al's model (2008)

Zacarelli et al's (2008) model aims explaining the origin of cluster competitiveness through the presence and respective intensity degree of 11 factors that are explained ahead.

To each one of these factors a metric is proposed. This metric indicates whether the factors is present in the cluster and how intense it is.

3.2.1 – The 11 competitiveness factors

Zaccarelli et al's (2008) model proposes 11 factors to analyse 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 utilisation;
(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;
(11) Result strategy aiming the cluster.

The existence of the nine first factors is viable only with self-organisation. However, factors (10) and (11), to occur, they need the cluster to have its own governance.

The cluster business 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).

The explanation for business clusters is presented in three steps: **(1)** Comprehension that clusters are self-evolving system, that are capable of having an strategic orientation; **(2)** Comprehension that the constitution of these systems are based on a strategic thinking; **(3)** Comprehension that the basis for the existence and operation of a cluster reflects observable evidence of competitive advantage that exists over firms operating outside the cluster.

According to Zaccarelli et al (2008), two ideas are key to understanding the model: **(1)** Self-organisation; **(2)** Supra-enterprise governance. The first, self-organisation, has evolving and spontaneous nature. It results from the systemic effects that come from the relations established in a supra-enterprise entity, characterised by the development of increasingly complex relations over time. The second one, governance, is the one that works as the supra-enterprise entity, of strategic nature, in the business clusters.

Cluster competitiveness is based on the 11 factors that were presented before in this article. These 11 factors, beyond indicating the specific effects brought by the system, suggest the cluster competitive advantage. The factor that is key to characterise the existence of a cluster is the geographic concentration of firms in the same industry in a contained area. Without this concentration, there is no evidence of the cluster existence. Factors 10 and 11 only occur with the presence of supra-enterprise governance and for this reason have strategic orientation nature.

3.2.2 – Proposed metrics

Zaccarelli et al (2008) propose metrics to analyse cluster competitiveness. Sarturi et al (2016) apply these metrics to the studied wine clusters.

Results achieved by Sarturi et al (2016) are used to analyse the influence of Triple Helix factors, as proposed in the objectives of this research.

4. Methods
This article has exploratory character, because it's not possible to define previously the Triple Helix configuration in the studied clusters. Etzkowitz e Leydesdorff (2000) mention three possible configurations: (1) Statist; (2) Laissez-faire; (3) Balanced.

It's also possible to assert that this article adopts a simplified perspective of the Triple Helix, that may be useful to facilitate the applicability of the model (RANGA & ETZKOWITZ, 2013).

The multiple case study method is employed. The variables used are qualitative. This choice is anchored on the fact that strategic variables are less measurable than other ones. Most strategic variables can only be measured by their effects. (DUNNING, 1995, p. 96).

The metrics used to analyse the studied clusters were developed by Sarturi et al (2016). Based on the results of this study, Triple Helix influence is analysed.

Yin (1994, p. xiii) considers a mistake the understanding that case study is a poor choice among the available , not always is qualitative and is much more than a description of individual habits and behaviours. (YIN, 1994, p. xiv). Stake (1995, p. 97) observes that the researcher that uses the case study method, opts for this path to recognise and establish new means to connect unknown liaisons among known phenomena. Patton (1990, p. 99) suggests other reasons for case studies: there are situations in which the researcher finds specific situations – uncommon successes or failures – and this technique may generate useful information.

Yin (1994, p. xv) notes that the case study may be the most appropriate method to analyse complex organisational phenomena. The understanding of the authors is that this is the main reason for justifying the method choice in this research.

4.1 – Data collection
Data collection was performed in secondary data sources. The used source is the Research of Sarturi et al (2016), which examined comparatively the competitiveness of wine clusters in Serra Gaucha in Brazil and Valle del Maule in Chile.

4.2 - Analysis
The analysis is qualitative. Each one of the competitiveness factors proposed by Zaccarelli et al (2008) is analysed in terms of the influence they receive from university, industry and government. To analyse this influence, Sarturi et al (2016) are examined in detail with the objective of understanding which helix is influencing the competitiveness factor. Also, it's checked how each helix influences the factor, in the terms proposed in the objectives of this study.

It's possible to present the analytic effort conducted in this research in a scheme as in figure 2, which follows. It's important to note that there are two levels of analysis: **Level 1**. Compares how each one of the helices is influencing the competitiveness factors of each cluster. **Level 2**. Compare the clusters in terms how they are being influenced by the helices.

Figure 2 – Scheme to analyse the competitiveness factors results, linking them to the Triple Helix
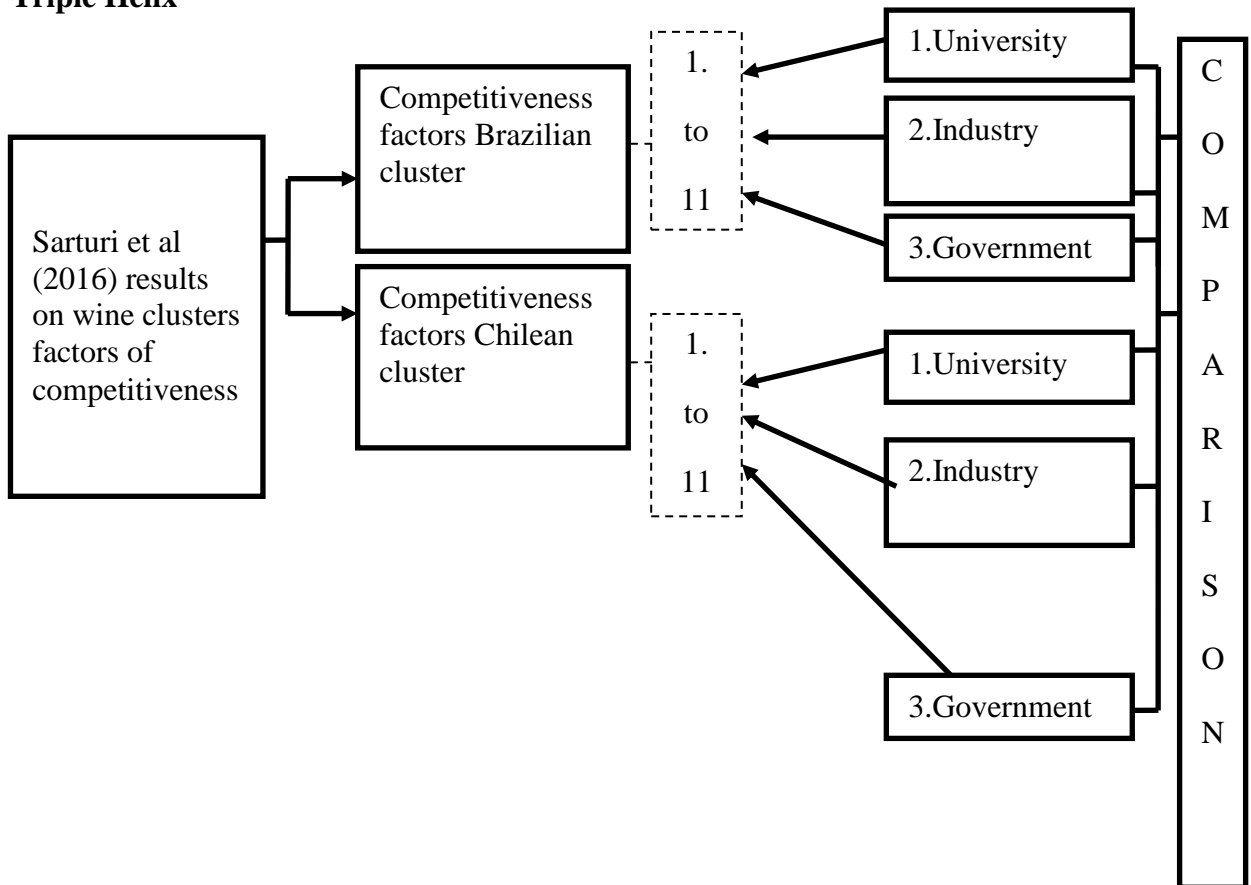
5. Wine clusters in Valle del Maule, Chile and Serra Gaucha, Brazil

Table 1, that follows, brings data on the studied wine clusters.

Table 1 – Main data on the studied wine clusters

	Serra Gaucha, Brazil	Vale del Maule, Chile
Exports 2011 (wine liters)	705,000	732,000,000
Exports 2011 (US$)	3.06 million	1.04 billion
% of country production	90%	47%
Area dedicated to cultivating wine grapes	31,363 ha	50,574 ha
Number of vines	12,037	5,396
Average area of each vine	2.6 ha	9.37 ha
Production 2011 (millions of liters)	279.6 (100%)	479.8 (100%)
Fine wine production	46.8 (17%)	455.3 (95%)
Table wine production	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)
Region total population	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
Year started cultivating vines	1875	1548

Source: prepared with information from Sarturi et al (2016)

6. Analysis

It's possible to group the 11 competitiveness factors proposed by Zaccarelli et al (2008) in two different categories: (1) The ones that clearly are influenced by the three helices; (2) The ones that there isn't enough evidence of receiving influence of the three helices.

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

Follows the list of factors that that receive influence o fone or two hélices - (1), (3), (4), (5), (7), (8) e (9) – with the respective explanations.

(1) Geographic concentration; beyond the evident presence of issues linked to industry, it's possible to argument that the presence of research and teaching institutions contributes to intensify even further the geographic concentration. However, it's 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. There can be incentives from the municipalities, for example, through offering tax breaks to business. Nevertheless, for the presente study, there isn't enough information to characterise that the possible tax breaks offered were relevant to geographic concentration.

(3) Firm specialisation; regarding this factor, the number of different existing business is also influenced by government in a more ample fashion. This happens because the form of taxation may inhibit or spur new firm creation to activities in the value chain that can be vertically integrated.

(4) Balance without privileged positions; it's not possible to assert that government and university influence the existence and intensity of this fator. Thus, only the presence of industry is evident here.

(5) Complementarity due to by-product utilisation; also in this factor it's not possible to assert that there is the presence of government. Beyond industry, there could be an argument in favour of the presence of university – through new technique creation – that could spur new firm creation. However, in the context of the present study, no information confirming the presence of the university could be obtained.

(7) Selective substitution of firms; this fator seems to be purely industry, because it's not possible to mention the presence of government here. Also, the presence of university cannot be mentioned. University can influence the creation of new firms, but not their substitution.

(8) Uniformity in technological prowess; another fator on which there seems to be only the influence of industry. University can influence in the opposite direction, because often new technologies are created in the academy and this can lead to technological inbalance instead.

(9) Community culture adaped to the cluster; again on this fator, it's only possible to assert positively on the presence of industry.

As all the factors need self-organisation to occur, industry is probably involved in all of them.

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

Factors influenced by the Triple Helix are: **Factor 2**, Scope of viable and relevant businesses; **Factor 6**, Cooperation among cluster firms; **Factor10**, Evolutionary character through new technology introduction; **Factor 11**, Result strategy aiming the cluster.

(2) Scope of viable and relevant businesses; regarding this fator, the influence of the Triple Helix is justified by the fact that, beyond the evidente need of industry influence, there is government contribution that facilitates or impedes new firm creation. University is needed to prepare the work force for a variety of activities.

(6) Cooperation among cluster firms; beyond cooperation not being viable without business, there isn't the creation of cooperatives without government facilitating it. Often, the creation of cooperatives brings together university and/or local teaching institutions. In truth, there is a second dimension of university influence, because these entities are state owned or, even if private, receive resources from government as indicated in other factors.

(10) Evolutionary character through new technology introduction; new Technologies are often created in the universities that transfer knowledge to industry. Thus, there is industry involvement, because to this factor be present, self-organisation and supra-enterprise governance are needed. Here, the indirect influence of government can be mentioned, as in factor 6, because universities and teaching institution, even when private, receive resources from government.

(11) Result strategy aiming the cluster; beyond self-organisation and supra-enterprise governance, needed to make the presence of this factor viable, the metrics proposed to this fator − geographic indication and number of firms that export − depend on government involvement. In the first case, government needs to set the rules and in the second government bodies need to support export promoting. University is involved in both cases, indicating parameters for regulation and supplying qualified workforce to firms that export.

5.3 – Triple Helix influence in the proposed levels of analysis

In the level 1 of analysis, helix industry, beyond influencing all the factors, also influences more strongly those ones that are influenced by the three helices. This is true in special for factors 6, 10 and 11.

Still in the level 1 of analysis, it's more evident its influence in the competitiveness factors 2 and 10, specially the latter, due to the existence of teaching and research institutions, as can be seen on table 2, that follows.

Table 2 − Presence of teaching and research institutions in the analysed clusters

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

Source: adapted from Sarturi et al (2016)

In the case of government, it's more evident its influence on factor 10. Some of the institutions are state owned in Brazil, as for example, IFRS, EMBRAPA and FEPAGRO.

In the level 2 of analysis, which compares how the two clusters are being influenced by the helices, follow the results:
- the Brazilian cluster is in advantage in the factors 1, 6 and 7.
- the Chilean cluster is in advantage in the factors 2, 4, 10 and 11. (SARTURI et al, 2016).

From these results, the cause of the Brazilian cluster advantage in the fator 6 and of the Chilean cluster in the factors 2 and 11, as well in the fator 10, where the two clusters are tied, can be discussed. All these factors - 2, 6, 10 and 11 - are the ones influenced by the Triple Helix.

In the case of factor 6, the Brazilian cluster advantage is due to the existence of a higher number of cooperatives than in the Chilean cluster.

In the Valle del Maule, there is the Loncomilla cooperative that congregates more than 100 associates, mostly small and medium sized producers. At Serra Gaucha, cooperatives with similar profile were found. One of the examples is Nova Aliança, with approximately 800 associated families; Aurora, with more than 1 thousand associated families and Pompeia, with approximately 260 associated families. (SARTURI et al, 2016).

Thus, the Brazilian cluster tends to cooperate more than the Chilean, once it shows a larger number of cooperatives (SARTURI et al, 2016). Cooperative existence is influenced mostly by industry, what allows asserting that in this factor the influence of this helix is stronger in the Brazilian than in the Chilean.

In the case of **factors 2 and 11**, in which the Chilean cluster is in advantage and in **factor 10**, in which there is balance, it was found the following:
- **Factor 2. Scope of viable and relevant businesses**. The Chilean cluster seemed more competitive in this factor, once at Serra Gaucha there are no makers of bottles and corks. (SARTURI et al, 2016). Wilks (2006) apud Sarturi et al (2016) had pointed in a previous investigation that in Brazil there are only two bottle suppliers that produce in large scale, having the beer industry as its main customer. In the case of corks, these are supplied by five Brazilian makers, that produce them using raw material imported from Portugal and Spain. This item represents a lot in the cost of the Brazilian wineries.
- **Factor 10. Evolutionary character through new technology introduction**. There is a list of institutions on chart 4 that run activities related to Research and technological development. Both clusters are assessed as similar on this item, although the Chilean may be considered superior on this item due to the slightly higher number of institutions (seven, against six for the Brazilian).
- **Factor 11. Result strategy aiming the cluster**. In both metrics utilised to analyse this factor, the Chilean cluster is in advantage compared to the Brazilian one. The Valle del Maule cluster has the origin denomination since 1995, according to the decree 464 (1995), 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 higher than in in the Brazilian cluster. It should be observed that the internationalisation process of Brazilian wine firms is recent. (SARTURI et al, 2016).

Table 3, that follows, presents the competitiveness factors, comparatively, to the Brazilian and to the Chilean cluster, with their relation to the Triple Helix.

Table 3 – Competitiveness factors in the wine clusters, Brazilian and Chilean and relation to the Triple Helix

Factor	Cluster in advantage	Triple Helix
Factor 2. Scope of viable and relevant businesses	Chilean	Mainly industry but government and university as well.
Factor 6. Cooperation among cluster firms	Brazilian	Mainly industry but government and university as well.
Factor 10. Evolutionary character through new technology introduction	Balanced	Mainly university, but government and industry as well.
Factor 11. Result strategy aiming the cluster	Chilean	Mainly industry but government and university as well.

Source: Prepared by the authors with information from Sarturi et al (2016).

In the case of **factor 2**, industry is the predominant helix, because new business creation is dependent on it. However, the role performed by government and university is relevant because the former can incentive business creation with its policies and university is key in new technology creation because it can drive new business creation when it transfers them to start-up firms.

In **factor 6**, again industry is the predominant helix. However, many times these initiatives have governmental support and involve the university.

Regarding the **factor 10**, the predominant helix is the university, with its role of new technology creation – introduction. Industry performs an important role here as well, because it introduces innovation in business processes. Of course, government has a role as well, of regulation in this factor.

In the regard of **factor 11**, industry is again predominant. In the metrics for this factor, beyond the key role in the origin denomination initiative, it couldn't happen without the government, that regulates it, being the university a support.

7. Conclusion

The objective of this study is to analyse the influence of the Triple Helix on the competitiveness factors of clusters proposed by Zaccarelli at 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 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; **(11)** Result strategy aiming the cluster.

Regarding the factors that aren't influenced by the three helices, industry influences all the factors, university influences only factor 2 and government, factor 4.

Table 4, that follows, aims at contributing to a better understanding of these results.

Table 4 – Competitiveness factors of clusters influenced by the Triple Helix

Competitiveness factor	Industry	University	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 utilisation	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 introduction	Yes	Yes	Yes
11. RESULT STRATEGY aiming the cluster	Yes	Yes	Yes

Regarding the differences in the helices influence, it was verified that in factor 6, industry seems to be determinant to the Brazilian advantage in this item.

In the case of factor 2, where the Chilean cluster is at advantage, it also seems that industry is key to this result.

In regard to factor 10, where it was found the studied clusters at balance, with eventual advantage to the Chilean, university and government are determinant to this result.

Finally, on factor 11, the influence of industry and govern seem to be key to the Chilean cluster advantage in this item.

Table 5 helps one to comprehend these results.

Table 5 – Differences in the helices influence between the studied clusters

Competitiveness factor	Cluster at advantage	Helix 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 and government
Factor 11. Result strategy aiming the cluster	Chilean	Industry and government

The main contribution of this study is linking in more explicit way Triple Helix to competitiveness. Beyond utilising competitiveness factors, that are consolidated to clusters, the application comparing two clusters in the same industry in different countries, throw light on the power of the concept, as well as on the helices on competitiveness.

To assert that university role has become more important, it would be necessary to compare the current situation with what was the status quo before the knowledge economy. Evidently, this is not possible to be done. What can be asserted is that, although university has an important role, it's not possible to affirm that its role is more important than industry and government, that appear as first and second in the model helices, respectively.

Regarding the limitations, there are the analytical and the methodological ones.

In terms of analytical limitations, the influence of each one of the hélices on the 11 competitiveness factors was not analysed. The analysis was restricted to the four factors that are influenced by the Triple Helix. Another limitation is the subjective character of the analysis. The latter constraint can lead to distortions.

Another analytical limitation that must be noted, as conclude Guimaraes (2009), who studied comparatively wine clusters in Brazil and Portugal, is the fact that is very difficult to understand precisely the competitiveness origin: whether it comes from agglomerating in a cluster or from participating in global value chains.

The main methodological limitation is using secondary data sources. Beyond the problems with the collection *per se*, there may be issues in the analysis, which is contingent on data that was collected in secondary sources by its turn.

As future studies suggestion, beyond the replication of the research with data obtained in primary sources of data, it's possible to consider the replication of the research in clusters of other industries and countries, in a fashion that allows not only comparing results and countries but also reach new conclusions on the influence of the Triple Helix on competitiveness factors of clusters.

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