

Innovation and competitiveness of the business clusters in Paraguay: evidence of their limitations

Innovación y competitividad de los clusters de Paraguay: evidencia de las limitaciones

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Abstract: This article aims to analyze the competitive position of business clusters in Paraguay, identifying its main limitations. Formalized business clusters from seven sectors, geographically distributed in different parts of the country, were the object of this research. First, a comparative research in a regional level was carried out and, in a second stage, a multicase research of different clusters in the country, focused mainly on factors associated with competitiveness. The results show that the level of implementation in the seven sectors falls within the category "survival cluster of small and medium enterprises" and they present common weaknesses such as limited capacity for innovation, low level of specialization, integration and cooperation, which directly influence the competitiveness of SMEs grouped under this business model. The uncomfortable position on the board of regional competitiveness imposes the need for a refoundation of the Paraguayan business clusters.

Keywords: Cluster, competitiveness, innovation, SMEs.

Resumen: Este artículo tiene por objetivo analizar la posición competitiva de los clusters de Paraguay, identificando sus principales limitaciones. Fueron objetos de investigación los clusters formalizados de siete sectores, ubicados geográficamente en distintas zonas del país. Se ha llevado adelante un estudio comparativo a nivel regional, y en una segunda etapa, un estudio multicase de los distintos clusters del país, enfocado principalmente a los factores asociados a la competitividad. Los resultados muestran que el nivel de implementación en los siete sectores, se encuadran dentro de la categoría "cluster de sobrevivencia de pequeñas y medianas empresas" y presenta debilidades comunes pronunciadas como la limitada capacidad de innovación, bajo nivel de especialización, integración y cooperación, que influyen directamente en la competitividad de las Pymes agrupadas bajo este modelo de negocio. La incómoda posición en el tablero de la competitividad regional, impone la necesidad de una refundación de los clusters paraguayos.

Palabras clave: cluster, competitividad, innovación, Pymes.

1. Introduction

Small and medium-sized enterprises (SMEs) are essential components of the economy of any country in the world (Bayarcelik et al., 2014). According to Paraguay's General Statistics, Surveys and Censuses Department (DGEEC - for its name in Spanish), these companies represent 90% of the country's business web, contributing to a large percentage of the Paraguayan economy, and working as the main provider of job opportunities, but at the same time, they face a series of problems that threaten their permanence in the market.

Being a developing country, with all the cultural, social and economic characteristics that this implies, SMEs in

Paraguay maintain a difficult situation. The problems experienced by SMEs, together with the competition that prevails in the market, forces organizations to apply a different approach to the activities related to the management of the company. Given this situation, the development of innovation is of considerable importance and the internal and external factors influencing it have been addressed in several studies with different approaches and sectors (Martínez-Román and Romero, 2013; Kreiser et al., 2010; Radas and Bozic, 2009). This phenomenon has become essential to maintain a competitive advantage and to ensure the survival of SMEs operating in a competitive and dynamic environment (Van de Vrande et al., 2009). However, it is observed that in developing countries contexts, researches in this field are still very scarce

The literature on innovation has been conceptualized in different ways over time (Damanpour, 1991; Garcia and Calantone, 2002). In this sense, the innovative strategy of associativity is a valid approach to collective efficiency (Porter, 2000), since the common problems of SMEs tend to aggravate when they operate in isolation. Although SMEs are aware of the need to innovate, many of them find great barriers and limitations for the development of this process (Hewitt-Dundas, 2006; Madrid-Guijarro et al., 2009). According to previous research, SMEs differ from large firms on their approach to innovation, this does not mean that they are less innovative, simply that innovative behavior is different. Therefore, stimulating innovation in these companies is a very important task from the perspective of the economy as a whole (Keizer et al., 2002).

Dynamic changes in the business environment caused mainly by globalization have generated the emergence of new organizational forms that allow agents to respond more effectively to challenges. In this sense, cluster or association theory has been positioned as an option for smaller companies, as a local development strategy. The objective of this work is to analyze SMEs grouped under the cluster model in Paraguay, and to identify the main problems associated with their level of competitiveness.

2. Literature review

2.1. Competitiveness and associated factors

Competitiveness refers to an organization's ability to systematically maintain comparative advantages that enable it to reach, sustain and improve a particular position in the socio-economic environment (Porter, 2000). It can also be defined from a perspective of local and global market share (Berumen, 2006), and it requires the action of a set of factors and variables for an adequate functioning, among which is innovation (Porter, 2000).

Hernández (2000), indicates that there are different levels of competitiveness with their respective factors: at the microeconomic level (companies), branch or sector (structural) and national "productive or financial" (systemic). The main approaches to systemic competitiveness have been set forth by Esser et al. (1996), where locational factors are relevant. In addition, the World Bank (WB), through the World Economic Forum (WEF), defines competitiveness as a set of variables that make up a country's level of economic prosperi-

ty (WEF, 2014). There are 3 competitiveness indicators for the clustered regions for the BM, which are: a) "basic" (development of natural resources, effective production of subsistence inputs, creation of physical infrastructure, but mainly of minimum necessary intellectual capital); b) "potentialization or efficiency" (factors driving intellectual capital and labor, new markets development for consumer goods and services, and financial markets); and c) "innovation or high competitiveness" (factors that develop new products and services, which contain characteristics of added value, differentiation and large volumes).

In this context, and as endorsed by the literature, SMEs are important players in competitiveness and have important advantages: their size allows them a fast response to changes in the environment and facilitates their integration as a link in productive chains; also as efficient suppliers of intermediate or final goods and services that promotes the emergence of larger national companies (Castellano, 2003). Different theories show that the sustained component of competitiveness, currently, is the innovation capacity of companies. This capacity even transcends at the sector level, migrating the model of isolated companies to the model of associativity, thus becoming an innovation of the business model, which proposes new scenarios and actors to remain competitive.

2.2. Innovation as an enabler of competitiveness

Innovation is an integral activity which involves the whole organization and it is one of the most important factors associated with competitiveness (Porter, 2000). The extensive literature emphasizes innovation as a means by which changes in organizations are explored, and their role as an engine of competitiveness, profitability and productivity (Rogers, 1995). Innovation has been defined in different ways in literature: as a process, system, program or an outcome, in terms of its adoption or its novelty (Hage, 1999), however, in the business context, it is concerned with doing something new or different (García and Calantone, 2002), and the creation of value (Linder et al., 2003).

According to Rossberger (2014), firms differ in their capacity for innovation due to several factors, and in the particular case of SMEs, this capacity is influenced mainly by the limitations of financial resources, but also the absence of good practices (Kaufmann and Todtling, 2002; Freel, 2005). Another negative factor perceived by these companies is that innovation does not imply an immediate greater benefit due to the costs incurred, which often becomes a barrier that discourages inno-

vation, especially in very traditional and conservative cultures.

Although SMEs lack the resources, skills and competences, their advantage over large companies lies in the "behavior" factors that have to do with flexibility, dynamism, efficiency and proximity to the market (Hewitt-Dundas, 2006). This makes them companies that are capable of innovating, but it requires certain conditions and triggering factors, such as partnership and cooperation. The relationship between innovation and competitiveness through the performance of SMEs is an issue that, because of its importance, has summoned in the last decade the empirical research effort of different authors, in different geographic contexts, with different results (Storey, 2000; Galia and Legros, 2004; Martínez-Román and Romero, 2013). All these researches conclude that innovation, regardless of type and intensity, becomes a sustainable competitive advantage for this type of companies.

However, not all SMEs have the capacity to innovate, conditioning this situation to all the organization (Martínez-Román et al., 2011). In this sense, Baden-Fuller and Pitt (1996); and Nueno (1998) consider the existence of three dimensions related to the capacity for innovation: knowledge, human capital and an organizational structure adapted for the development of innovations. About that, the associative model or cluster pursues these three dimensions, positioning it as a propitious model for the development of innovations, based on cooperation and competition in a common geographical context.

2.3. SMEs Cluster: a collaborative network towards innovation.

Due to the limited competitive potential of SMEs to meet the new demands of the market, the main challenge has been focused on generating an environment that stimulates learning, innovation and constant improvement in these companies (Meyer-Stamer and Altenburg, 1999), which is why collaborative inter-enterprise networks have been successful in many parts of the world. For this purpose, Candido and Abreu (2005) mentioned that interorganizational networks are privileged configurations that allow each of its members to complement each other, based on coordination and cooperation between companies. But this associative action is not enough to explain business excellence, but it also requires the search and incorporation of other factors such as communication, knowledge and experience, as well as allocation of resources by companies and institutions (Terziowski, 2003).

The most referenced definition in the literature is Porter's contribution (2000), which defines the cluster as a grouping of companies and institutions related to each other, belonging to the same sector or market segment, that are geographically close and that collaborate to be more competitive. These geographic concentrations of interconnected companies bring together specialized suppliers of inputs, service providers, specialized infrastructure, government and institutions offering training and education, information, research and technical support. The association between companies and public and private institutions tends to facilitate integration, cooperation, solidarity, cohesion, innovation, materializing a collective efficiency (Guimaraes et al., 2000)

The competitive advantages resulting from the clusters are based on three main aspects: specialization, inter-firm cooperation and flexibility in terms of production (Porter, 2000). According to Darlove (2003), clusters affect competitiveness in three ways: first, they increase the productivity of companies in the area; second, they control the speed and direction of innovations; and third, they stimulate and trigger the creation of new companies within the cluster. However, the simple association under the cluster model is not enough to raise the innovative activities and competitiveness of SMEs (Baptista and Swann, 1998), it also requires the fulfillment of structural conditions and cultural adaptation, as well as the coordination of all the efforts of the units (companies and institutions). On the other hand, it is also important to advance in the cluster typology. Meyer-Stamer and Altenburg (1999) propose three cluster groups:

- a. Cluster of survival of micro, small and medium enterprises; which produce low quality consumer goods for local markets, mainly in weak entry barriers activities. The degree of cooperation and specialization is low, reflected in the lack of skilled labor in the local workforce.
- b. Advanced cluster or differentiated producers; they are those in which most companies were successful in import substitution and they mainly produce for the domestic market. They usually comprise a heterogeneous mix of companies ranging from small to large producers or retail companies.
- c. Transnational clusters; they are companies that are part of more complex technological activities, such as electronic or automotive industries. They usually have few links with SMEs and national institutions.

It is worth mentioning that all links or members of the chain have essential factors and areas of attention that influence their development, it and depends on the management of these factors and the relationship with the environment, to position the cluster towards a sustainable competitiveness. The cluster's life cycle consists of phases called: incipient, articulated, inter-related until it reaches its self-sufficiency phase, associated with the context of 4 general characteristics, as shown in Table 1.

Table 1. Evolution phases of the cluster

Characteristics	Phase I Incipient	Phase II Articulated	Phase III Inter-related	Phase IV Self-sufficient
Productive relations	Scarce	Business Articulation	Integration of productive relations	Full production integration
Technology	Absence of technological development	Production Specialization	Technical sophistication	Innovation and own technological development
Demand	Weak	Basic	Medium	Sophisticated
Institutionality and normativity	Incipient	Basic	Institutional development and normative application	Full development and application of regulatory standards

Source: ONPEC (2014).

3. Methodology

In order to achieve the objective of the research a study was carried out in two phases: On one hand, at the sector / business level (meso and micro), a multicase study to identify specific indicators that reflect the competitive position of different formalized clusters in Para-

guay: Cotton - Textile industry - Clothing; Feed - Swine Meat; Feed - Chicken Meat; Cassava - Starch; Stevia; Fruit; and Software. On the other hand, a comparative documentary analysis of the indicators of regional competitiveness of Latin American clusters (WEF, 2014).

From the point of view of the way of approaching the problem, the research is considered qualitatively and exploratory, although quantitative data and information are taken into account for a more complete analysis. The data collection included secondary information obtained from official documents from the World Bank (WB) and the Ministry of Industry and Commerce of Paraguay (MIC - by its name in Spanish). The gathering of field information (primary) was collected through semi-structured questionnaires (the questionnaire used was adapted from the PINTEC/FINEP model from Brazil), through interviews with representatives of the clusters of Paraguay, agglomerated in the seven productive sectors and responsible of supporting institutions between September and December 2015.

4. Results and Discussion

Following Porter's theory concerning the cluster, the national development strategy was promoted by the government in the late 1990s, with the support of the European Union, through plans to increase exports. This resulted in the initiative of forming clusters in 7 sectors of different regions. The incursion of Paraguayan companies into the value chain for commercialization in scale, under the cluster mode, was formalized in 2002, with productive sectors of different sizes and structures, which are: (a) cotton - textiles - clothing, (b) balanced feed - pork, (c) balanced feed - chicken meat, (d) manioc - starch, (e) stevia, (f) fruit, and (g) software. The eligibility criteria were: territorial concentration, degree of associativity of companies, experience in the use of business development services, number of companies and producers and importance of the economic sector.

From the analysis focused at the (micro) level of different clustered sectors of Paraguay, and analyzing the indicators of productive relations among the members, technology, demand and institutional regulations, evidence has been found that positions the sectors of Paraguayan clusters in a scenario of transition from the incipient phase to the articulated phase, resulting in a limited competitiveness.

Table 2. Ranking of Latin American Clusters

STATE 1 Basic Factors	Transition phase	STATE 2 Efficiency Factors	Transition phase	STATE 3 Innovation Factors	Global Competitiveness Position
			Chile		33
			Brazil		48
			Mexico		53
		Costa Rica			57
		Peru			61
		Colombia			69
			Uruguay		74
		Ecuador			86
			Argentina		94
	Bolivia				104
		Paraguay			116
	Venezuela				126

Source: WEF (2014).

The comparative positioning of clusters, based on the World Economic Forum (WEF), shows the place of Latin American countries in the competitiveness ranking in Table 2. As a result of this analysis, it is evident that the clusters of Paraguay present very deep weaknesses compared to other clustered countries of the region, reflected in the indicators of the competitiveness factors used by the WB. The reality of the clusters in Paraguay is not very good, in a comparison of competitiveness, it is located in the last place, in state 2 called potentialization. This position may allow Paraguay to move towards the phase of transition that implies an important

global competitiveness, but it is very far from reaching doors of the level of innovation and high competitiveness. The situation reflects a very retarded position in relation to the other countries, in fact it is in the 116th place of 144 clustered economies in the world, and among the last 3 in Latin America. On the other hand, to assess this result, it is also important to use the analysis of the specific components or indicators, in order to establish a precise scenario for each of the indicators of competitive growth in the countries. Table 3 shows that Paraguay, along with Bolivia and Venezuela, has a huge gap in terms of efficiency and innovation

Table 3. Specific indicators of cluster competitiveness in Latin America.

Factors		Chile	Braz.	Méx.	Costa Rica	Peru	Co-lom.	Urug.	Ec-uad.	Ar-gent.	Bol.	Parag.	Venez.
a	Basic	28	73	63	67	69	77	43	75	96	94	106	126
b	Efficiency	32	38	53	60	57	63	73	100	86	122	110	117
c	Innovation	45	39	49	35	94	66	78	93	88	100	123	135
Global Position		33	48	53	57	61	69	74	86	94	104	116	126

Source: WEF (2014).

This uncomfortable position of the competitiveness of the Paraguayan cluster reflects the structural deficiencies at the macro level for the three factors in which the country should improve, which can be synthesized in:

a) Factors of cluster basic requirements: deficiency in government services to improve the performance of SMEs, waste of public spending, weaknesses in the protection of intellectual property, lack of trust in State institutions.

b) Critical factors to increase efficiency and competitiveness: bad hiring practices, and a great distrust in professional management, limited human resources training, financing problems in the public sector for SMEs, very limited access to the internet in cost and quality, predominance of commodities, and high unfair competition.

c) Factors for innovation: weakness in the quality of scientific research institutions, deficiency in the collaboration of the company with research institutions and the government.

On the other hand, in the analysis of the sectoral level of the Paraguayan clusters that have been formalized, similar weaknesses are observed that are related to structural and even cultural problems, and that together with the problems at the macro level analyzed above, they have a strong influence that make competitiveness and innovative effort insufficient to advance in the development of clusters towards the phases of evolution with greater productive integration and technological development (Table 4).

Table 4. Characteristics of Paraguay's Cluster

FORMALIZED CLUSTER	Productive relations	Technology	Demand	Institutionality and normativity
Cotton – Textile- Clothing	Business Articulation	Production Specialization	Basic	Basic
Balanced feed – Pork	Business Articulation	Production Specialization	Medium	Basic
Balanced feed – Chicken	Business Articulation	Production Specialization	Basic	Basic
Cassava – Starch	Scarce	Absence of technological development	Weak	Basic
Stevia	Scarce	Absence of technological development Weak Basic	Weak	Basic
Fruit	Business Articulation	Absence of technological development	Basic	Basic
Software	Business Articulation	Production Specialization	Basic	Basic

Based on this result, and according to the types defined above, Paraguay's clusters are still stuck within the category called "SMEs Survival Cluster". First, there are very visible weaknesses related to the characteristics and potential for the development of the clusters. Most of them lack modern management techniques and the ability to organize and continually improve production in a systematic way. On the other hand, although one of the principles of cluster formation is the existence of conditions that lead to cooperation, it is observed that the cooperative relationship between SMEs and institutions, as well as the ties with larger companies, are still weak in clusters in Paraguay, possibly due to weaknesses in internal governance. In addition, the productive specialization between the companies of these clusters is less developed than the companies from an external sector.

Productivity is also a problem that affects these companies, especially in the agroindustrial clusters of the country, an area in which greater professional skills, high initial investments and economies of scale are required. Although most SMEs within these clusters are committed to similar activities and markets, making these two factors the main mechanism for the know-how transference, these learning mechanisms apparently have not yielded the expected results, possibly due to the absence of management practices as well as the limited level of education of microentrepreneurs. Another situation that is observed is the lack of trust among employers. As an extension of this, the relations of the companies integrating the clusters and the universities or research institutes continue to be very ephemeral and irregular. The interaction between these agents of the cluster is of vital importance for the promotion and development of innovation; however this work shows that it is very little practiced.

On the other hand, SMEs need more support from public institutions, and therefore there is the need for an overall policy mix for this type of business and specifically for the clusters. It also reflects the need to strengthen the active participation of local supportive institutions (municipalities and governor's office) and national institutions (ministries, universities, among others); and that can generate actions to provide services to small businesses, or even stimulate the private sector to improve these supports. It appears that SMEs in Paraguay's clusters are far from independent from public sector support, to start operating just like any other private sector company. Also the lack of efficiency on the part of the state for the control of the informality is a factors that negatively affect the development of the clusters. Table 5 shows a summary of the main common deficiencies of Paraguay's clusters, leaving as a premise that the way to overcome these obstacles may be different for each sector.

Table 5. Limitations of the clusters of Paraguay (micro level).

Common Deficiencies of SMEs	Possible causes
Low level of competitiveness	<ul style="list-style-type: none"> - Heterogeneity in development levels. - High cost of management. - Limitations to develop logistics. - Inadequate management of human resources. - Low productivity. - Lack of knowledge of the market.
Weak capacity for innovation	<ul style="list-style-type: none"> - Poor networking with supporting institutions (universities or research centers). - Weaknesses and lack of sectoral policies. - Absence of tools for the development and management of innovation. - High dependence to the supplier (main company). - Scarce access to resources (human and financial)
Low level of specialization	<ul style="list-style-type: none"> - Poor integration to the value chain. - Excessive reliance on vertical integration - Resistance to information exchange (processes, technology, good practices in sales).
Low level of integration and cooperation	<ul style="list-style-type: none"> - Scarce incentives for cooperation - Little stimulation of supporting institutions - Limitations to the share capital for agreements - Lack of confidence - Inadequate organizational culture

5. Conclusions

From the point of view of the regional and national competitive position of the clusters in Paraguay, the results of this research clearly show that this business model, with basic principles of cooperation and regional development, are in a position of competitiveness that is still deficient. In relation to the clusters of the countries of the region, they require concrete and even urgent

actions to move towards a better competitive level that assures the networks of companies and institutions, and their evolution towards the path of self-sufficiency.

Paraguayan clusters are in the category called "SME Survival Cluster", and they show clear signs that they are positioned in a transition scenario between the Phase 1 called incipient and the Phase 2 (Table 1). This position is based on low productive relations, a relatively weak demand in some sectors, and a lack of productive specialization, which is due in large part to the limitations of technological development, where innovation is very scarce. To this, it is added that the supporting institutions, apparently do not play an active, sustained and dynamic role. The results of this research demonstrate that a "refoundation" of existing clusters in Paraguay is necessary to become a business model aimed at boosting the competitiveness of SMEs and generating the expected local, regional and national development.

Although there are some clusters that reflect a better integration and position than the others, most are immersed in low efficiency and productivity, lack of innovation capacity, low level of specialization, integration and very limited cooperation capacity, associated to absence or poor structural conditions (infrastructure and excessive informality). It is possible to conclude that the challenge for the companies of the cluster undoubtedly begins with the realization of a deep self-diagnosis exercise accompanied by a greater orientation towards the environment. It is necessary to move towards a global approach of the cluster model to strengthen the cooperative relations between companies and institutions, as well as to explore and systematize to the maximum the possibilities to capture strategic information.

The research reflects that the current position is far from a level of innovation and high competitiveness, ranking among the last three countries in Latin America. However, Paraguay integrates the list of countries located in the state called "maximization or sustained growth", in which there are certain advances, although with limited impacts, in the development of factors that promote intellectual capital and labor, the effort to develop new markets, as well as the development of some financing programs

The results also show that specific competitiveness factors, such as compliance with basic factors, production efficiency and innovation capacity, show an important gap in relation to other countries. The analysis demonstrates the common deficiencies of SMEs related to the low level of competitiveness, mainly due to a low innovation capacity, low level of specialization and limited level of cooperation and integration of the companies

and institutions that make up the clusters. The present research has its limitations by the very characteristic of the investigation.

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