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geography Perspective**

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*Competitiveness of Colombian Departments observed from an Economic geography
Perspective*

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*Introduction: I. The Ambiguities of the Concept of Competitiveness:
an alternative conceptual framework. II. Competitiveness
Measurement Problems: critical review of literature in Colombia.
III. An alternative Proposal for Measuring Regional
Competitiveness. – Conclusions. – Bibliography.*

Summary

In this paper, we analyze the regional competitiveness concept and its measurement using the old and New Trade Theory and the New Economic Geography. The analysis shows that the competitiveness has no sense when is applied to the goods market, while has sense (however, not in all situations) when is applied to the productive factors market. Contrary to most approaches and measurements of the competitiveness of Colombian departments, we show that is possible to obtain simple measures which, in addition to being consistent with the conceptual framework of economic geography, are the product of the combination of a small number of variables.

Palabras clave: Regional competitiveness, New Trade Theory, Economic Geography, Colombian departments, Competitiveness Ranking

Clasificación jel: R10, R12, R19

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Introduction

The topic of competitiveness is new for economic development analysis and public policies. In Colombia, as well as in most Latin American countries, its origin goes back to the second half of the 1990s when international insertion and economic aperture programs were adopted (Peres, 1997).

In its beginnings, the topic was limited to business spheres and national government officials but in recent years it has gained importance at sub-national levels, becoming in something like a mantra that is invoked during the analysis, and the practice, of economic development (Moncayo, 2003), or a creed or an “industry” (Lall, 2001), or in a dangerous obsession (Krugman, 1995). In a manner, this has led to thinking that any reflection about globalization, economic development, or public policies, must necessarily mention competitiveness.

As a matter of fact, competitiveness in Colombia has become a fundamental element in public policy agendas in national and regional settings, and also the topic of studies by prestigious national and international academic institutions. Several of the studies concerning the competitiveness of Colombian departments (CEPAL, 2002 and 2007; CRECE, 2002; CID, 2002), have centered on measurement, because this is considered of vital importance for taking decisions in public and private fields. These studies use conceptions and methodologies similar to those by the World Economic Forum, WEF, and the International Institute for Management Development, IMD. Despite the importance of measurement for the purposes indicated, in Colombia such studies have not received sufficient attention concerning the discussion of the theoretic validity of the concepts used, or the pertinence of the methodologies adopted.

The results of some of these studies pose several questions. The first deals with the idea that regions compete with each other for markets of goods, showing no differences from the behavior of firms. An identical association has been made between firms and countries, which has been the object of many critiques and questionings (Lall, 2001;

Krugman, 1995). Besides, independently from the adopted conception of competitiveness, in such studies neither the sense of the confrontation, nor its causes or explaining factors, are specified. The second, related to the latter, is that measurement appears as an end in itself, without clearly establishing its relationship with the adopted notion of competitiveness, nor with its determinants, conducing to errors concerning the design and adoption of public policies (Kitson et al. 2004; Lall, 2001). On this regard, the measurement that has dominated has been based on the so called “growth competitiveness,” which has also been criticized for its conceptual and empirical inconsistencies from the theory of growth itself (Lall, 2001).

This article analyzes these questions with arguments from the economic theory, particularly that of economic geography, emphasizing the mobility of productive factors and the paradigm of increasing returns. The article shows some of the problems and inconsistencies presented in the measurement of competitiveness of departments in Colombia, and proposes an alternative conceptual and methodological approach based on economic geography. Likewise, it proposes a competitiveness measurement that, besides being compatible with the previous approach, is not significantly different from the ranking results obtained in other studies and with the advantage that is calculated with a smaller number of variables and factors.

The article is divided into three sections. In the first one, the debate is centered around the notion of regional competitiveness, presenting a conceptual framework that is based on trade theories, geography and an evaluation of multinationals. In the second part, the most relevant studies about regional competitiveness in Colombia are revised, presenting a methodological framework that, in our judgment, is consistent with our conceptualization. In the third part, a measurement of competitiveness is obtained through the use of the principal components and the hierarchical clusters analysis. Finally, conclusions and final observations are presented.

I. The Ambiguities of the Concept of Competitiveness: an Alternative Conceptual Framework.

The ambiguity of the notion of competitiveness arises in the difficulties to precisely identify its actors or agents, the scenarios of the ‘confrontation,’ and its causes.

Although there is no agreement among specialist concerning the topic¹, our inquiries about the numerous definitions of competitiveness at a country, a regional, or a firm, level, indicate that the starting point has been trade and its relationship with well-being and economic success. In this sense, it is associated with the capacity of an economy to produce goods and services that pass the international markets tests and, simultaneously, keep high growth rates and high population well-being levels (Storper cited by Kitson et al. 2004). According to such definition, a region becomes more competitive when increase its capacity to participate in the market (displacing other regions completely or partially), and as a consequence increase the income of its inhabitants.

This definition, commonly used for the analysis of national economies, has also extended into the regional setting by associating directly with the notion of export-base and limiting itself to the field of trade. In this manner, besides not distinguishing between regions and countries and evading the problem of resource mobility, such notion implicitly accepts that nations, as well as regions, behave as firms and when they confront each other in goods markets, trade is a zero-sum game. As rightly indicated by Krugman and other economists, such conception is incorrect from the perspective of economic theory: countries do not behave as firms, and states, or territorial levels, do not have as an objective to compete among each other, but try to create opportunities for all economic agents².

¹ There is a numerous set of definitions from different perspectives: trade, macro-economy, micro-economy, business, structuralist, and systemic. In our judgment, this is a sign of the concept’s ambiguity. On this regard, see Bougrine (2001).

² We remark that different from public goods, private goods suppose exclusion. Likewise, we remark that the first type of goods are provided by national or local governments, while the second are the result of the firms’ activities. This is an aspect that shall no be ignored when differentiating the behavior of firms, nations and regions.

These ideas come from the belief that the notion of competitiveness accepted in business and administration literature, can be extended into sub-national and national levels. In a strict sense, firms compete for increasing their participation in the market in such a manner that, when a firm wins, it does it at the expense of the others. Therefore, for the notion of competitiveness previously developed to have complete sense for a region, the region must define itself and behave in a manner that is analog to a firm, and should also place itself in the same scenario of the latter, in a particular market. In other words, besides being specialized in the production of one good, it should also confront other regions that also produce the same good. However it's apparently, that this is not a good description of the regions.

A. Regional Competitiveness and Trade

Consider a scenario where regions in a country relate with each other through flows of inter- and intra-industry trade. This reflects, precisely, the reality of sub-regional and international trade.

The first flow implies that regions trade complementary goods and, therefore, each is partially or completely specialized in the production of a different good. The second type implies that regions trade similar goods but each one specializes in a particular variety or in certain quality of the good.

Then, under both types of flows, we move away from the required conditions for the usual definition of competitiveness to be applicable at regional or at country levels. In this way, the notion of complementarity, as a mechanism to reach higher levels of real income, gains importance. In the next lines, we will emphasize on the latter.

When inter-industry trade is considered, the natural reference frameworks are the Ricardian and Heckscher-Ohlin models. From either one of the models, it is possible to explain the way how countries (and in an analog way regions) can benefit from complementarity. In these settings, firms find themselves in a perfect competition

scenario, producing goods with a with low degree of substitubility in terms of consumption (for instance manufactured goods and food) using labor and/or capital, which in turn are scarce resources. In this type of situation, opportunity costs create the possibility for regions to specialize in just one of the goods, and take advantage of the mutual benefits of trade. In other words, they improve their income (measured by their capacity to buy) through specialization and trade. In this type of scenario the notion of competitiveness is neither relevant nor suitable, unlike the notion of complementarity.

If in the previous scenario, regional authorities consider to adopt competitiveness policies, with the objective of expanding markets for all goods (in this case manufactured goods and food), they will increase production of the good in which don't have comparative advantage, sacrificing, therefore, production of the good in which has comparative advantage. In this type of situation, compared with a specialization situation, the regions loses as they obtain a smaller real income. Authors like Krugman and Lall, in the texts cited above, showed this but only at a national level. Now, as regions are much more open to trade at the interior of countries, the previous analysis can be extended to this level.

Differently from the previous scenario, intra-industry trade considers simultaneous purchases and sales of similar goods among *regions*. The differences among the goods can be based in secondary characteristics such as packaging, colors, design, etc, or can be based in the quality, existing high and low quality varieties. At a country level. Balassa (1966), Grubel (1967), and Grubel and Lloyd (1975), showed the importance of this type of trading, while Greenway and Milner (1983), and Hine and Milner (1995) observed the existence of secondary differences and quality differences in intra-industry trade.

In the case of the first type of differences, goods are produced under scale economies in an imperfect competition scenario. Krugman in his works of 1979, 1980 and 1981 under monopolistic competition assumption, shows that the producers' rationality brings a situation of specialization in the production of a limited number of varieties in each country. This in turn produces the gains associated with scale economies when firms confront a larger market (the market of the integrated economy). This creates the

possibility for a mutually beneficial exchange as the inhabitants of both countries increase their real income and enjoy a larger variety of consumption goods. Naturally, this analysis can be extended at a regional level, which shows that under this type of intra-industry trade, the gains for the regions come, again, from complementarity and not from competitiveness.

If we consider quality differentiation, the principle of comparative advantage rules again, creating a situation in which the regions benefit from specializing production of a determined quality (Falvey et al. 1987).

To summarize, in a situation of inter-industry or intra-industry trade based on quality differences, free trade conduces to an equalization of factor remuneration and, therefore, to an efficient assignation of resources through comparative advantages mechanism (Lall 2001). Meanwhile, in a situation of intra-industry trade based on secondary differences, efficiency increases through scale economies mechanism. Therefore complementarity, not competitiveness, explains the relationships established by regions in international and inter-regional trade, and implies that trade is possibly not the most relevant scenario of the “confrontation” among regions in a country.

Porter, whose works (Porter 1991, 1998) have inspired approaches concerning regional competitiveness in Colombia, has question the validity of the theory of competitive advantages, trying to make competitiveness an alternative concept for specialization and complementarity in trade. For this author, firms are the players in competitiveness. However, nations, and therefore regions, are not only the spaces of their location but also actors that can contribute with their actions to the competitiveness of firms. This makes room for a new concept of competitiveness associated with the business on one side, and the “environment,” in which firms operate, on the other. From this notion, it is implicitly stated that regional levels are important for competitiveness because that is where firms gets inputs and resources (human capital for instance) , establish horizontal and vertical relationships with other firms and industries, takes the the institutional environment, and

create chains, and clusters or firm groupings. Under this perspective, one can deduce that in addition to firms, firms “environments” also confront each other in the markets.

On another front, once competitiveness becomes independent from the theory of comparative advantages, and as a result from the factor endowment of regions, the trade success of firms, regions and countries falls upon the competitive advantages, dynamic or created, (Haque, 1995.)³ This, in our judgment, is another way of referring to factors with increasing returns, externalities and complementarities. Firms’ competitiveness, and as result national and regional economies competitiveness, reflect the strategies of firms and of different government levels to improve the environment where they are located, independently of the resources they may have.

Nevertheless, this last notion is not free of ambiguities because the scenario and the motives for competition are still imprecise. Furthermore, regions are not differentiate from nations⁴, the relationship between competitiveness and the economic resources are not clarified, and their allocation, are not clearly established. In our judgment, not recognizing specialization according to the availability of resources, implies stating that firms have an intrinsic capacity to “confront” in any market, without an explanation for the origin of the resources used in production.

B. Regional Competitiveness, Agglomeration and Resources Mobility

Until now, we have omitted productive resources mobility, a crucial aspect to understand competitiveness and its importance from a regional perspective. The problem consists on understanding regional competitiveness as an increase of the income, that is due to the attraction of resources associated with the agglomeration of economic activity; a logical

³ Identifying the success of firms in markets and the prosperity of countries and regions with their productivity, is not a novelty. In this sense, competitiveness becomes just an alternative expression to refer to productivity. From the perspective of growth and development economy theories, this angle may be considered unnecessary and useless.

⁴ In our judgment, Porter’s approach, although useful, does not clearly establish differences between levels of government or between territorial scales due to its functional character and because he considers territory as a factor that is part of the firms strategies or a “container” where they set up. On this matter, see Conti (1995).

argument in terms of spatial and geographical economy and in terms of economic structural change⁵.

Next, we will examine the manner on how resources mobility associated with the process of agglomeration, which also affects productivity, intervenes in regional competitiveness. Agglomeration, from an economics perspective, results from the interaction between transportation costs and increasing returns. In the following lines we will examine the pertinence of the concept of competitiveness based on the attraction of resources, inside and outside regions' countries.

1. Agglomeration and Mobility of Resources in the National Territory

If we start with a perfect competition situation with constant returns of scale and decreasing marginal products of the factors, mobility produces a result, , that is identical to the one based in the inter-industry and intra-industry trade generated on the quality differences of the goods⁶: an equalization of factor returns and an efficient assignation of resources. In the case of a country without restrictions to mobility, regions attract resources that are scarce and put out those that are abundant, and achieve well-being gains, converging to a same level of per-capita income. In this type of situation gains are obtained by complementarity in the use of resources, and not by their accumulation⁷.

The case is different when regions are conceived not just from a perspective of specialization and resource endowments, but also as an agglomeration of firms and population. This assumes the existence of scale economies, externalities, clusters, cumulative learning and transportation costs. In this type of case, competition for scarce resources, although limited, does not lose its sense, which leads us to consider region competitiveness as a matter of spatial and economic geography.

⁵ Despite natural resources being considered, from the perspective of economic development, as an "exogenous" condition of productivity, due to their non-mobility, they have not been taken into account when examining competitiveness (Rodrik, 2003, Gallup, 1998.)

⁶ Regions of a country are considered as completely open economies without restrictions on the trade and mobility of resources among them.

⁷ Mobility acts as a perfect substitute for trade as it affects factor prices in a similar way, and according to Porto (2003) becomes a fundamental theoretical piece demonstrated by Mundell in 1957.

Spatial economy, under the light of the New Economic Geography and also the modern theory of growth, has demonstrated that in a scenario as the one previously described, mobility and trade give way to processes of “cumulative causation” and economic polarization with territorial manifestations (Fujita et al. 1999). Under the light of these perspectives, the existence of increasing returns and transportation costs originate processes of agglomeration of the economic activity, in which some regions attract resources while others drive them out⁸. This explains how regions evolve, creating cumulative and dynamic advantages, associated with the supply of resources such as technology and innovation, physical capital, infrastructure and human capital (Stiglitz 1989). In a certain manner, this are the principal factors that intervene in a productivity increase, all associated with growth and agglomeration.

Lets take a moment to see a part of the mechanism. It's known that scale economies generate important incentives for a given level of demand be covered by an only plant. If there were no transportation costs, firms would be indifferent regarding the placement of this plant, so agglomeration processes would not occur. Nevertheless, when these are considered, firms design strategies to reduce them. One such strategy is to move to the areas where the biggest markets are. If this behavior is followed by all firms, the small initial differences in the distribution of economic activities become big.

Therefore, it makes sense that some regions gain at the expense of others, and that they remain able to keep a sustainable growth by attracting resources, giving meaning to competitiveness. For a certain level of demand, and under a full employment situation, the result of this process is of zero sum. The previous statement means that the most successful regions would be those with high growth rates that are due to an increase of accumulation rates, and due to the efficient assignation of resources towards the activities with the highest production levels, and/or to the activities with a significant weight on externalities, clusters, complementarities and factors with increasing returns: human

⁸ The approaches about cumulative causation, and the uneven character of the economic and regional development process are found among the old ideas of Myrdal, Perroux and others.

capital, innovation, public capital, etc. Frequently, these regions are the ones with the highest levels in the competitiveness rankings for Colombia and other countries. However, this is a result that in the first stages is natural to economic functioning and not to firms', or regions', strategies, nor to public policies, even if they somehow can contribute to agglomeration.

Nevertheless, in advanced development phases, in regions with advantages in terms of the availability of factors with increasing returns and of capital and quality institutions, dispersion forces begin to operate: high prices for non-mobile factors, negative external economies related with the congestion and contamination. In such circumstances there is an expulsion of the economic activity that generates the competition among other regions in a country. However, the geographical proximity of some regions to the center is a factor that can limit inter-regional competition for resources, and can contribute to increasing the capacity of the central regions to attract them. This is basically explained by the interaction between the market potential of the central regions, pecuniary and technological externalities, and geographical proximity. The previous is the support of the famous "concentrated deconcentration," in which firms that come out of the center relocate near it, as they value proximity, more than the possibility of completely avoiding the centrifuge forces, and limit their power as a result. For this reason, regions nearer the center are expected to be the most competitive and, differently from Porter's approach, the behavior and strategies of firms are not independent from the advantages of market access and resource availability, and in particular of geographical factors, and infrastructure and telecommunication factors.

It is necessary to mention that, in the case of a major reduction of transportation costs due to improvements to road infrastructure and services, and only in the case that some of the periphery locations have the previously mentioned favorable conditions concerning physical and human capital and institutions, resources will abandon the central locations attracted to this type of regions. As a conclusion, the message is clear: Regional competitiveness is not general phenomena, but a limited one where it gains logic as a matter closely related to firms' spatial strategies, and articulated with regional

governments' public policy actions concerning the improvement of the supply and the quality of productive factors.

2. External Resources Mobility

Because of globalization and economic openness, flows of trade and investment have intensified and regions have inserted themselves in the international scenario. For this reason, some observations, regarding the problem of competition in relation to foreign investment, are necessary.

An important part of the flow of productive resources among countries and regions is due to direct foreign investment under two basic modalities: vertical and horizontal (Navaretti et al. 2004). The first modality is linked to the fragmentation of production processes of a multinational firms⁹. The second is linked with the replication of its production processes in other countries. Now, if a multinational firm wants to invest in a country, a situation in which all its regions can receive this productive resources emerges. When a region receives these resources, the others perceive an opportunity cost and, in this manner, one of the regions increases its level of income in comparison with the remaining regions. Then, the key question is: Given the types of direct foreign investment, which factors determine that a multinational firms invests in a particular region and not in another?

It is obvious that for foreign investment dedicated to the production of primary goods, agricultural or mining, there aren't alternatives for localization. The former is fundamentally determined by physical geography and, particularly, by the channels through which productivity is transmitted: soil quality, topography, climate, and access to markets. All, but the last factor which can be affected by supply and infrastructure quality, are considered exogenous factors and, therefore, are far away from being controlled (Rodrik, 2003, Gallup, 1998). As a consequence, the notion of regional competitiveness loses meaning in this case.

⁹ Nearly one third of all the exports of the United States, and 42% of all its imports, are sales from one multinational firms division to another.

On the contrary, multinational firms with manufacturing vocations which spatially fragment their processes, (in other words, which integrate their investment vertically), locate their production phases according to the intensity in the use of the resources, and the endowments in the different regions. For instance, multinationals look to minimize their labor costs in developing countries, locating processes that are labor intensive. However, fragmentation implies assuming the costs of transporting the goods between different countries as they go through the different production phases. This forces firms to carefully consider their location to minimize transportation costs. Therefore, we have that the regions offering advantages in these terms, will also be the most competitive. These type of advantages results from the interaction between the physical geography, and the transportation and telecommunications infrastructure. In this type of situation, competitiveness policies make sense if they center on strengthening infrastructure.

Through the horizontal foreign direct investment (HFDI), multinational firms supply given demand levels in a foreign country. Under the presence of scale economies and transport costs of merchandises between regions, assumptions extensively used in HFDI literature (Navaretti et al. 2004), firms would locate themselves in regions with the biggest markets, duet to the reasons previously presented in the framework of resource mobility at an inter-regional level.

Finally, it is important to recognize the role of the physical geography and of institutions to increase the capacity of regions to attract resources. First, we remark the fact that those regions with extreme conditions for the human life have low probabilities of attracting resources. On this regard, Nuñez and Sanchez (2000) suggest that geography affects the economic activity of municipalities in Colombia via: soil productivity, natural resource availability and tropical diseases. Second, the successful development of any type of economic activity depends on the institutional framework in which it happens and, therefore, institutional quality is a determinant factor for investment to settle in a region.

II. Competitiveness Measurement Problems: Critical Literature Review

The validity and the strength of a competitiveness measure, at a regional scale in this case, depends of the consistency of the analytical framework supporting its construction, of the measurements' coherence with the analytical framework, and of the adopted methodology (Lall, 2001).

The pertinence of the analytical framework depends of a clear and precise definition of the scenario in which regions compete, and also of the market failures that imply economic conflicts among the regions; otherwise, one would simply be presenting a regional growth analysis (Lall 2001). In addition, the theoretical rigor of the framework depends that the scenarios and the failures being considered and evaluated under the light of the economic theory.

The coherence between the measure and the framework depends on selecting a set of variables that are consistent with the framework. Finally, methodological strength depends on the use of proper statistical techniques that eliminate, or reduce, the possible biases.

Paper's such as Lall's (2001), indicate some of the problems and inconsistencies presented by the measurements, for a numerous and diverse set of countries, done by the World Economic Forum (WEF) , and the International Institute for Management Development (IMD). The principal papers about the competitiveness of Colombia departments -CRECE (2002), CID (2002), CIE-UdeA (2006), and CEPAL (2007) – have adopted procedures that, to our judgment, are similar to those of the questioned studies.

For instance, Lall shows that the WEF's notion and measurement of competitiveness have problems due to the absence of a framework that identifies market failures that imply economic conflicts among countries. In another paper, Krugman (1995) shows how the most accepted definition of competitiveness, *at country level*, is nothing but a “fun” way to denominate productivity, and in this manner questions the construction of indexes at this level. On another front, the measurement made by the IMD also has

problems as it does not keep a close relationship with the chosen conceptualization, which in turn is based on the four forces of competitiveness argued by Porter.

Studies in Colombia, in line with those of the IMD and WEF, consider a numerous and diverse set of variables and factors. Among the most representative factors are those of: infrastructure and information technologies, government and institutions. Also considered are: internationalization, business management, finances, human resources, science and technology, the environment, and the economy's strength. In our judgment, some of these can be considered expressions of the agglomeration degree of the economic activity as, the dense labor markets with the highest qualification levels, the most dynamic and profound financial systems, and the research centers, tend to concentrate in the cities and regions with the highest degrees of economic activity. The internationalization factor has to do with commercial aspects which, according to the argument in the previous section, reflect the specialization of Colombian regions and, therefore, do not imply inter-regional competition. Finally, aspects such as business management do not seem to have a solid justification from the economic theory to explain competitiveness.

Only the studies of the CID, and of the CIE-UdeA, include variables and factors of a spatial and geographic nature, as do the papers of Houvari (2001) and Kronthaler (2003), for Finland and Germany, as one of the particular elements that differentiates regions from countries. This is a conceptually and methodologically advance because imply the adoption of an economic geography approach that identifies the factors which are a source of increasing returns, or that are closely linked with agglomeration, pecuniary and technological externalities, market potential, human and public capital, etc.

We have, therefore, that rankings in Colombia have been constructed with redundant factors, and factors are themselves composed of a large number of variables. This, according to Kitson et al. (2004) results in problems of over-prescription of policies. Furthermore, there is no compatibility between the aggregation levels of variables with those of a cluster, which correspond with a modality of organization conceptualization that is not always associated with a particular region. On this regard, we need to remark

that neither regions nor countries are identified with clusters. Finally, we observed that these indexes, more than the competitiveness of similar regions, reflect the persistence of forces towards concentration and a pattern of spatial specialization in agreement with factor endowment which also explains territorial imbalances.

Another interesting point deals with the calculation of the weights associated with the factors and variables that compose the competitiveness measurements. Most rankings found in literature for Colombia and other countries – IMD (2006), WEF (2008), CRECE (2002), CEPAL (2002), CEPAL (2007), Regional Studies Group (2006), and CID (2002) – have been obtained by weighting a determined number of factors, or variables, deemed relevant to the competitiveness of a region. These studies may differ according to the factors used but, with regards to the calculation of weights, most adopt the Principal Component Analysis (PCA), and occasionally complement it with the hierarchical clusters analysis.¹⁰ However, there are papers that do not use this methodologies. For instance, the CID's paper assumes subjective criteria about the weighting of variables and factors, without significant differences in the final results from those obtained by the CEPAL and the CRECE.

Naturally, the PCA option offers a clear advantage as the information contained in the statistics series, is the information that determines the degree of importance of a variable inside the index. Despite having advantages over the ad hoc weighting, due to its objectivity, as it is based on statistics and mathematical criteria, it presents some disadvantages that need to be mentioned. First, contrary to methods such as factor analysis, it requires of the ad hoc grouping of variables and factors according to economic intuition, empiric evidence, or the researcher's experience. Second, it can produce factor indicators that behave in an opposite manner, and contrary, to the predictions or intuitions of the economic theory. Then, for instance, one might have a situation with a ranking in which the regions with the highest levels of economic activity agglomeration, are also the ones with the worst institutional conditions. If this happens, the method necessarily assigns a weight with a negative sign to one of these two factors,

¹⁰ There is a short presentation of both methods in Appendix 1.

in such a manner that an improvement in said factor represents a worsening in the competitiveness index. For instance, this happens in the CEPAL's paper. Third, competitiveness rankings can be very unstable in relation with the introduction of factor or variable indicators. This means that the inclusion or exclusion of a variable in a factor, can produce a result that is completely different from that expected for the factor. Then, for instance, the exclusion of an indicator can result in a factor losing its statistical significance, or having an incidence on competitiveness contrary to the one predicted by theory or empiric evidence.

We conclude from this critical literature review that the attempts to improve competitiveness indicators, by increasing the number of variables and factors, are vane and expensive as they do not improve our knowledge of the topic, nor do they provide additional information to raise the quality of policies on this subject. Now, as competitiveness is associated with a relative measurement, indicators that reflect the situation of a political-administrative entity as a matter of factors with increasing returns must be built.

III An Alternative Proposal: Methodology and Results.

A. Methodological Proposal

Below, we present an alternative proposal to measure the competitiveness of Colombian departments which, in addition to being consistent with the conceptual framework developed in the first section and using less information than the measurements of other studies, produces results which are compatible with the predictions of economic theory and of empiric evidence about regional development in Colombia.

According to our judgment, a competitiveness indicator of this kind must be built from the following factors: a) the economic activity agglomeration degree which indicates the regions' strength or potential to attract productive resources, whether national or foreigner, and includes market failures such as scale economies and transportation costs;

b) access to markets, and road and transportation infrastructure, conditions which influence the cost of transporting goods abroad, keeping in mind market failures related to the costs of transporting a good from one country to another; c) the quality level of institutions that regulate property rights and private activities are conditions for the structural transformation of regions, and facilitate collective actions and the use of externalities and economies of agglomeration; d) the physical geographic conditions which affect human activities, particularly productivity and population well-being; and e) human capital as a factor of well-being, of productivity and innovation, and of technical change.

Considering the Colombian departments as the regions inside the country, and using a data base for 23 departments,¹¹ a competitiveness index was developed and clusters or conglomerates were established. The techniques used were principal components and hierarchical cluster analysis. Keeping in mind the theoretical elements discussed concerning competitiveness, five factors related to the concept were defined: Agglomeration and demand potential, transportation and communications infrastructure, physical geography, institutions and human capital. For each one of these factors a set of variables¹² was gathered and, using the technique of principal components, reduced in its dimensionality in a manner that only one variable is obtained at the end. This is the index providing information about the factor. A global competitiveness index was obtained by applying the same technique on the set of indexes calculated in the previous step, except on the one for institutions as it behaves contrarily to the other indexes considered¹³. The cluster analysis was applied to the complete set of variables. Bellow are the principal results.

¹¹ The departments considered were those that offered complete information about the variables used in the study. They were: Antioquia, Atlántico, Bogotá-Cundimarca, Bolívar, Boyacá, Caldas, Caquetá, Cauca, Cesar, Chocó, Córdoba, Guajira, Huila, Magdalena, Meta, Narino, Norte de Santander, Quindío, Risaralda, Santander, Sucre, Tolima and Valle del Cauca.

¹² The variables correspond to 2005. For more details about the variables and indicators contemplated for the measurement of different factors, see Appendix 3.

¹³ This, as previously explained in the previous section, creates serious problems in its interpretation in the global index (an index that includes this factor suggests that the lower the institutional quality is in a department, indicates a signal of higher competitiveness.)

B. Results: Competitiveness Index and Cluster Analysis for Colombian Departments

1. Agglomeration Factor

Probably the most significant fact observed in the ranking developed from the agglomeration index (see graph 1), is that Bogotá-Cundinamarca sits on the first place, very far from all the other regions. This observation is coherent with the results of the most recent studies related with the distribution of economic activity inside the country that shows how the Bogotá-Cundinamarca region has been gaining relative weight¹⁴. According to our discussion, this is the region that generates the most strong inertia to attract national firms (under the dynamic of spatial economy), and multinational firms (under the dynamic of HFDI). By agglomerating the larger part of the country's economic activity, it is also the region that offers the largest market potential for the non-tradable sectors. This implies that it has the largest number of hotels, shopping centers, store chains, etc., and the largest possibility for these activities to increase.

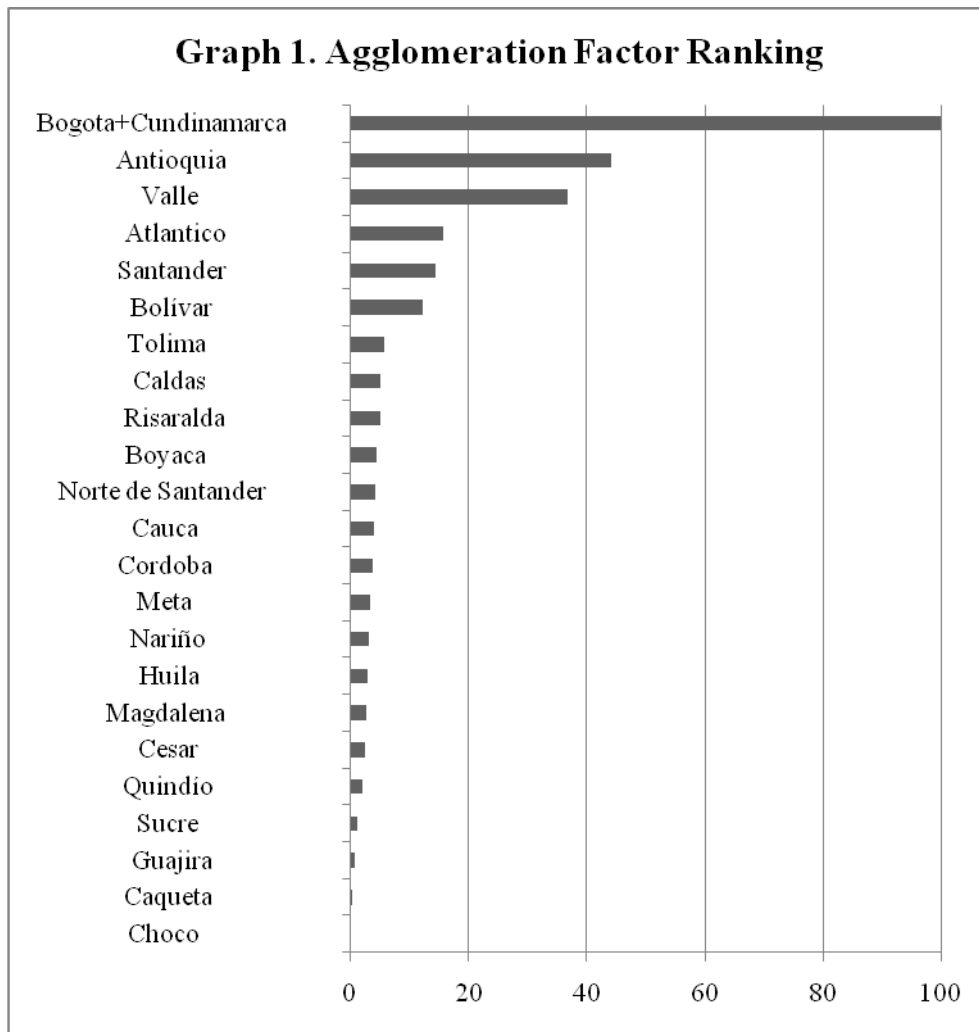
This region is followed by Antioquia and Valle, with a small advantage of the first department over the second. According to Moncayo (2007), both of these departments have lost relative weight, which clearly indicates a tendency towards the strengthening of Bogotá-Cundinamarca. It is important to point out that Valle has traditionally been a more dynamic region, in terms of the reception of foreign direct investment (FDI), than Antioquia and it also has some advantages over Antioquia because of its geographical location and for its Port of Buenaventura.

Positions 4th, 5th and 6th on the ranking of this factor are occupied by Atlántico, Bolívar and Santander, three departments that do not show big differences among themselves. Santander makes part of the “Trapecio Andino¹⁵,” which represented 60% of the country's Gross Domestic Product in 2000 (Moncayo 2007). Additionally, although Atlántico has lost weight, gained by Bolívar, on the economic development of the

¹⁴ Baron (2003), Bonet and Meisel (2006), and Lotero (2007.)

¹⁵ With Valle, Antioquia and Bogotá-Cundinamarca

country it remains as the fourth economic and population agglomeration. The middle positions are occupied by a large number of departments with no-major differences among each other: Magdalena, Córdoba, Huila, Sucre, Caldas, Risaralda, Tolima, Cesar and Boyacá.. In the lasts places we have Quindío, Meta, Cauca, Chocó Guajira Nariño and Caquetá wich conform the group of economies of small economic and population agglomeration.



Source: Own calculations

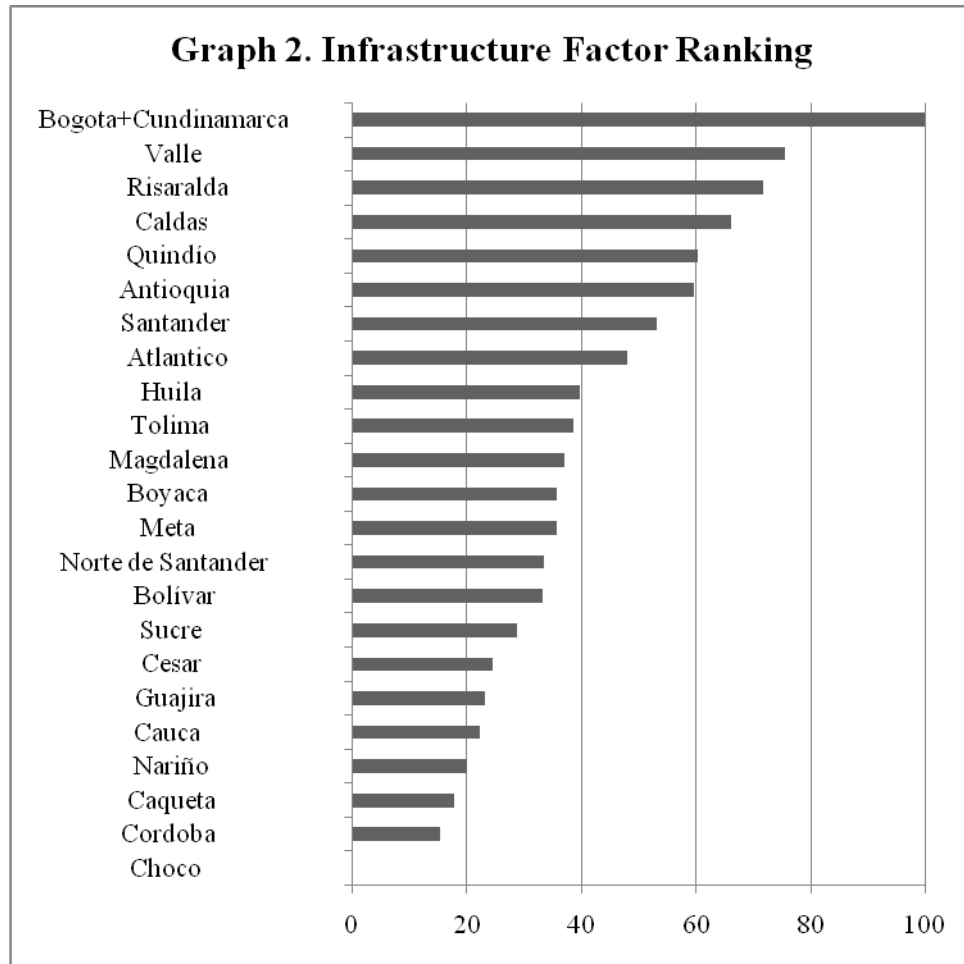
2. *Transportation and Telecommunications Infrastructure Factor*

As with the previous factor, a clear superiority of Bogotá-Cundinamarca over the rest of the regions-departments is observed (see Graph 2). The following seven positions corresponds to the departments of Valle, Risaralda, Caldas, Quindio, Antioquia, Santander and Atlántico. Of the latter seven, Valle, Antioquia, Atlántico, Caldas and Santander, are also among the seven positions following Bogotá-Cundinamarca, in the agglomeration factor. This indicates a close relationship between the two factors.

The importance of the “Eje Cafetero” needs to be remarked. This importance is explained by its geo-strategic localization as a communication node among the commercial flows of the three most important economies in the country (Bogotá-Cundinamarca, Antioquia and Valle) that allowed a development of his road infrastructure along the primary roads of the national road network. An additional advantage lies on the fact that these departments are small, which implies a stronger impact of said network than in other departments¹⁶.

A high correlation (0.83) between this factor and the agglomeration factor is also observed. This can be explained by the fact that the most dense and economically dynamic markets require a bigger road and telecommunications infrastructure *in their interior*. The correlation between the factors is not higher as, in addition to road infrastructure serving the region’s interior, the infrastructure that connects the region to other regions and to the world is also considered.

¹⁶ This is contrary to departments such as Antioquia, whose territorial extension minimizes the importance of the primary roads of the national network and the development of secondary roads along it, creating in this manner the low indicator levels concerning road infrastructure coverage.

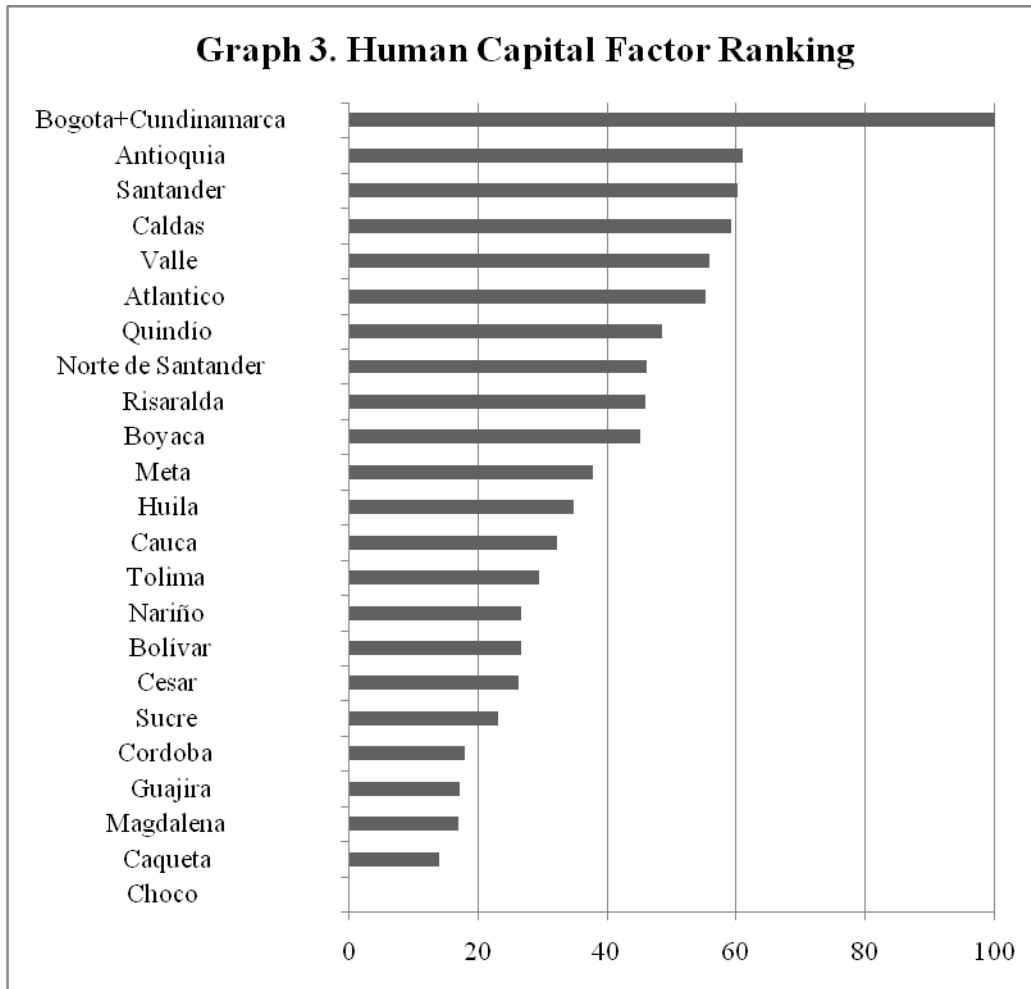


Source: Own calculations

3. *Human Capital*

The Bogotá-Cundinamarca region occupies the first place in this factor (see Graph 3) quite far from the other departments. This is the only region that comes close to the idea of innovation poles with intensive production processes of human capital and technological innovation. This region is followed by Antioquia, Santander, Caldas, Atlantico and Valle. Caldas comes in fourth place as it is a region where a good number of universities and research centers have established as a result of departmental and municipal (Municipality of Manizales) policies for consolidation of higher education. A third group above the national average is formed by Risaralda, Quindio, Boyaca and

Norte de Santander. Finally, we must remark that the last places are occupied by the departments on the Caribbean Coast, as said macro-region faces a big challenge with regards to its human capital and innovation.

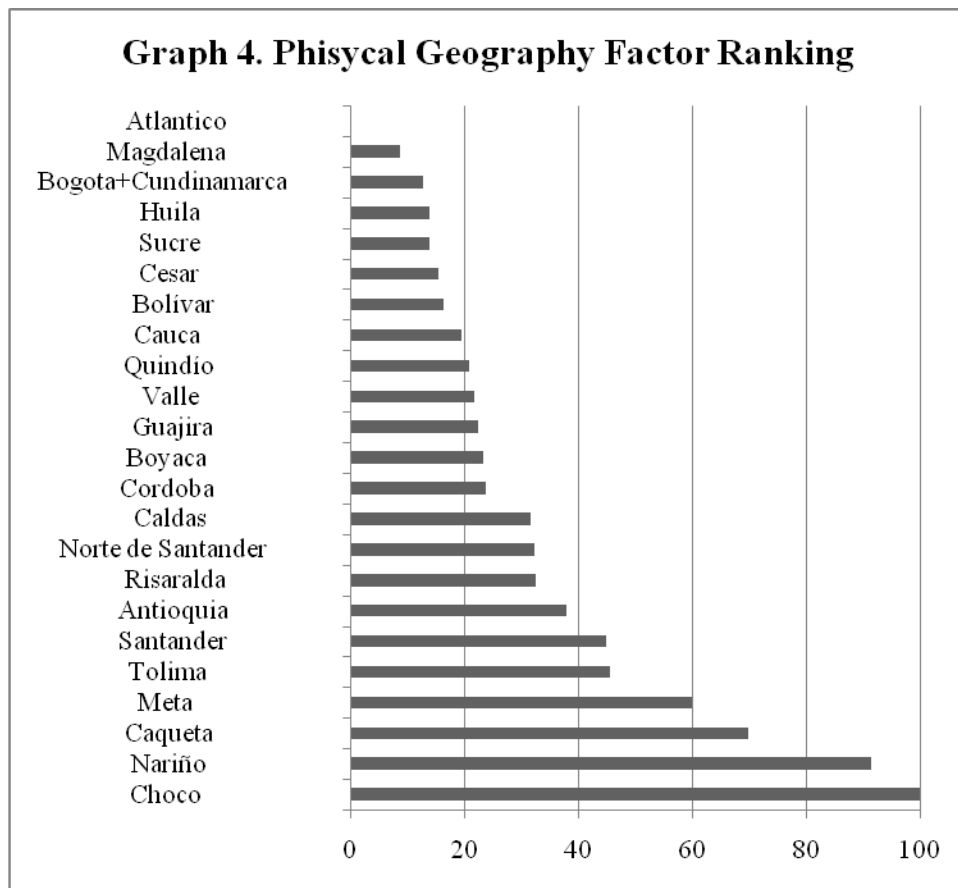


Source: Own calculations

4 *Physical Geography*

This factor is made up by the variables of malaria, leishmaniasis, rain precipitations and tropical forests. This means that having a high value in this index implies having a high value on these variables and, therefore, less capacity of attraction of economic activities that are not intensive on natural resources. As observed (see Graph 4), the regions with the highest extensions of tropical forests (Choco, Narino, Caqueta) show a higher index

value. This is not surprising as they are closely related with rainfall and tropical diseases. On the contrary, Atlántico, Magdalena and Bogotá-Cundinamarca show the lowest values and, as a result, are the most competitive regions in terms of first nature geography. The privileged locations of Bogotá and Atlántico could be the ultimate cause of the localization and agglomeration of economic activity there. Even today, it gives them a privileged situation in comparison with other regions.



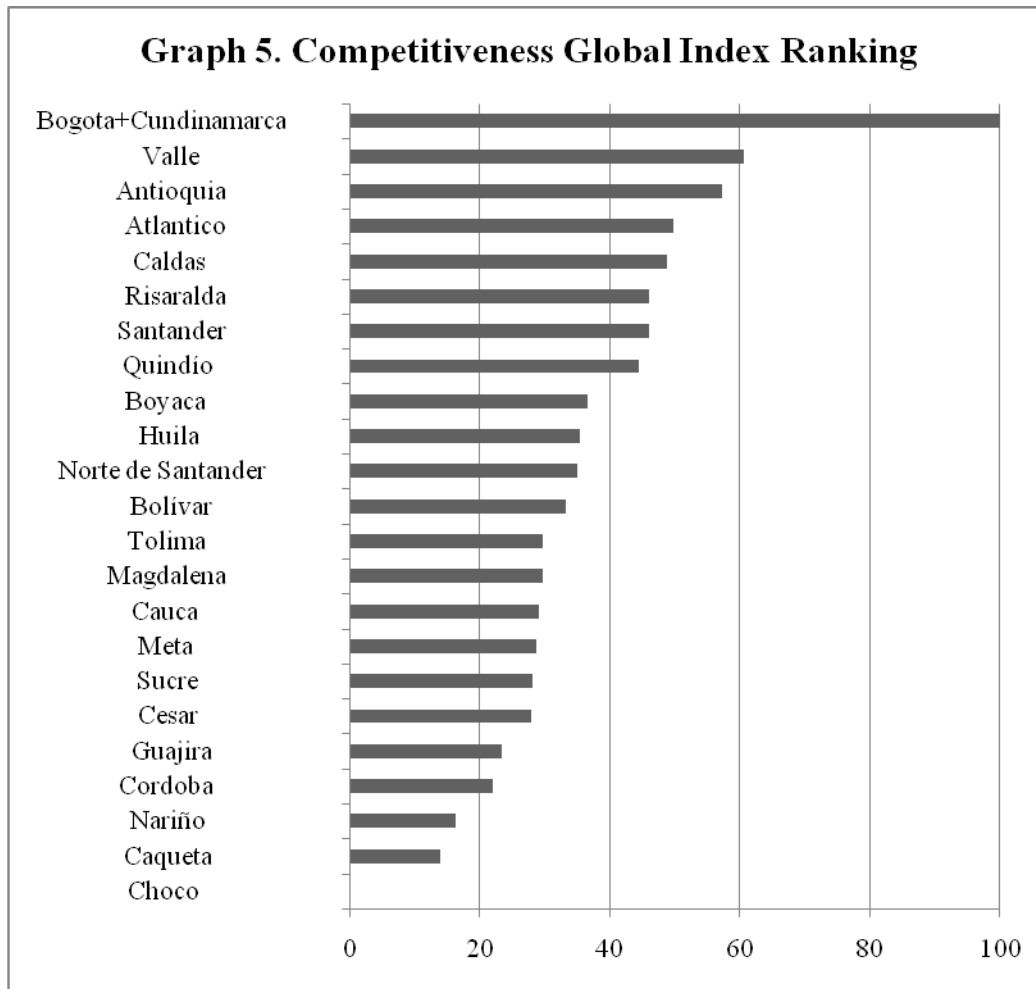
Source: Own calculations

Departments such as Antioquia and Santander, important in the national economic ambit, do not show a good performance on this index as, in their interior, there is great variety of soils, climates and vegetations. There, attractive conditions and climates for the settlement of cities (such is the case of the Aburra Valley) coexist with places that offer adverse conditions for investment and productivity increases.

5 *Regional Competitiveness Global Index*

Just as observed in the rankings of agglomeration, infrastructure, and human capital, the superiority of the Bogotá-Cundinamarca region, over the rest of the departments (see Graph 5), is clear. The great capacity that this region has to attract productive resources through the inertias generated by the agglomeration, by the advantages provided by its infrastructure, and by the suitability of its physical geography, is confirmed. Following Bogotá-Cundinamarca are, once again, Valle and Antioquia, with a small lead for Valle which has a higher infrastructure index. Next, on the 4th, 5th, 6th, and 7th positions are Atlántico, Caldas, Risaralda and Santander, respectively. These last four departments do not show significant differences among themselves. As expected, the most competitive departments sit on the highest places of the indexes of agglomeration and infrastructure, as these are the factors with the biggest weight on the global index (see Table 1).

The results of our index show that the center regions, those with a higher degree of economic activities agglomeration, are the ones that attract the most resources and, therefore, the most competitive. This coincides with the studies made by CEPAL, CID and CRECE (see Table 2). However, differently from those developed in these studies, our index uses few factors and few variables (see Appendix 3), which are closely related with our conceptual framework centered upon the New Economic Geography. This reinforces the idea that the other indexes use redundant factors and variables. This means nothing but the expression of a lack of conceptual, theoretical, and methodological precision regarding the topic of competitiveness, which we relate to the ability that a region has to attract resources. We conclude, therefore, that the attempts to improve competitiveness indicators by increasing the number of variables and factors, are vane and expensive as they do not improve our knowledge about the problem, nor do they provide additional information to raise the quality of policies on this subject.



Source: Own calculations

Table1. *Factors and weights of the competitiveness global index*

Factor	Weight
AGGLOMERATION	0.387334964
INFRASTRUCTURE	0.348313541
HUMAN CAPITAL	0.331003432
PHYSICAL GEOGRAPHY	-0.184225158

Source: Own calculations

Table2. *Competitiveness Rankings for Colombia*

Departamentos	CEPAL 2007	CID 2002	CRECE 2000	GER 2008
Antioquia	2	2	2	3
Atlántico	7	4	5	4
Bogotá	na.	1	1	na.
Bogotá-Cundinamarca	1	n.a.	n.a.	1
Bolívar	12	7	13	12
Boyacá	9	16	16	9
Caldas	5	12	6	5
Caquetá	n.a.	24	n.a.	22
Cauca	13	17	20	15
Cesar	18	14	19	18
Chocó	22	23	23	23
Córdoba	21	18	22	20
Cundinamarca	n.a.	9	9	n.a.
Guajira	16	10	14	19
Huila	11	20	15	10
Magdalena	17	15	18	14
Meta	14	6	10	16
Nariño	20	22	17	21
Norte Santander	15	13	12	11
Quindío	8	11	7	8
Risaralda	6	8	8	6
Santander	4	5	4	7
Sucre	19	21	21	17
Tolima	10	19	11	13
Valle	3	3	3	2

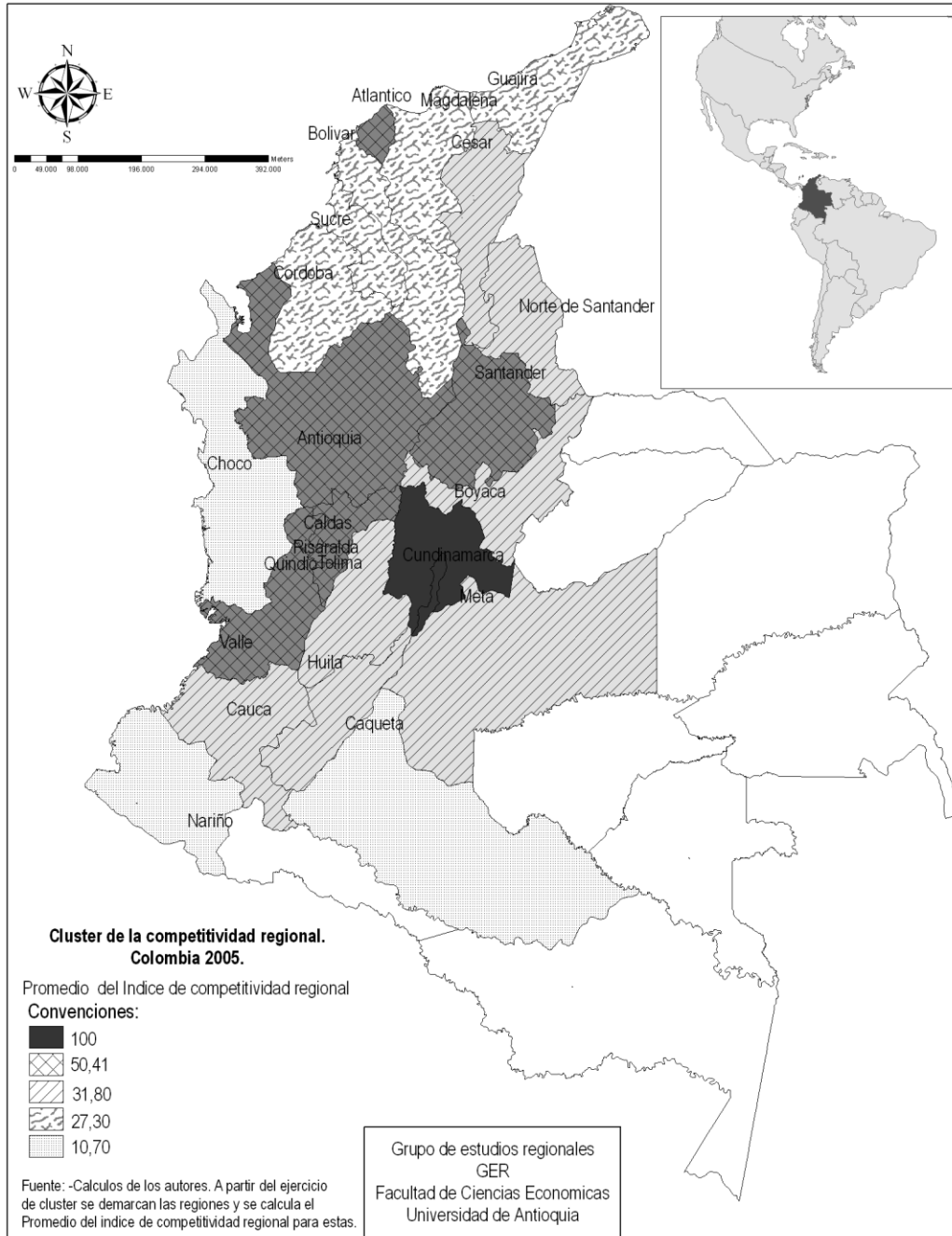
Source: CEPAL, CID, CRECE y Own calculations

6. Clusters' Analysis

A cluster's analysis apply to all the variables that compose our regional competitiveness index, enables us to identify five department clusters, or typologies, in the national territory¹⁷. The spatial distribution of the five clusters can be observed in Map 1, which permits recognizing a center periphery figure in Colombia's regional competitiveness.

¹⁷ See appendix 2 for the dendrogram of the groups and other specifications of the cluster's process.

Map 1. *Regional Competitiveness Clusters for Colombia 2005.*



Source: Own calculations

Table 3 shows the characteristics of each group or cluster according to the regional competitiveness factors and to the global ranking¹⁸. The differences between regions can be identified through this characterization.

Table 3. *Clusters Characterization Based on Factors*

Cluster	Agglomeration	Human Capital	Physical Geography	Infrastructure	Competitiveness
I. Bogotá	100	100	12,76	100	100
II. Antioquia, Atlántico, Valle, Caldas, Santander, Risaralda y Quindío.	17,63	55,12	27,04	62,14	50,41
III. Norte de Santander, Cauca, Tolima, Boyacá, Huila, Cesar, Meta.	3,93	35,99	29,96	32,91	31,8
IV. Guajira, Magdalena, Bolívar, Córdoba y Sucre.	4,18	20,42	17,02	27,58	27,3
V. Nariño, Choco, Caqueta.	1,17	13,63	87,08	12,62	10,07

Source: Own calculations

The first group is conformed exclusively by the Bogotá-Cundinamarca region. As previously stated, this region occupies the first place in all the rankings except in the physical geography factor (which affects competitiveness negatively). This leadership over the other places is pronounced and places the Bogotá-Cundinamarca region in a unique position in the country, far of a situation of competition with the other regions.

The second group is composed by traditional economy regions such as Antioquia, Valle and Atlántico, and also by the emerging regions located inside the “trapecio andino”: Risaralda, Caldas, Quindio and Santander. These regions have the highest levels of infrastructure (62.14), human capital (55.12), and agglomeration (17.63), after the

¹⁸ For each one of the different factor scores estimated in the document, an index, with values for each department oscillating between 0-100, was developed. Then, from the index matrix, the average of the departments that make up each region was calculated in order to obtain an index for each of them.

Bogotá-Cundinamarca region¹⁹. We must point out that, in terms of agglomeration, the difference between this group and the others is of four times. A gap that defines the disparity of the accumulation causation processes between the first two groups and the others.

The third cluster groups the departments that have common limits with traditional economies, and also have an institutional development which has brought upon better levels of human capital (35.9) and infrastructure (32.91), when compared with the latest two groups. This group is conformed, from south to north, by: Cauca, Tolima, Huila, Boyaca, Meta, Norte de Santander and Cesar.

The fourth group is conformed by the Caribbean Coast economies of: Bolivar, Sucre, Cordoba, Guajira and Magdalena. Atlántico is the exception as it is placed in cluster II. The geographical continuity of these departments groups them around the paradox of high levels of port infrastructure and low levels of road infrastructure, producing a low infrastructure result (27.52). On the other hand, their levels of human capital (20.42) and of agglomeration (4.18) are quite precarious to promote the levels of competitiveness.

The fifth cluster is conformed by Choco, Caqueta and Narino, the last three regions in the global ranking, characterized for having the lowest levels of agglomeration (1.17), of human capital (13.69), and of infrastructure (12.62). Furthermore, this group is conditioned, in an exogenous manner, by its first nature geography, as it sits on the first places of the geography ranking (87.08) and this implies that territorial conditions there are adverse to the development of economic activities. Therefore, these departments seem

¹⁹ Observing the dendogram (see appendix 2), one can deduct a difference in this macro-region in which Antioquia and Valle maintain a certain distance from the other group members. Said difference is evidenced in the agglomeration and infrastructure factors. In terms of the agglomeration ranking index, there is an enormous gap between Antioquia and Valle's average, 40.48, and the average of Santander, Risaralda, Quindio, Caldas and Atlantico, 8.49. In terms of the infrastructure ranking index, there are also some, not so large, differences. Here, the average of the traditional economies is 58.8 while the average for the other departments in the macro-region is 47.02. According to the cluster exercise, such disparity is statistically unjustifiable for the creation of another conglomerate. This means that said distance is minimal with regards to the distances between groups defined in the exercise. However, we want to emphasize this fact with the objective of not creating the erroneous conclusion that the semi-leader economies, such as Antioquia's and Valle's, have been completely caught up by the other emerging economies such as Quindio, Risaralda, Caldas, Atlantico and Santander.

to be destined to be weak economies without expectations of improving their competitiveness levels.

Conclusions

The concept and measurement of regional competitiveness are analyzed in this article under the light of the old and the new trade theory and of the New Economic Geography. The analysis shows that competitiveness loses meaning when it is applied to the goods market, as regions interrelate through flows of inter-industry or intra-industry trade which implies the use of complementarities which in turn lead to the gains typical of this type of trade.

When the market for production factors is considered, and the existence of scale economies, externalities, clusters, cumulative learning and transportation costs are assumed, the regions' competitiveness for scarce resources, although limited, does not lose its meaning. The New Economic Geography has shown that, in a scenario as the one previously described, mobility and trade give way to processes of "cumulative causation" and economic polarization with territorial manifestations (Fujita et al. 1999), where some regions attract resources while others drive them out.

In order to establish a competitiveness ranking of the Colombian departments, four factors were defined and built for: agglomeration, infrastructure, human capital and physical geography; and the analysis techniques of principal components and hierarchical clusters, were employed. The results of our index show that the center regions, those with a higher degree of economic activities agglomeration, are the ones that attract the most resources and, therefore, the most competitive. This coincides with the studies made by CEPAL, CID and CRECE. However, differently from those developed in these studies, our index uses few factors and few variables, which are closely relate with our conceptual framework centered upon the New Economic Geography. This reinforces the idea that the other indexes use redundant factors and variables. This means nothing but the expression of a lack of conceptual, theoretical, and methodological precision

regarding the topic of competitiveness, which we relate to the ability that a region has to attract resources. We conclude, therefore, that the attempts to improve competitiveness indicators by increasing the number of variables and factors, are vane and expensive as they do not improve our knowledge about the problem, nor do they provide additional information to raise the quality of policies on this subject.

The previously stated facts reinforce the idea that thinking about general competitiveness policies may be incorrect. This is because agglomeration, as the principal resource drawing force, is the result of spontaneous economic processes which are quite difficult to change.

Finally, the cluster analysis suggests two aspects: One is the center periphery figure in Colombia's competitiveness, and the second is that competitiveness can become more relevant, among departments, inside small groups. This suggests that this concept is applied in a very restricted form. In this manner, growth and regional development policies (which usually include improvements to infrastructure, to human capital and to innovation processes) gain relevance.

BIBLIOGRAPHY

BALASSA, Bela (1966). "Tariff Reductions and Trade in Manufactures among the Industrial Countries", *American Economic Review*, Vol. 56, No.3, pp. 466-73.

BARÓN, Juan David (2003). "¿Qué sucedió con las disparidades económicas regionales en Colombia entre 1980 y el 2000?", *Documentos de trabajo sobre economía regional*, Banco de la República, Cartagena.

BONET, Jaime y MEISEL, Adolfo (2006). "Polarización del ingreso per cápita departamental en Colombia, 1975 – 2000", *Documentos de trabajo sobre economía regional*, Banco de la República, Cartagena.

BOUGRINE, Hassan (2001). "Competitividad y comercio exterior", *Revista Comercio Exterior*, Vol. 51, No. 9. Sept.

CEPAL (2007). Escalafón de la competitividad de los departamentos colombianos, disponible en: <http://www.cepal.org/publicaciones/xml/3/29973/LCL.2684-P.pdf>.

CEPAL (2002). “Escalafón de la competitividad de los departamentos colombianos”. Informe final, diciembre.

CID (2002). Sistema de indicadores de competitividad departamental SICD, *Informe Final al Ministerio de Comercio Exterior*, Bogotá.

CONTI, Sergio (1995). Four paradigms of the enterprise system, en Sergio Conti; Edward Malecki y Oinas, Päivi. (comp) “The industrial enterprise and its environment: spatial perspectives”, Hong Kong, Singapore, Sydney. Avebury.

CRECE (2002). “Ranking de competitividad de los departamentos colombianos”, *Observatorio de la Competitividad de Caldas*, disponible en: <http://www.recintodelpensamiento.com/crece/public.asp>.

CUERVO, Luis y GONZÁLEZ, Josefina (1997). “*Industria y ciudades en la era de la mundialización. Un enfoque socio espacial*”, Tercer Mundo Editores, Bogotá.

FALVEY, Rodney y KIERZKOWSKI, Henryk (1987). Product Quality, Intra-Industry Trade and (Im)perfect Competition, in Henry Kierzkowski, ed., “Protection and Competition in International Trade”, Oxford: Basil Backwell.

FESER, Edward; KOO, Kyojun; RENSKI, Henry y SWEENEY, Stewart (2001). “Incorporating Spatial Analysis in Applied Industry Cluster Studies”. Prepared for the Economic Development Quaterly, University of North Carolina.

FUJITA, Masahisa; KRUGMAN, Paul and, VENABLES, Anthony (1999). *The spatial economy: Cities, regions and international trade*. MIT Press, Cambridge MA

GALLUP, John L. (1998). Geography and economic development *en* Boris Pleskovic, Joseph Stiglitz ed., “Annual World Bank Conference on Development economics. Washington”, World Bank.

GER (2006). *Indicadores de Competitividad de Antioquia y sus Regiones*. Medellín, Centro de Investigaciones Económicas (CIE).

GREENAWAY, David; HINE, Robert y MILNER Chris (1995). “Vertical and Horizontal Intra-Industry Trade: A Cross Industry Analysis for the United Kingdom”, *The Economic Journal*, Vol. 105, No. 433, Nov1995, pp. 1505-1518.

GREENAWAY, David y MILNER Chris (1983). “On the Measurement of Intra-industry Trade”, *The Economic Journal*, No. 372, Dec 1983, pp.900-908.

GRUBEL, Herbert (1967). “Intra-Industry Specialization and the Pattern of Trade”, *The Canadian Journal of Economics and Political Science*, Vol. 33, No. 3, pp. 374-388.

GRUBEL Herbert y LLOYD Peter (1975). *Intra-Industry Trade: the Theory and Measurement of Intra-Industry Trade in Differentiated Products*, London: The Macmillan Press Ltd.

HAQUE, Irfan (1995). “*Trade, Technology and International Competitiveness*”, The World Bank, Washington, D.C.

HOUVARI, Janne; KANGASHARJU, Aki y ALANEN, Aku (2001). “Constructing an Index for Regional Competitiveness”, *Pellervo Economic Research Institute Working Papers*, No: 44, Helsinki. June 2001.

HOUVARI, Janne; KANGASHARJU, Aki y ALANEN, Aku (2000). “Regional Competitiveness in Finland”, *ERSA 40th European Congress*, August – September.

INTERNATIONAL INSTITUTE FOR MANAGEMENT DEVELOPMENT (2006). *The World Competitiveness Yearbook*. Switzerland. IMD.

KITSON, Michael; MARTIN, Ron and TYLER, Peter (2004). “Regional Competitiveness: An Elusive yet Key Concept?”, *Regional Studies*, Vol. 38.9, pp. 991-999, December 2004.

KRONTHALER, FRANZ (2003). “A study of the competitiveness of regions based on cluster analysis, the example of East Germany”, *Halle Institute for Economic Research*, Halle.

KRUGMAN, Paul (1979). “Increasing Returns, Monopolistic Competition and International Trade”, *Journal of International Economics*, Vol. 9, No. 4, pp. 469-480.

KRUGMAN, Paul (1981). “Intraindustry Specialization and the Gains from Trade”, *Journal of Political Economy*, Vol. 89, No. 5, Oct 1981, pp. 959-973.

KRUGMAN, Paul (1980). “Scale Economies, Product Differentiation, and the Pattern of Trade”, *American Economic Review*, Vol. 70, No. 5, Dec. 1980, pp. 950-959.

KRUGMAN, Paul y Obstfeld, Maurice (2002). *Economía Internacional: teoría y política*, 5 edición. Editorial Espana : Addison-Wesley, 2002.

KRUGMAN, Paul (1998). *Desarrollo, geografía y teoría económica*. Barcelona. Editorial Antoni Bosch.

KRUGMAN, Paul (1995). *Geografía y Comercio*. Barcelona. Editorial Antoni Bosch.

KRUGMAN, Paul (1995). “Competitividad una Peligrosa Obsesión” en: *Internacionalismo Pop*. Bogotá. Editorial Norma.

LALL, Sanjaya (2001). “Comparing National Competitive Performance: An Economic Analysis of World Economic Forum Competitiveness Index”, *QEH Working Paper – QEHWPS6*, No. 61.

LOTERO, Jorge (2005). “Ajustes productivos y espaciales de la industria colombiana en el marco de la apertura comercial: una aproximación desde la geografía económica”, *Lecturas de Economía*, No 66.

LOTERO, Jorge; MORENO, Ana y VALENCIA, Mauricio (2005). “La competitividad: aproximación conceptual desde la teoría del crecimiento y la geografía económica”, *Borradores del CIE*, No 13, Medellín.

LOTERO, Jorge (2007). “Desarrollo y Competitividad Industrial en las Regiones y Departamentos Colombianos durante la Integración de los 90”, *Mimeo*, Universidad de Antioquia, Medellín.

MONCAYO, Edgar (2003). “Nuevas teorías y enfoques conceptuales sobre el desarrollo regional: ¿hacia un nuevo paradigma?”, *Revista de Economía Institucional*, No. 8, pp. 32-65.

MONCAYO, Edgar. (2008). *Dinámicas regionales de la industrialización. Análisis comparativo de Cundinamarca y Bogota DC*, Centro de investigaciones y estudios universidad central (CIES), abril.

MORENO, Ana (2006). “Diferencias cuantitativas y cualitativas en el proceso de inserción internacional de la industria de las regiones colombianas”, Capítulo de libro por publicar.

MORENO, Ana y POSADA Héctor (2007). “Evolución del Comercio Intraindustrial entre las regiones colombianas y la Comunidad Andina, 1990-2004: un análisis comparativo”, *Lecturas de Economía*, No 66 (enero-junio), pp. 83-118.

MUNDELL, R.A. (1957). “International trade and factor mobility”, *American Economic Review*, No. 47.

NAVARETTI, Giorgio y VENABLES, Anthony (2004). *Multinational Firms in the World Economy*. Princeton University Press. Princeton and Oxford.

NORTH, Douglas (1990). *Instituciones, cambio institucional y desempeño económico*, México, Editorial Fondo de Cultura Económica.

NUÑEZ, Jairo y SANCHEZ Fabio (2000). “Geography and Economic Development in Colombia: A Municipal Approach”, *Research Network Working Paper*, #R-408. Inter-American Development Bank.

PARRA, Juan Carlos (2008). “Hechos Estilizados de la Economía Colombiana: Fundamentos Empíricos para la Construcción y Evaluación de un Modelo DSGE”, *Borradores de Economía*, No. 509.

PERES, Wilson (Coordinador) (1997). *Políticas de competitividad industrial: América Latina y el Caribe en los años noventa*, Ed. México : Siglo XXI.

PORTER, Michael (1991). “*La ventaja competitiva de las naciones*”. Vergara, Buenos Aires.

PORTER, Michael (1998). “*Competitive Advantage: Creating and Sustaining Superior Performance*”, Simon & Schuster/Free Press.

PORTO, Natalia (2003). “Libre comercio, igualación del precio de los factores y turismo”, *Borrador, Departamento de Economía*, Universidad Nacional de la Plata

POSADA, Héctor; RAMÍREZ, Margarita y RUIZ, Dora (2005). “Comercio intraindustrial entre Colombia y Estados Unidos, 1998-2002”, *Revista Oikos*, No. 19, pp. 2-29.

PRESIDENT'S COMMISSION ON INDUSTRIAL COMPETITIVENESS (1985). *Commission on Industrial Competitiveness Report*. Washington D.C.

RODRIK, Dani (2003). *In search of prosperity: Introduction*, Princeton University Press,

WORLD ECONOMIC FORUM AND HARVARD UNIVERSITY (2008). "The global competitiveness report". En; <http://www.gcr.weforum.org/>

Appendix

Appendix 1. Analysis of Principal Components and Hierarchical Cluster Analysis

1. Analysis of Principal Components

Starting from a set of P variables $X = (x_1 \ x_2 \ \dots \ x_p)$ the analysis of principal components creates a new set of variables such that: the first variable (first principal component) explains, as much as possible, the variability of the set of original data. The following variables (the following components) explain as much as possible the remaining variability, and finally, these new variables are uncorrelated. Generally, this type of analysis is used with the purpose of reducing the dimensionality of data, using the fact that the first components drawn by the method recuperate a large proportion of the original data variability.

Let Ω be the matrix of correlations of $(x_1 \ x_2 \ \dots \ x_p)$. Assuming that the variables are standardized, the first principal component has the following form: $y_1 = Xa_1$, where X is of the order $n \times p$ and a_1 is of the order $p \times 1$. a_1 is selected in such a manner that y_1 retains the most part of the variance of the original data, subject to $a_1' a_1 = 1$. The previous occurs when a_1 is the eigenvector associated to λ_1 , which is the largest eigenvalue of Ω . Similarly defined is $y_2 = Xa_2$ (second component) with a maximum variance λ_2 , second biggest eigenvalue of Ω , and a_2 eigenvector associated to λ_2 .

The component y_j is built in the same manner. At the end, all the components obtained are uncorrelated among each other. The method's applicability depends on the existence of an adequate correlation structure among the variables, and there are various methods to detect this structure. Among the most important and used are: KMO Test, Barlett's test of sphericity, correlation matrix inspection, correlation matrix determinant inspection and Anti-image matrix inspection.

2. Hierarchical Cluster Analysis

Hierarchical Cluster Analysis (HCA) is a method that establishes groups of observations (conglomerates or clusters) inside a sample. In our cases, it allows us to establish a group of departments from the variables that characterize them. The criteria used for the grouping is distance. In this manner, observations that are near each other belong to the same group, and observations that are far from each other are placed in different groups. The construction of clusters can be made from the different distance measures and the different grouping methods. For instance, the measurement of Euclidian distance - that was used in this study - is calculated as a straight line between two groups, interval measures assume that variables are measured in scale, and counting measures assume they are discrete numbers. The formula for distance is given for:

$$d_{ij} = \sqrt{\sum_{k=1}^t (X_{ik} - X_{jk})^2}$$

where k are the different variables that measures the competitiveness.

After calculating the distances between two clusters, some grouping methods associate considering the pair of objects that is the closest between the clusters, or the pair of objects that is the farthest, or a hybrid between these methods. Ward's method was used for the clustering.

Appendix 2. *Dendogram and Related Statistics*

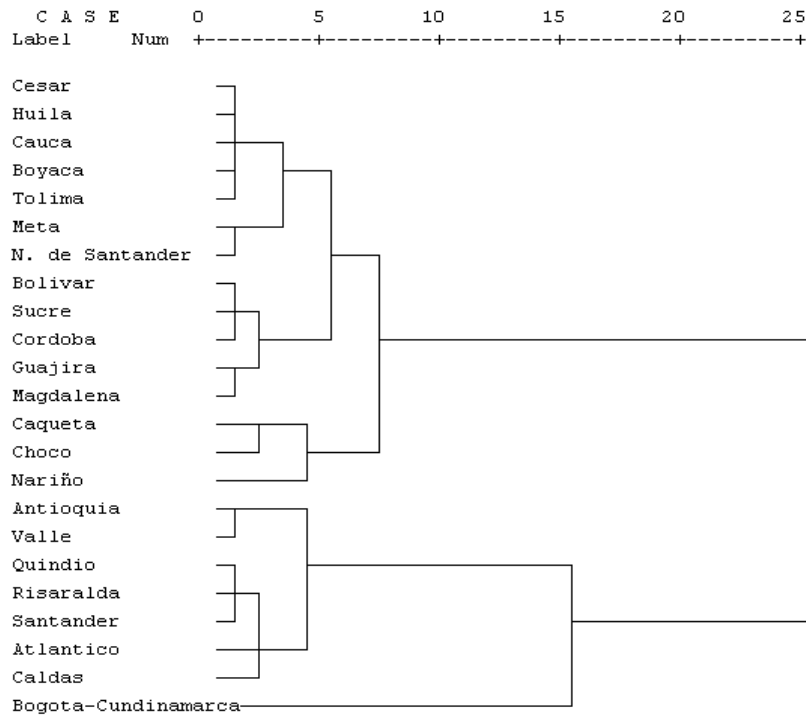
The dendogram is the result of a cluster analysis through a hierarchical agglomerative algorithm²⁰, in which each department starts as a set in itself, meaning 23 groups, and one by one begin to fuse until forming a single set. Then, depending on the distance between the groups, different groups can result. A minimum distance would produce 23 groups and a maximum distance would produce only one group. On this matter, the question of which the optimum number of cluster is, arises. The statistical analysis of the distance between the groups²¹, indicated that the optimum number is five conglomerates. This number maximizes the trade off presented by the analysis, where the less Euclidian distance between groups, the more homogeneity in the set. Nevertheless, this results in less synthesis capacity for the exercise as it produces many groups with few elements.

The five conglomerates mentioned in the article are identified upon reading the dendogram. Also observed, when reading from right to left, is the ramification of the dendogram. These are grouped into two basic region typologies: those with relatively high levels of regional competitiveness (conglomerates I and II,) and the regions left behind in the development of factors that define competitiveness and/or doomed because of their geography (conglomerates III, IV and V).

²⁰ A dendogram is the graphic representation of the cluster process. Departments are nodes which begin separated from each other and, according to the Euclidian distance between themselves, begin to form groups with each other. In this manner, the branches of the dendogram show the fusions given in the cluster, step by step, and the length of the branches indicates the minimal distances or differences that must be accepted for said fusion to occur. Therefore, a good cluster exercise must have groups with small branches so that the groupings show homogeneity among its members.

²¹ Agglomerated distance between clusters is the simplest test to determine the optimum number of clusters. This is calculated by the SPSS, and is defined as the distance between two groups that fused together plus the distance of the previous algorithms. A basic principle of cluster analysis is that a significant change in the series of agglomerated distances, indicates that the difference between the fused sets is relatively significant and, therefore, that it is time to stop the fusion in search for group homogeneity. See <http://biplot.usal.es/DOCTORADO/3CICLO/BIENIO-06-08/MetodosClasicos/exposicCluster.pdf>

Graph A2.1. *Dendrogram of Regional Competitiveness Clusters. Colombia 2005*



Appendix 3. Variables, factor and subfactors, of the competitiveness indexes for Colombia.

Table A3.1. Variables, factor and subfactors, of the competitiveness indexes for Colombia.

INSTITUTION	FACTOR	SUBFACTOR	VARIABLES
CEPAL 2007	Fortaleza económica	<i>Estructura económica</i>	<ul style="list-style-type: none"> ▪ PIB per cápita departamental ▪ Participación del PIB departamental en el PIB nacional ▪ Índice de especialización industrial ▪ Densidad empresarial.
		<i>Comercio internacional de bienes</i>	<ul style="list-style-type: none"> ▪ Coeficiente de internacionalización de mercados de exportación ▪ Diversificación de mercados de exportación ▪ Tasa de orientación exportadora no tradicional ▪ Diversificación de las exportaciones
		<i>Servicios financieros</i>	<ul style="list-style-type: none"> ▪ Establecimientos financieros per cápita ▪ Cartera per cápita ▪ Captaciones per cápita ▪ Cajeros electrónicos per cápita ▪ Cobertura de seguros (primas per cápita).
		<i>Social</i>	<ul style="list-style-type: none"> ▪ Índice de pobreza ▪ distribución del ingreso (Gini) ▪ población urbana sobre población total.
	Infraestructura	<i>Infraestructura básica</i>	<ul style="list-style-type: none"> ▪ Cobertura de telefonía ▪ Cobertura de energía ▪ Cobertura de alcantarillado ▪ Cobertura de acueducto
		<i>Infraestructura de transporte</i>	<ul style="list-style-type: none"> ▪ Red vial pavimentada por departamento ▪ Cubrimiento de vías pavimentadas departamentales
		<i>Infraestructura de las comunicaciones</i>	<ul style="list-style-type: none"> ▪ Penetración de internet
	Capital humano	<i>Educación</i>	<ul style="list-style-type: none"> ▪ Colegios de nivel alto superior y muy superior según el examen de estado como porcentaje del total ▪ Índice de logro educativo
		<i>Salud</i>	<ul style="list-style-type: none"> ▪ Personas afiliadas al régimen de salud por 100 habitantes
	Ciencia y tecnología	<i>Ambiente científico y tecnológico</i>	<ul style="list-style-type: none"> ▪ Docentes doctores por habitante ▪ Personal en I&D por habitante ▪ Centros de investigación por habitante ▪ Productos de C&T por habitante
	Finanzas públicas	<i>Índices de desempeño fiscal</i>	<ul style="list-style-type: none"> ▪ Indicador sintético de desempeño fiscal de los departamentos ▪ Indicador sintético de desempeño fiscal de las capitales de los departamentos

	Medio ambiente	Recurso hidrológico	<ul style="list-style-type: none"> ▪ Índice de oferta hidrológica ▪ Porcentaje de población en las cabeceras municipales con alto índice de escasez de agua ▪ Porcentaje de población en las cabeceras municipales vulnerables por disponibilidad de agua
		Actividades antropicos	<ul style="list-style-type: none"> ▪ Residuos sólidos por 10.000 hab ▪ Promedio municipal de demanda bioquímica de oxígeno (DBO) en las masas de agua ▪ Emisiones atmosféricas del sector industrial de Sox Nox CO ▪ PTS por habitante ▪ Cambio multitemporal de los agrosistemas (1986-1996) ▪ Porcentaje de la mortalidad por causas respiratorias
		Institucionalidad ambiental	<ul style="list-style-type: none"> ▪ Gasto ambiental por habitante
CID 2002	Infraestructura/Localización		<ul style="list-style-type: none"> ▪ Densidad vial ▪ Densidad puerto marítimo ▪ Densidad aeropuerto internacional ▪ Distancia mercado interior ▪ Líneas telefónicas/hab. ▪ Usuarios internet/hab. ▪ Costo energía ▪ Eficiencia uso energía ▪ Cobertura servicio agua ▪ Cobertura servicio alcantarillado
	Recursos naturales		<ul style="list-style-type: none"> ▪ Superficie cultivada ▪ Superficie forestal ▪ Minería ▪ Producción ▪ Longitud de costa ▪ Escasez de agua
	Capital humano y empleo		<ul style="list-style-type: none"> ▪ Población analfabeta ▪ Escolaridad superior ▪ Calidad de la educación ▪ Escolaridad población ocupada ▪ Productividad laboral ▪ Tasa de desempleo
	Empresas		<ul style="list-style-type: none"> ▪ Grandes empresas ▪ Empresarismo ▪ Activos empresariales ▪ Sector financiero/PIB ▪ Inversión privada/PIB ▪ Depósitos sistema financiero ▪ Productividad agrícola ▪ Cartera sistema financiero
	Innovación y tecnología		<ul style="list-style-type: none"> ▪ Inversión pública I&D ▪ Horas capacitación ▪ Trabajadores horas asesorías de empresas ▪ Docentes doctores

	Instituciones	<ul style="list-style-type: none"> ▪ Delitos contra la vida y seguridad ▪ Delitos contra la libertad individual ▪ Delitos contra patrimonio
	Gestión del gobierno	<ul style="list-style-type: none"> ▪ Ingresos/1000hab ▪ Inversión pública ▪ Inversión social ▪ Indicador de desempeño fiscal dpto ▪ Indicador de desempeño fiscal mpio ▪ Infraestructura
	Inserción en la economía mundial	<ul style="list-style-type: none"> ▪ Grado de apertura exportadora ▪ Grado de apertura total ▪ Exportaciones industriales/hab
CRECE 2000	Ciencia y tecnología	<ul style="list-style-type: none"> ▪ Productos de ciencia y tecnología ▪ Personal vinculado a I+D por cada 10 mil hab. ▪ Docentes con doctorado ▪ Números de centros de investigación ▪ Capacidad de oferta para desarrollo tecnológico ▪ Inversión en I+D en la industria ▪ Inversión en aseguramiento de la calidad ▪ Gasto publico en C&T por cada 10 mil habitantes
	Finanzas	<ul style="list-style-type: none"> ▪ Cartera per cápita ▪ Cobertura de seguros ▪ Cajeros electrónicos ▪ Profundización financiera ▪ Establecimientos financieros ▪ Margen de utilidad empresarial por departamento ▪ Razón corriente empresarial ▪ Nivel de endeudamiento empresarial
	Fortaleza económica	<ul style="list-style-type: none"> ▪ Población urbana sobre población total ▪ PIB per cápita departamental ▪ Índice de entrada de empresas ▪ Distribución del ingreso ▪ Índice de pobreza ▪ Participación del PIB departamental en el PIB nacional ▪ Índice de especialización industrial ▪ Crecimiento del PIB per cápita
	Administración	<ul style="list-style-type: none"> ▪ Productividad total de factores ▪ Dinámica de la productividad total ▪ Eficiencia de los procesos empresariales ▪ Prestaciones laborales en la industria ▪ Productividad laboral ▪ Remuneración en la industria al trabajo ▪ Dinámica de la productividad laboral
	Gobierno e instituciones	<ul style="list-style-type: none"> ▪ Fortaleza tributaria ▪ Dependencia de transferencias ▪ Ingresos tributarios per cápita departamental ▪ Cubrimiento de seguridad privada ▪ Ingresos no tributarios per cápita departamental ▪ Carga de la deuda ▪ Transferencias por situado fiscal per cápita ▪ Gasto en educación ▪ Ingresos corrientes/gastos corrientes

		<ul style="list-style-type: none"> ▪Gasto en salud en funcionamiento ▪Gasto en funcionamiento contra la vida y la integridad personal ▪Numero de veedurías ▪Gasto público total como porcentaje del PIB ▪Seguridad publica ▪Delitos contra la libertad individual y otras garantías ▪Gasto en infraestructura ▪Número de acuerdos de reestructuración de deuda ▪Regalías sobre ingresos totales 	<ul style="list-style-type: none"> ▪Gasto en funcionamiento ▪Delitos
	Infraestructura	<ul style="list-style-type: none"> ▪Cobertura de telefonía ▪Computadores con internet por cada 100 mil habitantes ▪Cubrimiento de vías pavimentadas departamentales ▪Red vial pavimentada por departamento ▪Cobertura de alcantarillado ▪Cobertura de acueducto ▪Conexiones RDSI por cada 100 mil habitantes ▪Cobertura de energía ▪Numero de camas por 10000 habitantes ▪Carga aérea por cada 10 mil habitantes ▪Proveedores de servicios de internet por cada 100 mil hab. ▪Inversión en tecnologías de la información y comunicaciones ▪Tarifa media de energía industrial 	
	Internacionalización	<ul style="list-style-type: none"> ▪Tasa de penetración de importaciones ▪Tasa de orientación exportadora no tradicional ▪Diversificación de las exportaciones ▪Coeficiente de internacionalización ▪Diversificación de mercados ▪Tasa de orientación exportadora total ▪Balanza comercial departamental/PIB departamental ▪Dinámica de las exportaciones ▪Crecimiento de las importaciones 	
	Medio Ambiente	<ul style="list-style-type: none"> ▪Delitos contra los recursos naturales y el medio ambiente ▪Demanda de agua ▪Residuos sólidos 	

	Recurso Humano		<ul style="list-style-type: none"> ▪Numero de persona con regímenes de salud por cada 1000 habitantes ▪Tasa de analfabetismo ▪Índice de logro educativo ▪Capacitación técnica laboral ▪Cobertura de educación superior ▪Calidad de los colegios ▪Cobertura en primaria y secundaria ▪Tasa de crecimiento de la población ▪Violencia intrafamiliar ▪Delitos contra la formación sexual ▪Tasa de ocupación ▪Relación alumno-profesor ▪Esperanza de vida al nacer
GRUPO DE ESTUDIOS REGIONALES 2008	Aglomeración		<ul style="list-style-type: none"> ▪Participación del PIB departamental en el PIB nacional ▪Participación de la industria departamental en la industria nacional ▪Participación de los servicios departamentales en los servicios nacionales, ▪Población en la ciudad principal
	Geografía física		<ul style="list-style-type: none"> ▪Leishmaniasis ▪Malaria falsiparum ▪Precipitaciones ▪Uso del suelo en bosques
	Capital humano		<ul style="list-style-type: none"> ▪Cobertura educación superior ▪Pruebas Icfes ▪Gastos de las empresas industriales en proyectos de I+D ▪Personal que se encuentra realizando actividades de investigación y desarrollo e ingeniería en la industria <ul style="list-style-type: none"> ▪Centros de desarrollo tecnológico ▪Investigadores por millón de habitantes
	Infraestructura		<ul style="list-style-type: none"> ▪Toneladas carga de exportaciones portuarias ▪Densidad vial total ▪Teledensidad <ul style="list-style-type: none"> ▪Penetración de internet ▪Índice de servicios públicos

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