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A competitiveness index for the regions of a country

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This article, which forms part of a comprehensive research project on measuring the level of competitiveness, sets out a proposal for developing an index to measure the competitiveness of the regions of a country. The aim is to develop a new approach to competitiveness, by measuring how resources and capacities are managed in a given region of a country, to generate a sustained increase in business productivity and the well-being of its population. The following pillars of the competitiveness of regions are identified: (i) government and institutions; (ii) economic development; (iii) productive infrastructure; (iv) human capital; and (v) business efficiency. For each of these pillars, five factors and their variables are identified to measure the various aspects of regional competitiveness. These represent a second and third level of disaggregation that enhance the analysis that can be made using the results obtained.

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I

Introduction

The competitiveness of the regions comprising a country play a major role in ensuring that efforts are targeted on achieving sustained development that improves the well-being of the population. How to measure the competitiveness of regions has been discussed in various studies, which identify some of the components needed to develop a methodological measurement proposal.

This article sets forth a proposal for developing a regional competitiveness index (RCI) for a country, as part of a comprehensive research project on measuring competitiveness.

With this index, the aim is to highlight a new approach to competitiveness, measuring how resources and capacities are managed in a given region of a country, to generate a sustained increase in business productivity and in the well-being of its population.

II

Competitiveness

Although the origins of the concept of competitiveness date back to trade theories that are over three centuries old, today there is no consensus on its definition, nor therefore on how to measure it.

The concept of competitive advantage is based on “productivity” and on the factors that determine this within an enterprise. Productivity is the relation between the output obtained from a system for producing goods and services and the resources used to obtain that output — in other words their efficient use, or the relation between the results obtained and the resources used and time taken to obtain them (D’Alessio, 2004, p. 223). This approach, which is broadly accepted from the standpoint of its constituent factors, was described by Prokopenko in 1972, in *Productivity Management, A Practical Handbook* (Prokopenko, 1972).

This vision of productivity was enhanced in the 1980s with the widespread dissemination of *Competitive Strategy: Techniques for Analysing Industries and Competition* (Porter, 2000), which develops a model for understanding industries and competition, and for formulating a global strategy. The model presents the five competitiveness factors that determine the attractiveness of an industrial sector, along with their causes, as well as those that change through time and can be modified through the strategy.

Porter (1999) proposes the competitive advantage approach as the value that a firm creates for its customers, over and above its costs. This value

corresponds to what individuals are willing to pay, and is best represented by the extent that supply prices are lower than those offered by the competition. This requires individuals to obtain equivalent benefits. The optimal strategy should reflect an adequate understanding of the business environment.

Although the origin of the concept of a nation’s competitiveness dates back to trade theories several centuries old, it was Porter (1991), in *The Competitive Advantage of Nations*, who laid the foundations and recognized changes in the environment and the instability of generic strategies, pointing out the need for more dynamic models for thinking about the competitive advantage of nations.

Krugman (1994) points out that competitiveness becomes irrelevant at the national level, since the leading countries are not competing with each other, so it is more a domestic issue of the nation in question than an external one. On this point, Porter (1991) argues that a nation’s competitiveness depends on the capacity of its industries to innovate and improve, and that certain firms are capable of doing so consistently, tirelessly seeking improvements and an ever better source of competitive advantage.

In his book *Economía urbana*, Camagni (2005) highlights the debate arising from the position adopted on international competitiveness by Krugman (1998, p. 5), which casts doubt on the idea that the prosperity of a country depends on its commercial success.

For Camagni (2005), the principle of comparative advantage cannot be applied when analysing competitiveness between local economies and inter-regional trade, since this theory is based on the concept of relative costs and prices that adjust because of a lack of mobility among productive factors, currency devaluation, and the downward rigidity of prices and wages in a situation of autarchy or isolation. Nonetheless, in the case of regional economies, there are factors that divert the principle of comparative advantage from its foundations:

- i) one cannot speak of autarchy or isolation: the link between average productivity and real wages is lost;
- ii) productive factors move between regions: a region that has an absolute disadvantage in all goods will display imbalances in the labour market owing to factor mobility. This region adjusts quicker through emigration and depopulation than through price adjustments; and
- iii) there is no regional currency or specific exchange-rate for each territory. Starting from a situation of equilibrium in which each region has an

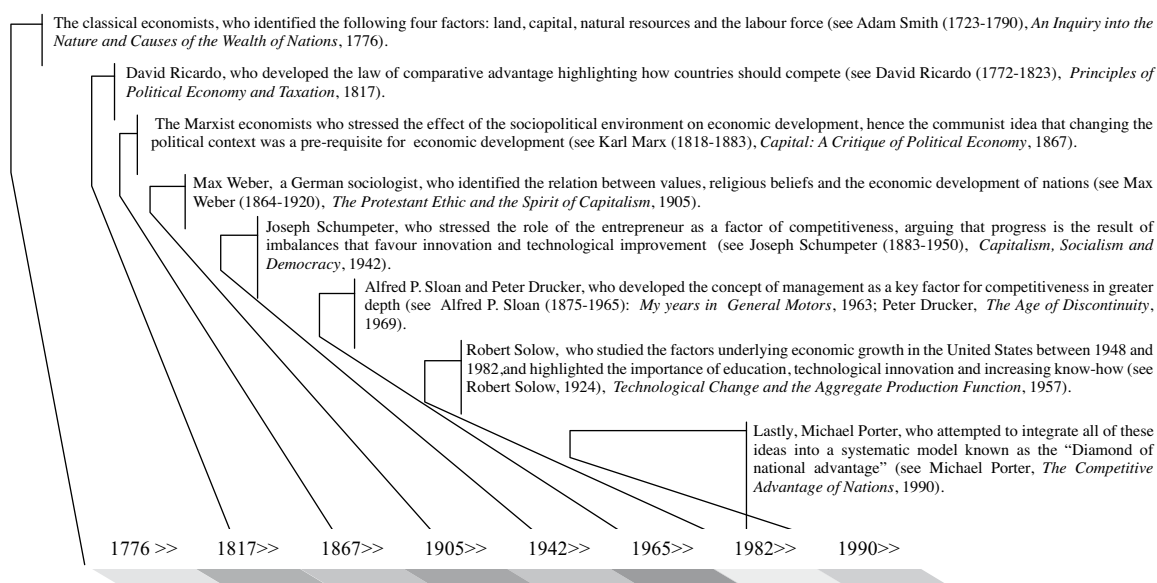
absolute advantage in some product, if a region sees that its productivity is growing by less than that of other regions and its output is becoming less competitive, it cannot devalue its currency as a country could.

In brief, the evolution of the theory of competitiveness starts from two fundamental theories: traditional economic theory and modern economic theory. The first is represented by the international-trade model (Smith, 1776), and the second by the competitive-advantage-of-nations model (Porter, 1991), also known as the “diamond of national advantage”, which gives rise to the determinants of national competitive advantage, and has produced the two most widely recognized studies worldwide measuring the competitiveness of nations based on its theoretical models. These studies are discussed in the next subsection.

The evolution of the concept of competitiveness is summarized in figure 1, which traces its development, through the thinkers of the last three centuries, as a process of aggregation culminating in the current proposal of Michael Porter.

FIGURE 1

Evolution of the concept of competitiveness



Source: S. Garelli, “The competitiveness of nations: the fundamentals”, IMD World Competitiveness Yearbook 2006, 2006 [on line] <http://www.imd.ch/documents/wcc/content/Fundamentals.pdf>

III

Global and regional competitiveness indices

The two most important world-level studies measuring the determinants of the competitiveness of nations are the Global Competitiveness Report (GCR) produced by the World Economic Forum (WEF), and the World Competitiveness Yearbook (WCY) produced by the International Institute for Management Development (IMD). Both are published annually, based on information obtained from statistical data and surveys conducted in each participating country. Partner institutions are responsible for compiling the data and conducting the survey. The two studies use similar competitiveness factors, drawn from the literature and empirical analyses.

The IMD classifies the data in terms of four factors: (i) economic performance; (ii) government efficiency; (iii) business efficiency; (iv) infrastructure; and each of these is divided into five subfactors. In contrast, the WEF classifies the data in 12 factors without additional classifications. It should be noted that the WEF classification corresponds to the 2008-2009 edition of the GCR, because major methodological changes were made in the three preceding editions, causing variations in the factors used to measure competitiveness.

Production of the global competitiveness index is led by Professor Xavier Sala-i-Martin, Chief Adviser to the WEF Global Competitiveness Network (2008, p. 3). The index is based on 12 competitiveness pillars and offers a detailed overview of the competitiveness scenario of the world's countries at all levels of development. It has been produced and published annually since 1979; and its 2008-2009 edition evaluated 134 developed and developing economies.

The ranking of the variables of the Growth Competitiveness Index (GCI) 2008-2009, using statistical data or the survey used to measure the competitiveness of the nations evaluated in this study, consists of 110 variables, of which 79 (72%) are obtained from the survey, and the rest (31) come from statistical data obtained from secondary sources.

The World Competitiveness Yearbook, meanwhile, has been published since 1989 by the IMD to provide government and business leaders worldwide with information on the status and main trends in the competitiveness of the participating countries. In 2008, the IMD published its index on 55 countries from

different regions of the world, for which it is assisted by strategic partners in each country involved.

- The WCY is based on two types of information:
- i) statistical indicators (hard data) compiled specially from international organizations such as the World Bank, the Organisation for Economic Co-operation and Development (OECD), the World Trade Organization (WTO) the Inter-American Development Bank (IDB) and the United Nations, among others; and
 - ii) annual surveys of entrepreneurs around the world (soft data).

Two thirds of the Yearbook is based on statistical information and one third on opinions and perceptions drawn from the business world. This distinguishes it from the Growth Competitiveness Index, which mostly compiles business opinions. Another difference with respect to the GCI is that whereas the WEF theory is based on the Porter (1990) diamond model, the IMD applies its own theory, which sees countries as managing their environments according to four fundamental forces that form the competitive environment.

Table 1 provides a summary of the indices and subindices published by the following organizations: (i) IMD 2008; (ii) Heritage Foundation (2008) with its Index of Economic Freedom; and (iii) the last three versions of the WEF Global Competitiveness Report. The latter include the Growth Competitiveness and Business Competitiveness Indices, which appeared in WEF publications of earlier years, and the Global Competitiveness Index, which is the current version of the index produced by this Swiss institution.

The regional competitiveness indices calculated in Latin America are derived mainly from research undertaken by Michael Porter and the Forum, and also from the IMD Global Competitiveness Yearbook. Although several of these regional indices have been discontinued, in all cases their development provided crucial support for decentralization processes. The Latin American indices include those of Mexico, Chile, Colombia and Peru.

Table 2 presents a summary of the determinants of regional competitiveness according to a sample of regional competitiveness indices produced in Latin America, showing the existence of a number of constant factors irrespective of the theoretical framework used.

TABLE 2
Comparison of regional competitiveness indices for a sample of countries

Country	Peru	Chile	Colombia	Colombia	Mexico	Mexico
Author	National Competitiveness Council (CNC)	Office of the Under-Secretary for Regional and Administrative Development (SUBDERE)	National University of Colombia	National University of Colombia	Mexican Institute of Competitiveness (IMCO)	Centre for Economic Research and Education (CIDE)
Main index (latest available)	Regional Competitiveness Index 2008	Regional Competitiveness Index 2003	Structural Departmental Competitiveness Index 2002	Revealed Departmental Competitiveness Index 2002	State Competitiveness 2008	Competitiveness of Mexican cities 2007
	Subindices					
1.	Institutional framework	Economic results factor	Infrastructure and location	Economic growth	Reliable and impartial legal system	Economic
2.	Infrastructure	Enterprises factor	Natural resources	External competitiveness	Sustainable management of the environment	Sociodemographic
3.	Macroeconomy	Persons factor	Human capital and employment	Quality of life	Inclusive, skilled and healthy society	Urban-environmental
4.	Health	Innovation factor	Firms		Stable and dynamic economy	Institutional
5.	Education	Science and technology	Innovation and technology		Stable and functional political system	
6.	Labour market	Infrastructure factor	Institutions		Efficient factors markets	
7.	Financial market	Government factor	Government administration		World-class leading sectors	
8.	Technological readiness	Natural resources factor	Integration into the global economy		Efficient and effective governments	
9.	Market		Economic growth		Exploitation of international relations	
10.	Business sophistication		External competitiveness		Vigorously competing economic sectors	
11.	Innovation					
12.	Natural resources					

Sources: National Competitiveness Council (CNC), *Índice de Competitividad Regional*, Lima, 2008; Office of the Under-Secretary for Regional and Administrative Development (SUBDERE), *Informe de competitividad regional*, Santiago, Chile, LOM Ediciones Ltda., 2003; National University of Colombia, *Sistema de indicadores de competitividad departamental*, Bogotá, D.C., Centre for Development Research (CID), 2002; Mexican Competitiveness Institute (IMCO), *Competitividad estatal*, Veracruz, 2008; Centre for Economic Research and Education (CIDE), *Competitividad de las ciudades mexicanas*, Mexico City, 2007.

IV

Definition of regional competitiveness

In this article, the word “regional” refers to the geographic division of a country, which can be defined in terms of various factors, including demography, history, culture, economics and climate, among others.

An analysis of earlier literature shows that competitiveness can be approached from two perspectives: firstly, as a set of factors that determine the level of productivity; and secondly, as a determinant of the sustained increase in the population’s well-being. Based on these perspectives, regional competitiveness can be defined as the management of resources and capacities to obtain a sustained increase in business productivity and in the well-being of the region’s population.

The definition proposed is tested by applying measures of competitiveness, which are statistical approximations, to evaluate the consistency of the definition proposed in the light of empirical evidence.

This evidence is obtained by comparing indicators of the country’s economic development, such as gross domestic product (GDP) per capita, total factor productivity (TFP), or indicators of recognized prestige similar to the regional competitiveness index (RCI), such as the Human Development Index (UNDP, 2006)

and the global competitiveness indices published by the IMD and WEF using specific parameters.

This analysis takes as its reference point the work done by Tello (2004) in his report on competitiveness factors in Peru.

The first measure of competitiveness compares the final result of the IMD Global Competitiveness Yearbook with per-capita GDP for the 55 economies covered by the IMD Yearbook in 2008. The analysis shows that countries ranked higher in terms of competitiveness have higher per-capita GDP.

The second measure of competitiveness is obtained by comparing the WEF growth competitiveness index (2005a, the latest year in which this index was published) and the per-capita GDP growth rate for the period 2007-2003. The analysis shows that countries with a higher GCI also had a higher per-capita GDP growth rate; so an increase in competitiveness is correlated with economic growth.

The third measure of competitiveness is obtained by relating the GCI to the annual average growth rate of total factor productivity (TFP) for the period 2004-2000. This shows a positive relation that suggests that improving competitiveness is also related to TFP growth.

V

Proposal for a regional competitiveness index

The proposal for the regional competitiveness index (RCI) includes a frame of reference for constructing indices, supported by both a general and a specific model. Lastly, the statistical calculation method is analysed and defined, and all of its components are presented.

The RCI belongs to the category of social indicators, generally linked to social research and the design and management of social projects. As such, it is a summary statistic, relating to the quantity or magnitude of a set of parameters or attributes of a given society.

Among indicators normally used for project management, social indicators can be classified as either simple or complex (Bobadilla, Del Águila and

Morgan, 1998). The RCI is in the complex category, since it requires a theoretical framework and there is no simple way to corroborate its results.

Indicators can also be classified according to their measurement purpose—for example impact, effect and compliance (Bobadilla, Del Águila and Morgan, 1998). The RCI can be classified as an impact indicator, because it measures competitiveness through the results obtained by each region at the end of a given period, generally a year, in which the actions of economic agents have increased or reduced competitiveness.

Social research deal with phenomena that differ in terms of their greater or lesser complexity and abstraction. The RCI and the concept of

competitiveness that underlies it can be categorized as an abstract concept which cannot feasibly be observed empirically and thus cannot be measured. It is therefore necessary to undertake a process of decomposition and transformation, what Lazarsfeld (1958) calls “operationalization”, to convert the notion and concept of competitiveness into a set of indicators susceptible to empirical observation, and, in the specific case of this study, the construction of an index.

According to Blalock (1970), this operationalization process must consider that, firstly, the index is conceptualized using theoretical reflections based on a literature review and the author’s own thinking; and secondly, that the measurement makes it possible to assign values to social phenomena according to specific criteria.

Lazarsfeld (1958) argues that the operationalization process makes it possible to express concepts in terms of empirical indices and consists of the following stages: descriptive representation of the concept; specification of the concept, identifying the dimensions of its components or semantic subdivisions; and the choice indicators for each dimension. Once the dimensional indicators have been chosen, they are synthesized by constructing indices.

VI

Determinants of regional competitiveness

The determinants of regional competitiveness, which in this study are referred to as pillars, have been defined on the basis of previous literature and the analysis of international experiences. There is no explicit consensus on what determines competitiveness; on the contrary, defining the pillars of competitiveness is in practice a process of choosing between different criteria. These can relate to availability, frequency and consistency with the concept (Joy Way, 2004); or to (i) consistency with the definition and conceptual framework; (ii) statistical support, in the sense that the factor is statistically related to an economy’s performance indicators; (iii) the fact that it can be measured in some form (qualitatively or quantitatively), and be easily distinguishable from other factors (Tello, 2004).

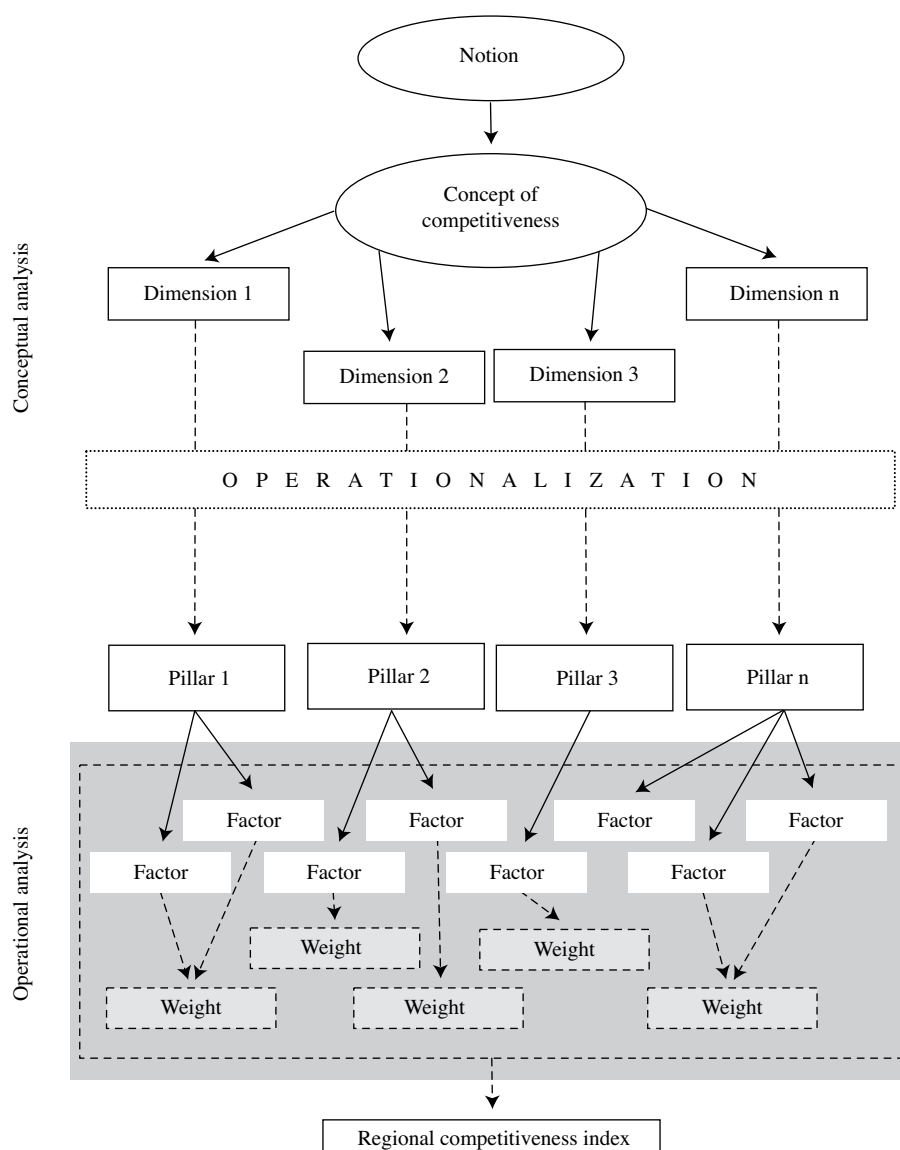
Figure 2 illustrates the process of ICR operationalization, based on the framework proposed by Lazarsfeld (1958). As there is no universally accepted definition of competitiveness, the process starts by proposing a definition, which is broken down into its initial components, namely dimensions, and which also give form to the pillars comprising the definition of competitiveness (in this case regional competitiveness). Lastly, the variables of the factors contained in the pillars are weighted, and possible combinations are defined. The assignment of weights attempts to express differences in relative importance in the RCI.

The methodology proposed is based on a review of similar experiences in constructing competitiveness indices and also on the literature review. The factors used, the statistical techniques applied and the information required mean that the RCI can be generalized and replicated in other countries that have a similar human development index (UNDP, 2006), to minimize the repercussions of the inherent economic and social differences in each country. The adaptations needed to apply the RCI in specific countries should not invalidate comparisons between their regions, to provide a base for expanding the scope of comparison, together with increasingly advanced reference points representing national objectives to be achieved.

This process of selecting pillars is a common denominator of competitiveness indices, particularly regional ones. Different methodologies are used in the process, ranging from the holding of workshops or interviews with experts, through to the application of *sui-generis* models. To identify the pillars of regional competitiveness proposed, the bases of the regional competitive advantages identified in Kitson, Martin and Tyler (2004) have been taken as a reference model (see figure 3). The concept of regional competitiveness related to these bases captures the notion that, although there are competitive and uncompetitive firms in each region, there are common elements in a region that affect the competitiveness of all firms. The approach followed by the authors is that of regional externalities, in other words resources that are external to the firm

FIGURE 2

Process of “operationalization” of the regional competitive index (RCI)



Source: P.F. Lazarsfeld, “Evidence and inference in social research”, *American Academy of Arts & Sciences*, vol. 87, No. 4, Cambridge, Massachusetts, American Academy of Arts & Sciences.

but which are used directly or indirectly and have repercussions on its efficiency, innovation, flexibility and dynamism—in other words, on its productivity and competitive advantage.

The procedure followed in this study to determine the pillars of regional competitiveness based on regional competitive advantages (Kitson, Martin and Tyler, 2004) includes two stages: generalization of the definitions of the six bases (see table 3) and an analysis of their applicability, comparing the bases with the existing global and regional competitiveness indices (see table 4).

The pillars are obtained mainly from the bases of regional competitive advantages (Kitson, Martin and Tyler, 2004)—except for cultural capital, since no empirical evidence has been found that is consistent with the definition of those bases in international experiences relating to the inclusion of cultural capital. Moreover, neither the global nor the regional indices include cultural capital as an individual factor or variable. In several cases, as in the pillars used in this study, it is considered in relation to education and hence as human capital.

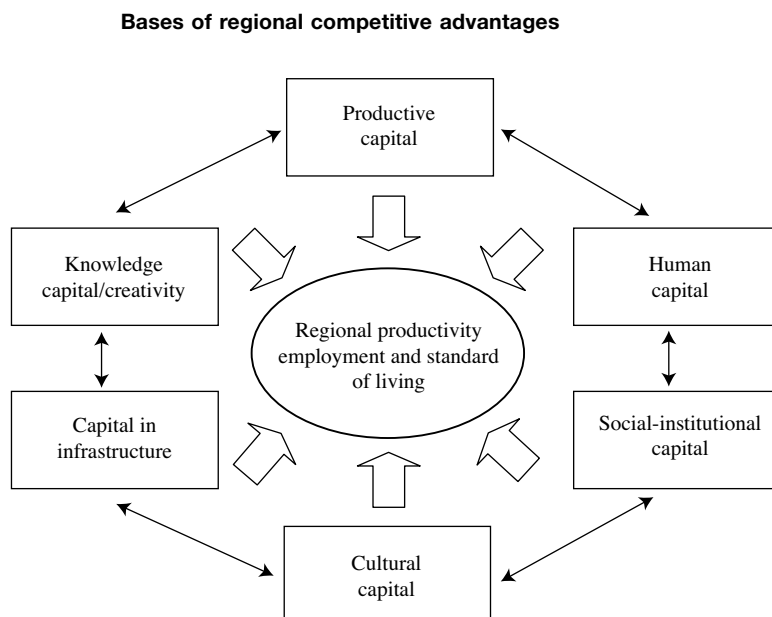
The proposed regional competitiveness pillars are now described, along with their foundations.

1. Government and institutions (P1)

The first pillar of regional competitiveness relates to the government and its institutions. In the case of the government, it is important to identify its main functions to be able to lay the foundations of the components with respect to its competitiveness. Although government is not the same as State, the government exercises the power of the State; in other words it undertakes State activities that are commonly referred to as powers of State. Accordingly, the State role can be analysed on three fronts: microeconomic, macroeconomic and institutional (León, 2003).

The government and institutions pillar arises from the microeconomic aspect of the role of the State; in other words, according to microeconomic theory, in a situation of perfect competition, the free market makes it possible to attain equilibrium. Nonetheless, this scenario is utopian because market failures or distortions prevent it from operating in such a situation of efficiency. The most common of these market failures is the existence of public goods that need to be managed with economic and social criteria, taking account of externalities, or generating monopolies and oligopolies. It is in these cases that

FIGURE 3



Source: M. Kitson, R. Martin and P. Tyler, "Regional competitiveness: an elusive yet key concept?", *Regional Studies*, vol. 38, No. 9, London, Taylor & Francis, 2004.

TABLE 3

Classification of the pillars of global competitiveness indices according to the bases of regional competitive advantage

Basis of regional competitive advantage	World Competitiveness Yearbook 2008	Global Competitiveness Index 2008-2009
1. Productive capital	— Economic Development	— Macroeconomic stability — Financial market sophistication — Market size
2. Human capital	— Economic Development	— Labour market efficiency
3. Cultural capital		
4. Social-institutional capital	— Government efficiency	— Institutions
5. Capital in infrastructure	— Infrastructure	— Infrastructure — Health and primary education — Higher education and training
6. Knowledge capital/ creativity	— Business efficiency	— Innovation — Goods market efficiency — Technological readiness — Business sophistication

Source: Prepared on the basis of M. Kitson, R. Martin and P. Tyler, "Regional competitiveness: an elusive yet key concept?", *Regional Studies*, vol. 38, No. 9, London, Taylor & Francis; International Institute for Management Development, *IMD World Competitiveness Yearbook, 2008*, Lausanne, Switzerland, 2008; World Economic Forum, *Global Competitiveness Index*, Geneva, 2008.

TABLE 4

Classification of the factors of regional competitiveness indices according to the bases of regional competitive advantage

Bases of regional competitive advantage	Regional competitiveness index 2003 (Chile)	Structural departmental competitiveness index 2002 (Colombia)	State competitiveness 2008 (Mexico)	Competitiveness of Mexican cities 2007
1. Productive capital	– Economics results factor – Natural resources factor	– Integration into the global economy – Economic growth – External competitiveness – Natural resources	– Stable and dynamic economy – Vigorously competing economic sectors – Exploitation of international Relations – Efficient factors markets – World-class leading sectors – Sustainable management of the environment	– Economic
2. Human capital	– Persons factor	– Human capital and employment		
3. Cultural capital				
4. Social-institutional capital	– Government factor	– Institutions – Government administration	– Stable and functional political system – Efficient and effective governments – Reliable and impartial legal system – Inclusive, skilled and healthy society	– Institutional
5. Capital in infrastructure	– Infrastructure factor	– Infrastructure and location		– Urban-environmental – Sociodemographic
6. Knowledge capital/ creativity	– Enterprises factor – Innovation factor – Science and technology	– Firms – Innovation and technology		

Source: Prepared on the basis of M. Kitson, R. Martin and P. Tyler, "Regional competitiveness: an elusive yet key concept?", *Regional Studies*, vol. 38, No. 9, London, Taylor & Francis, 2004; Office of the Under-Secretary for Regional and Administrative Development (SUBDERE), *Informe de competitividad regional*, Santiago, Chile, LOM Ediciones Ltda., 2003; National University of Colombia, *Sistema de indicadores de competitividad departamental*, Bogotá, D.C., Centre for Development Research (CID), 2002; Mexican Institute of Competitiveness (IMCO), *Competitividad estatal*, Veracruz, 2008; Centre for Economic Research and Education (CIDE), *Competitividad de las ciudades mexicanas*, Mexico City, 2007.

the theoretical foundations for State intervention arise and, hence, the foundation for government action through its institutions, based on Keynes (1936), who envisioned the role of the State.

2. Economic development (P2)

The second pillar of regional competitiveness involves, firstly, the performance of the regional economy; secondly the process of internationalization; and, thirdly, job creation capacity. The economic development pillar is linked to economic growth theory, the most representative model of which in modern growth economics is that of Solow (1956), who explained growth in terms of capital accumulation, expansion of the labour force and technical change. Nonetheless, unlike the Solow (1956) growth accounting framework, and with the goal of describing it, the economic development pillar aims to measure the effect of economic growth, which also needs to respond to criteria of sustainability, social responsibility and environmental stewardship.

According to Sachs and Larraín (1994), economic growth is necessary to improve the standard of living of a growing population. Malthus (1798), in contrast, argued that population growth would be limited by the amount of resources that the earth could provide. He claimed that population growth exceeded the possibilities of the planet (resources) to provide subsistence to man; and death, in the form of wars or widespread famine, would inevitably bring the relation into balance.

3. Productive infrastructure (P3)

Infrastructure is the primary intervention of human beings in a territory to gain access to it and activate its development potential (ADC, 2008). A region's infrastructure level is closely related to its degree of development, and, in the event of backwardness, severely constrains the possibility of achieving significant progress in the material well-being of its population.

One of the most important specialized indices is the infrastructure ranking published by *América Economía* (2008). The productive infrastructure pillar uses the methodology of that ranking and is seen as the current capacity of each region to sustain productivity and business competitiveness. It can

therefore be said that the effects of infrastructure are seen in job creation and improvements in the region's competitiveness and the quality of life of its citizens.

4. Human capital (P4)

Human capital is the value of the income-earning potential of individuals. Although it has a natural-resource component, it mostly stems from investment in education, skill development and health. These investments make human capital more productive (Larroulet and Mochon, 1995).

Economic science began to value the role of human capital following the contributions by Schultz (1961), who was the first to argue that skills and knowledge are a form of capital. A few years later, Becker (1964) considered human capital as a primary economic factor in his study on knowledge. Nonetheless, the most significant contribution, namely introducing human skills into the production function, appears in the work of Uzawa (1965) and Lucas (1988). According to these authors, an economy's production function can be represented through a *Cobb-Douglas* function ($Y = A \cdot K^\alpha \cdot H^{1-\alpha}$), which considers production (Y) to be determined by human capital (H) and by physical capital (K).

5. Business efficiency (P5)

National prosperity is created, not inherited; and it depends on the capacity of its industry to innovate and improve (Porter, 2001). In other words, competitiveness is synonymous with productivity; and this is achieved by promoting innovation, which is driven by the four attributes of a nation, which in turn depend on the capacity of its firms to innovate and improve.

Although the basis of the approach with regard to industry, firms and productivity is a solid foundation for the business efficiency pillar, there is also the systemic competitiveness approach (Esser and others, 1996, pp. 39-52) which, without contradicting the approach taken by Porter (2001), strengthens the view of the role of the firm. At the micro level, the systemic approach is directly related to the development of the firm and its immediate environment. This approach proposes that, to successfully cope with new demands, firms need to reorganize themselves both internally and in their surrounding environment.

VII

Factors and variables of regional competitiveness

The factors correspond to the elements comprising the pillars. Overall, the pillar is given a certain significance according to the variables involved and the weightings they receive. The determination of the factors and variables is the result of an individual process in each country, which is established through the fulfilment of criteria that need to be applied to achieve a selection in accordance with the country's characteristics. The criteria for determining factors in variables of the regional competitiveness index are:

- That the variables comprising the factors be compiled from an official source. There is an initial group of institutions that generate information, either obtaining it through fieldwork or making back-office calculations, and a second group that compiles information from the first to summarize it and produce statistical publications.
- That it has a continuous historical record lasting over three years. This criterion makes sure the information is continuous and that it is not a variable calculated to meet a particular need; this reduces the chances that it will not be available in the following year.
- That it has a breakdown by region.
- That the methodology used in the sources is rigorous and stable through time, so as not to affect the potential for comparative analysis.

These criteria are applied in the process of selecting factors and variables in the country's official sources of statistical information, and are considered in the framework formed by the pillars.

The "government and institutions" pillar consists of factors that quantify the capacity of regional and local governments to fulfil their State role, to provide services to their inhabitants (resources, expenditure, investment, security, presence of the State) and thus promote the sustained development of their region.

The factors comprising the "economic development" pillar include growth of production, employment, and others, which are not only the result of the previous year, but also of the latest representative period or business cycle. Similarly, the variables are expressed not only in current - value terms but also in real (deflated) terms to avoid bias arising as a result of price volatility. Foreign trade not only includes the value exported, but also the volume, and to a greater extent, the region's internationalization and diversification process.

With regard to the factors comprising the "productive infrastructure" pillar, these take as a reference the concept of physical base (Joy Way, 2004), which implies the set of physical factors on which a region's competitiveness is founded. Accordingly, the pillar includes infrastructure support, such as the road network, energy and transport, and in particular the way in which factors of production in each region are organized, such as connectivity and tourism.

The "human capital" pillar includes factors that are directly related to the theories discussed above. It takes account of school and higher education, distinguishing between private and public; it also considers non-university job training and, finally, health.

Lastly, the "business efficiency" pillar encompasses factors directly related to the firm, such as productivity, business skills and innovation, and those pertaining to its immediate environment, such as the business climate and job creation.

The variables form the general definition of the indicator used and jointly comprise the factor. Each of the variables is linked to an indicator, either a simple indicator or a relative one. The simple indicator shows the absolute value of the variable, whereas a relative one calculates it in relation to another variable, such as population or GDP, among others. Tables 5 to 9 show the factors and variables classified by each factor for each of the pillars.

TABLE 5

Components of the government and institutions pillar

Factor	Measurement Variable
1. Resources obtained	Relative direct revenue collection Direct revenue collection
2. Resources transferred	Relative transfer income Transfer income
3. Investment expenditure	Investment as proportion of total expenditure Investment expenditure
4. Public security	Crimes Misdemeanors Terrorism
5. Presence of the State	Presence of primary and secondary schools Presence of health establishments Presence of a police station or post Presence of the municipality

Source: Prepared by the authors.

TABLE 6

Components of the economic development pillar

Factor	Measurement variable
1. Economic size	Real GDP Per-capita GDP
2. Economic growth	Real and current gdp growth
3. Internationalization	Export value Exports as a percentage of GDP and export volume Export growth
4. Diversification	Destination countries Outputs
5. Employment	Employed EAP Relative employed EAP Remuneration of executives, employees and manual workers

Source: Prepared by the authors.

EAP: Economically active population.

TABLE 7

Components of the productive infrastructure pillar

Factor	Measurement variable
1. Energy	Electric power Unregulated customers and consumption by unregulated customers Regulated customers and consumption by regulated customers
2. Road network	National road network and density of national network Departmental road network and density of departmental network Neighbourhood road network and density
3. Transport	Land transport and density of land transport Air transport and density of air transport International freight traffic in airports Export freight traffic in ports
4. Tourism	1, 2, 3, 4 and 5- star hotels Hostels Other establishments
5. Connectivity	Fixed telephony and density of fixed telephony Cellular telephony and density of cellular telephony

Source: Prepared by the authors.

TABLE 8

Components of the human capital pillar

Factor	Measurement variable
1. School education	Reading comprehension and understanding of mathematics in primary school Reading comprehension and understanding mathematics in secondary school
2. Public higher education	Graduates from public universities and density Professional qualification from private university and density
3. Private higher education	Graduates from private university and density Professional qualification from private university and density
4. Private higher education	Density of graduates from private university
5. Job training	Graduates from private university Density of persons with professional qualifications from private university Persons with professional qualification from private university Density of technical training centres
6. Health	Technical training centres Job training centres and density Infant mortality Life expectancy Morbidity Medical coverage

Source: Prepared by the authors.

TABLE 9

Components of the business efficiency pillar

Factor	Measurement variable
1. Productivity	Average labour productivity Variation in average labour productivity Employed EAP
2. Business climate	Number of firms Penetration and coverage of the financial system Enterprise start-ups Effort to develop firms Presence of successful firms
3. Entrepreneurial skills	Management capacity Long-term vision Capacity for adaptation and internationalization
4. Innovation	Existence of innovative products/services Cases of innovative firms or persons Creation of new products or services Improvement of techniques and processes
5. Innovation	Existence of innovative products/services
6. Job creation	Cases of innovative firms or persons Creation of new products or services Improvement of techniques and processes Access to well-paid jobs Opportunities for self-employed workers Stable employment Wage level Non-wage labour costs

Source: Prepared by the authors.

EAP: Economically active population.

VIII

Calculation of the regional competitiveness index

The regional competitive index (RCI) can be represented as follows:

$$ICR = \frac{\sum_{k=1}^l Pillar_k}{l}$$

where the RCI is the average of the l pillars comprising it, and in which each pillar ($Pillar_k$) is represented by the average of the m factors comprising it.

$$Pillar_k = \frac{\sum_{j=1}^m F_j}{m}$$

Lastly, the factor (F_j) is the sum total of the n variables comprising it, weighted by

$$F_j = \sum_{i=1}^n V_i P_i$$

In other words, a factor (P_i)

where (V_i) = Variable i

and P_i = Weight of the variable i

Calculating the RCI faces two types of problem that are common to any effort to construct indices: (i) How to “standardize” different criteria?; and (ii) How to integrate the “standardized” criteria in the index? Both problems can be summarized in a single question: How to transform the variables so as to integrate them into a single index?

With regard to the first problem, there are three options that are the most widely accepted statistics

for standardizing criteria that stem from dissimilar variables or indicators: (i) conversion of scale; (ii) percentile rank; and (iii) standard result. Table 10 provides a summary of the capacities of each method with respect to the analytical criteria described.

It can also be seen that all methods fail to comply with at least one of the established criteria. The first criterion could be the most subjective of the three, and the negative observation for the standard result is due to the relative comparison with other methods that are simpler to understand because they do not have negative values and a restricted scale.

The relative difficulty of interpreting the standard result can be overcome by applying the scale conversion, after calculating the standard result. Moreover, the standard result is the only method that fulfils the third criterion of being able to provide an objective reference of the relative distance between the results of each region. For the reasons described, the standard result method complemented by scale conversion, which we will simply refer to as standardization, is the best method for calculating the RCI.

It is not feasible to define a uniform criterion to assign weightings to each of the variables comprising the RCI; nonetheless, some principles can be established to make the process less arbitrary. These basically relate to the unit of measurement of the variables, giving rise to the following two cases:

- i) Variables with an original measurement unit, in other words the unit derived from the main source from which it was compiled.

- ii) Variables with a transformed measurement unit, in other words the unit derived from a simple process of expressing the variable in relation to another variable that has some element of transcendence for the region, known as the transformer variable.

The first criterion in assigning weightings for each of the variables comprising each pillar of the RCI is to consider the two types of variables described; and, as the variable with a transformed measurement unit better represents the relative position of a given region or department, it is given a relatively higher weight than the variable with an original measurement unit. This is only true of cases in which both types of variable were used.

The second criterion for assigning weights relates to consistency with the identification of competitive advantages in the region. These are variables directly related to the fundamental aspects derived from the definition of regional competitiveness, such as (i) productivity; (ii) creativity; (iii) internationalization; and (iv) social welfare, among others. All of the variables related to these concepts must be assigned a relatively larger weight than the other accompanying variables.

The availability and quality of information at the subnational level in Latin America is a significant obstacle, owing to the different territorial divisions, degree of disaggregation of the information, and the relative importance of the factors or pillars in each country, which could affect the weighting criteria. All of this stems from the fact that the methodology is mainly based on secondary information.

TABLE 10

Comparison of methods for calculating the regional competitiveness index (RCI)

“Standardization” method	Easy to interpret?	Allows ranking?	Allows relative distances to be calculated?
Scale conversion	Yes	Yes	No
Percentile range/rank	Yes	Yes	No
Standard result	No	Yes	Yes

Source: Prepared by the authors.

IX

Conclusions

The definition and scope of competitiveness will remain a work in progress, possibly until partial consensus is reached, either in its definition or in its spheres of application. Moreover there is no proven and disseminated methodology for judging the quality of the results of a given competitiveness index, either at the world level or, as in this case, at the regional level. The difficulty stems from its status as a relative indicator, in other words, it does not determine which region is competitive but provides a relative view of the competitiveness of a given region compared to its peers. A country's RCI is therefore a tool or a guide for business or State policies. The role of global competitiveness indices, as a guide for countries' development, has also been sharply criticized when compared to the development results of certain countries or regions. Such is the case of the annual global competitive indices published every year by the WEF and IMD, the WEF index since 1979 and the IMD index since 1988.

Developing a regional competitive index for a country is a real effort to construct a tool to support its development. Every aspect of its preparation needs to be the best, taking into account the literature review, critical analysis of other experiences, but above all, clearly understanding the concept of regional competitiveness that it is intended to measure, namely

to prepare a tool that contributes to development by efficient management of the region's resources to the benefit of its inhabitants and increasing business productivity.

The determinants of the competitiveness of regions were identified and referred to as pillars: (i) government and institutions; (ii) economic development; (iii) productive infrastructure; (iv) human capital; and (v) business efficiency. For each of these pillars, five factors and their variables were identified, which measure various aspects of regional competitiveness. These represent a second and third level of disaggregation which contributes to the analysis that can be performed with the results obtained.

A country's RCI is a structurally specific model, consisting of statistical information obtained from secondary sources, and, to a lesser extent, primary data obtained from a survey of entrepreneurs in all of the country's regions. From these two large data sources, indicators are selected to form the five pillars of the RCI. The selected indicators go through a standardization process to consolidate units of measurement and ultimately obtain three types of results: (i) the global RCI results; (ii) the partial RCI results for each of the region; and (iii) the partial RCI results for each of the five pillars.

(Original: Spanish)

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