

Lessons from the location and relocation of firms in the municipalities to the north and west of Bogotá

Working Paper WP15EG1

Enrique Gilles

Universidad EAN

Andrés Francisco Baquero-Ruiz

Universidad de los Andes de Bogotá

June 2015

The findings and conclusions of this Working Paper reflect the views of the author(s) and have not been subject to a detailed review by the staff of the Lincoln Institute of Land Policy. Contact the Lincoln Institute with questions or requests for permission to reprint this paper.

help@lincolninst.edu

Abstract

In recent decades, the city of Bogotá and its neighboring municipalities have witnessed a spatial reorganization of industrial activity that has had major repercussions on the spatial flow and socioeconomic sustainability of the entire region. This change has not been free from challenges and problems for private enterprises, nor for the local governments that have promoted this reorganization through tax and other types of incentives. This paper seeks to contribute to the development of better policies and incentives for attracting and retaining firms, combining a few elements of contemporary economic geography with some more assertive policies that identify and emphasize those factors of the environment that firms deem most relevant at the time of selecting the location for their productive or logistics facilities, using the Analytical Hierarchical Process (AHP) methodology to quantify the weight of each factor affecting a decision.

Keywords: Bogotá, globalization, business location, land management, land policies, tax incentives, AHP

About the Authors

Enrique Gilles has a Ph.D. in Economics from the Toulouse School of Economics (France) and a Master in Environmental, Natural Resource, Energy and Agricultural Economics from the same university. He is a graduate in Economics from the Universidad de la República, Montevideo, Uruguay. His professional career has involved working as both faculty member and researcher: first as a research assistant in Uruguay, then developing his doctorate in France, and finally in Colombia, where he has been a professor, researcher, and consultant in economics. His areas of interest are macroeconomics, international economics, urban and regional economics, and political economy. He has lectured at domestic and international conferences and published in the aforementioned fields. He currently holds the position of full professor in the School of Administration, Finance and Economics at Universidad EAN in Bogotá, Colombia.
Contact: enriquegilles@gmail.com

Andrés Baquero is a Civil Engineer and Specialist in Economics from the Universidad de los Andes de Bogotá (Colombia) and holds a M.Sc. in Regional and Urban Planning Studies from the University of London. Mr. Baquero worked for nearly seven years in the public sector, formulating policies and implementing development and transportation infrastructure projects at the national and urban level. He is currently a consultant at the InterAmerican Development Bank for the incorporation of low-carbon technologies in urban transportation and is also a Regional and Urban Development Associate at MoBiLé – Consultoría en Movilidad S.A. Mr. Baquero frequently participates in business ventures and development and has worked as a professor at institutions of higher learning in Colombia and as a researcher at the Centro Latinoamericano de Innovación en Logística (CLI) of the Fundación LOGyCA in Bogotá, Colombia, mainly in the fields of complex systems and alignment of public and private sector actions.
Contact: andres.baquero@mobile-cm.com.co; afbaquero@gmail.com

Table of Contents

Introduction.....	1
Conceptual Framework.....	2
Spatial location of economic activity and urban, regional, and national structures.....	2
The private sector view: factors to be considered in industrial location decisions.....	4
Land and public sector institutions.....	7
Opportunities and threats of globalization for cities and regions.....	8
Location of Economic Activities in Bogotá and Neighboring Municipalities	10
The economy of Bogotá and its interaction with Colombia and the world.....	11
General Trends in Land Regulation and Land Use in Bogotá and Neighboring Municipalities	13
Review of Studies on Industrial Location and Land Use Policy in Bogotá.....	15
Methodology	17
Survey design	18
AHP methodology.....	18
Hierarchical structure used.....	20
Data Processing and Analysis.....	21
The Survey questionnaire and the information gathering process	21
Weighting the various contextual factors in the location decision of firms.....	21
Changes in the weights of contextual factors depending on the characteristics of firms.....	23
Conclusions and Recommendations	30
References.....	33
Annex 1: Survey Questionnaire	36

List of Tables

Table 1. Comparison of Economic Performance in 2011: Bogotá and Main Departments	12
Table 2. Volume and Value of Imports in the Main Economic Centers of Colombia, 1998 and 2012.....	12
Table 3. Volume and Value of Exports from the Main Economic Centers of Colombia, 1998 and 2012.....	13
Table 4. Comparison of Alternatives using the AHP Methodology.....	19
Table 5 — Hierarchical Structure of the Problem being Analyzed.....	20

List of Figures

Figure 1. 21 st Century Spatial Structure.....	4
Figure 2. Competitiveness Diamond Proposed by Porter.....	6
Figure 3. Operating Strategies and Business goals.....	7
Figure 4. Average Weight Assigned to Contextual Factors by Firms Choosing the Location for their Productive or Logistics Facilities	22
Figure 5. Comparison of Weights Assigned to Contextual Factors by Firms Facing Different Levels of Competition for their Products.....	24
Figure 6. Weights Assigned to Contextual Factors by Firms According to the Volume of Local Sales	26
Figure 7. Weights Assigned to Contextual Factors by Firms According to Sector.....	27
Figure 8. Weights Assigned to Contextual Factors by Firms According to Firm Size	28
Figure 9. Weights Assigned to Contextual Factors by Firms According to Where the Firm is Located.....	29

Lessons from the Location and Relocation of Firms in the Municipalities to the North and West of Bogotá

Introduction

In the past three decades, there has been a clear trend among firms to locate in the municipalities around Bogotá. This phenomenon accounts for both the migration of firms from Bogotá and the establishment of new businesses. Although some observers acknowledge other factors as influencing the location decisions of firms, the adoption and promotion in recent years of tax incentives to attract businesses to some of the municipalities around Bogotá has created the perception that the decisions are still based primarily on cost considerations. There is ample evidence that these municipalities offered generous tax-exemption packages to the firms that locate in their jurisdiction, although in many cases firms are required to comply with a few additional conditions.¹

The business relocation phenomenon is well known in both academia and within governmental entities, but their primary source of knowledge is eminently theoretical, since it is based on what each one thinks the firms are looking for or prefer. Firms are the ones making decisions and taking advantage of location benefits, but they are also the ones that must face and overcome multiple obstacles to establish or transfer their various productive activities.

This study seeks to advance our understanding of the way in which the mobility of capital and greater regional connectivity impact upon individual municipalities, and to what extent their governments are autonomous in defining their fate in the new global context. We start in section 2 by carrying out a broad review of the literature aimed to identify how such capital mobility and connectivity influence the way in which firms make location decisions, and what type of opportunities and threats this new context has created for local governments.

On the basis of the results of our review of the literature, we then analyze the context of Bogotá and its neighboring municipalities to assess the relative importance of various contextual factors in the location decisions of firms. To this end, we developed a methodology that combines the Analytical Hierarchical Process (AHP) with variables reflecting characteristics of the firms, and discuss to that extent our findings match with the theory, and what benefits may eventually be derived from further development and wider application of this methodology.

The paper is organized as follows: section 2 describes the conceptual framework of the study; section 3 presents data about Bogotá and surrounding municipalities, describing how the city and the region are situated within the current global networks of production and consumption. This analysis is complemented with a review of several documents and studies related to land use and the factors affecting the location decisions of firms in the region. Section 4 describes the methodology, and section 5 presents the results of the analysis. We conclude in section 6 identifying

¹ See, for example, the Municipal Council of Cota (2009), <http://www.eltiempo.com/archivo/documento/MAM-138251> and <http://www.eltiempo.com/archivo/documento/CMS-7759411>

the various aspects that should be taken into account in regional public policy related to the attracting firms and influencing their location decisions.

Conceptual Framework

Spatial location of economic activity and urban, regional, and national structures

The theory of spatial location of economic activity dates almost as far back as the origin of modern economic theory. The theories of Adam Smith and David Ricardo, applied to trade between countries, provide an initial answer to the question of where to produce what type of product. Ricardo, in particular, emphasized the importance of cost differences (i.e. of technology) as a source of comparative advantage, and the role it has in international trade. Later Heckscher and Ohlin developed the theory of differences in factor allocations, explaining that countries trade due to relative differences in their availability of production factors.

In the 19th century, Von Thünen (1966) proposed an initial, more formal link between geography and economic activity by examining the eventual relationship that may exist between the economic preferences of a variety of economic activities and urban structure. His analysis focuses on isolated populations and on the productive structures predominant in mid-19th century. He found that the production function of each activity creates its own “bid-rent” curves and predictable urban structures that emerge from the interplay of different activities.

Alonso (1964) follows Von Thünen’s ideas and applies them to the economic structures of the 20th century, but changes the focus of the analysis. While Von Thünen emphasizes the role of freight in location decisions, for Alonso location decisions are made by commuters—people who have to commute to perform certain economic activities. This new perspective makes it clear that in the world of the second half of the 20th century, the principles identified by Von Thünen continued to be applicable.

The models developed by Von Thünen and by Alonso assume that firms and people are motivated to locate near one another. From a classic perspective, this spatial-concentration tendency may be explained in two ways. First, both firms and people will want to be located closer to their customers, suppliers and/or workplaces so as to lower their transportation costs and time, seeking to maximize their benefit and well-being, as explained by Weber (1909). Second, as proposed by Marshall (1920) the trend of geographical concentration reflects economies of agglomeration which offer three main benefits: (i) the development of suppliers specializing in production inputs; (ii) the development of a trained labor force given more employment options; and (iii) the dissemination of information and knowledge from one actor to the other. From these two main approaches we may conclude that cities developed as a response to local economic systems that seek to maximize their benefits within certain relatively isolated economies.

Advances in transportation and communication technologies during the 20th century greatly transformed the way actors access or disseminate information and participate in domestic and foreign markets. Held and McGrew (2000) argue that a key difference in the current

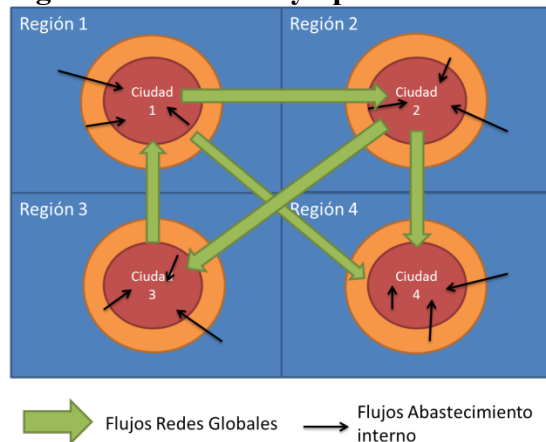
globalization context is the speed with which information, ideologies, and products are disseminated through communication media, and the ease of access by people to the information. Dicken (1998, pp. 81–97) and Friedman (2007) argue that advances in telecommunications and transportation have “shrunk” and “flattened” (respectively) the world. That has enabled many firms that were traditionally limited to local contexts for production and competition, to start producing and competing on a global scale.

Although at some point in recent times it was argued that in a hyper connected world with low transportation costs the benefits of agglomeration would disappear, recent experience indicates that that is not the case. In fact, under certain conditions economies of agglomeration were strengthened. Porter (1990; 2000), Scott et al (2001), Sassen (2001), Storper (2003) and Berger (2006) confirm the persistence of agglomeration economies in spatial concentrations called clusters, which are places with high capacity for specialized command and control activities, innovation, and other complex jobs that are optimized by the proximity to other actors with similar capabilities.

By stating that the world is now a set of city-regions linked to one another by production and distribution networks, Scott et al. (2001) elegantly capture the net effect of the tension between centripetal forces of agglomeration economies and centrifugal forces leading to the spatial relocation of industrial activities. The result is a dual regional/global context that combines the urban structures of Von Thünen and Alonso with a lattice of regions similar to that proposed by Christaller (1933) with its “central place theory”. The global “lattice” is characterized by movements of information, products and capital moving in two directions: (i) between the regions that make up the world, using cities as nodes of inflow and outflow; and (ii) between each city and its respective hinterland. Figure 1 presents an overview of this complex international structure.

Local dynamics maintain concentric urban structures, consistent with the urban structural models of Von Thünen/Alonso, and are represented in figure 1 by the blue squares and the red and orange circles. However, city-regions are not isolated as these models suggest; instead, there are flows between them represented in figure 1 by the green arrows. Not all cities necessarily have interactions with all other cities in terms of inputs or products. The lines within each city-region symbolize the flow of cargo (or information); although these are local flows they may even be key inputs for activities that interact with the trade and distribution networks.

Figure 1. 21st Century Spatial Structure



Source: Authors' design, based on Von Thünen (1966) , Alonso (1964), and Scott et al (2001).

The flows shown in figure 1 suggest that information, products, and/or capital from other city-regions compete (and even replace) those created within the respective city-region. At a TED talk, Steel (2009) affirmed that advances in transportation and production systems, particularly those related to refrigeration, precipitated a breach between the close relationship that cities had with their hinterlands in terms of providing food. If that happens with foods, which are mostly essential and perishable products, then it is possible to imagine that any other product or service may be susceptible to being supplied from outside the city-region.

The private sector view: factors to be considered in industrial location decisions

One of the consequences of the “flattening” of the world, as noted by Friedman (2007), is that today a firm may locate its different activities in those places where it benefits the most. Berger (2006) reviews the factors that led some American, Japanese, and European firms to relocate part of their production to plants in Mexico, Eastern Europe, or Asia, but to maintain their corporate offices along with some of their more complex manufacturing activities in their countries of origin, thereby obtaining the highest benefits from local and offshore capabilities. Sheffi (2012) reports that Inditex, the parent company of the clothing store Zara, decided to relocate part of its production and logistical operations from its headquarters in La Coruña to a logistics platform in Zaragoza, from which it gained better access to the leading Spanish cities as well as to the European and global markets. In 2001, Boeing relocated its corporate offices from the state of Washington, where the company was founded and where its main aircraft factory is located, to Chicago, because Chicago offers better international connectivity and a larger base of financial and business services for corporate activities (The New York Times, 2001). It is also common to find large corporations opening research and development centers near those cities and/or universities known for their involvement in generating knowledge. Certain locations are more frequently favored, such as Silicon Valley or Boston for high-tech companies (Saxenian, 1994), New York, London, or Tokyo for mass-consumption or business/financial service firms (Sassen, 2001), or Washington, D.C., for think tanks, multilateral agencies, or nongovernmental organizations.

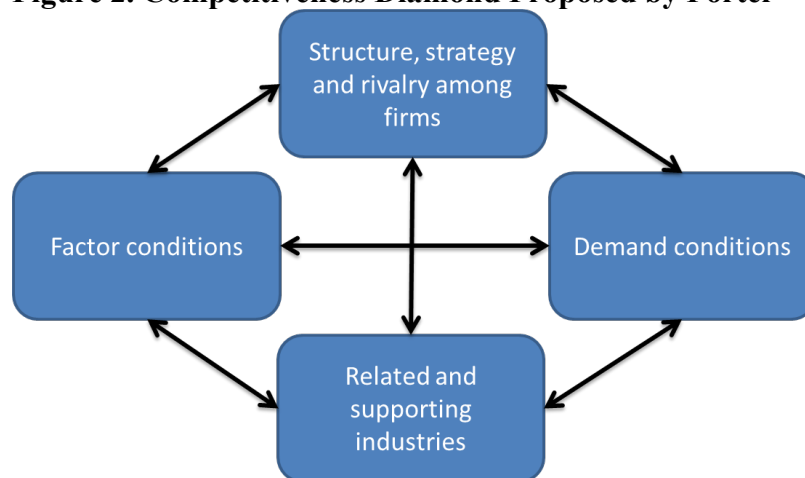
A common factor in the current location dynamics of economic activities is that it now seems that cost is no longer the *main criterion* for defining the industrial location. In New York, London, Tokyo, Hong Kong, Singapore, Boston or Silicon Valley land is expensive and incomes, on average, are high. Thus, one can imagine that operating in these places will be costly. In the case of Inditex, it is possible Zaragoza may be less expensive compared to la Coruña, but the simple fact of building a new production plant and transferring activities generates costs that could have been saved by staying in the original location. In this regard, Berger (2006) notes that many of the firms that she analyzed decided to close offshore operations and return those plants to the home country as the lower cost of inputs and/or operations did not offset the higher downtime or lower productivity that those offshore plants suffered. These issues caused firms to have greater profits in the plants located in their country of origin than in plants relocated abroad.

Furthermore, the new global production structure reveals the complexity associated with the location decisions for the various facilities and activities of firms. The flexibility that firms have to locate their activities where they consider the most appropriate places means that the location decision can almost be specific to each of the firm's activities. The literature describe two instruments that can help firms to identify the most appropriate locations for them: (i) the statements made by Porter (1990; 2000) with respect to clusters² and the competitive advantages that these places have for the development and consolidation of industrial activity, and (ii) the triad of operational strategies proposed by Lapide (2006).

According to Porter, clusters are the physical manifestation of the virtuous dynamics of his "competitive diamond" (see figure 2). The diamond consists of four factors, although according to the author, with adequate dynamics in two of those it is possible to develop and consolidate a competitive advantage. The first is *factor conditions* which refer to the development of productive inputs such as urban capital and physical infrastructure. Factor conditions may becomes a competitive driver if they offer specialized capabilities that differentiate the zone from other possible competing zones, as in the case of Singapore, Hong Kong, Rotterdam or Hamburg. The second factor, *demand conditions*, refers to the size and the sophistication of the demand from customers, with the most competitive zones being those with more demand as well as customers that are sophisticated and require product innovations that open markets, such as Silicon Valley and Boston, and, in general, the entire United States. The *strategy, structure and rivalry* of firms also influence aggregate performance, since the more ambitious firms that confront one or more strong competitor are going to be encouraged to develop differentiated capabilities and products more quickly, and that will contribute to aggregate economic growth and to the development of more sophisticated markets, such as Silicon Valley and Boston, and other global cities such as New York, London or Tokyo. Finally, locally available and advanced *related and supporting industries* facilitate the development of new products and wealth generation. The high capabilities and dynamism that exists in clusters make benefits exceed costs, regardless of how high the latter are, and they tend to create virtuous circles that attract or create new firms; that way, clusters generate capabilities and wealth which can give then worldwide advantage in the global production and distribution networks.

² Porter assigns the name of cluster to spatial concentrations that result from the interaction of all the diamond's components.

Figure 2. Competitiveness Diamond Proposed by Porter

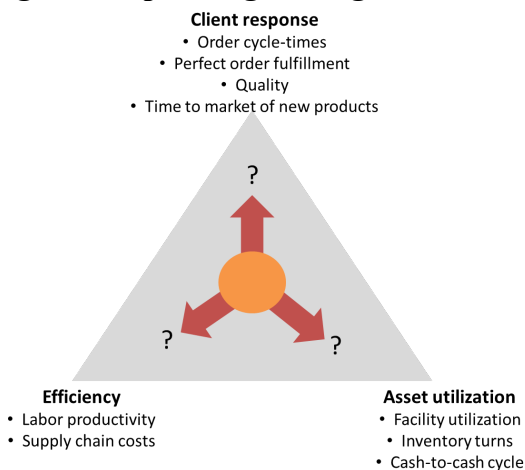


Source: Porter (1990).

The current capacity of firms to perform their activities where they consider the best place means that they are able to share among the different clusters if they so desire and if their corporate and operational strategies allow. Berger (2006) concluded from her study of 500 firms over five years that there is no better organization and productive strategy for a firm to succeed in the global context, and the real secret is having the vision and commitment to succeed. In a parallel and complementary analysis, Lapide (2006) concludes that there is no single best practice to manage a supply chain that would ensure the success of firms. Rather, the best supply chain management practice will depend on the business and operating strategy of the firm.

One of Lapide's (2006) interesting findings is that although there is no single best logistic strategy, there are three major foci that such strategy can take, which are mutually exclusive. These are shown in figure 3: (i) internal efficiency, (ii) customer response, (iii) use of the firm's assets. Firms that concentrate on the efficiency objective, are generally those that sell standardized or generalized products (commodities). To achieve high profitability this type of firm has to achieve the greatest savings, using economies of scale and/or reducing any time or cost not strictly necessary. In pursuing this goal, they may consolidate distribution centers even though that may entail longer restocking/response times for customers. Firms that adopt the customer approach strategy normally sell unique or innovative products, and for them being close to customers and having the ability to respond to them quickly create a major competitive advantage. Finally, firms that aim to maximize the use of their assets concentrate on creating a broad distribution network that lets them take best advantage of the operating permits or the productive capabilities of the expensive production plants that they have.

Figure 3. Operating Strategies and Business goals



Source: Lapide (2006).

Combining the approaches by Porter and Lapide, one would conclude that firms focusing on efficiency will tend to locate in clusters offering advantages in terms of global or local production capacity; and they will have few distribution centers to keep operating costs low, even though that may result in longer customer response time. Firms focused on customer response will tend to locate as near to their target customers as possible, and they will tend to have a greater number of distribution centers to minimize customer response time. For their part, firms that emphasize the asset utilization strategy (generally those involve natural resource operations) will tend to locate near the sources of inputs and work actively to create their own global networks for distribution and sales to help them maximize the income that can be earned from their assets.

Land and public sector institutions

Governments, elected by the residents of a given area to satisfy their common needs, have a different view and perception of land problems than the private sector. The differentiation proposed by Hudson (2001) between social and economic *places* illustrates well the different views on land held by the public sector (which represents its constituents) and private firms. People develop a strong attachment to the place where they live and create long term social ties that contribute to their well-being and personal development. For their part, firms occupy land to be able to carry out economic activity, and despite their social responsibility and local commitments, are more likely to abandon a given location if the competitive dynamics or the wear and tear on their machines forces them to find a new place where to continue their operations and be competitive.

City-regions, where social and economic activities coexist, are highly diverse, complex places characterized by constant tension between the public and private sectors due to their different views, multiplicity of actors, and diverse interests among them. These tensions hold some irony in themselves as the same constituents who demand from their government programs and projects to increase employment and generate local wealth, also demand regulations or restrictions that end up pushing out firms to other regions or countries, reducing employment.

Further to the differences between social and economic activities, other factors contribute to differentiate the perceptions held by the public and private sectors regarding land. For private actors, a location is a highly flexible production variable; firms can increase or decrease the consumption of land according to their operating dynamics. For the public sector, their territory is a constant offering little flexibility; land improvement in their jurisdiction tend to be slow and costly, and competes with other social needs for resources. If the production facility of a given private sector firm becomes obsolete, the firm has the option of closing or abandoning it to another location where it can reorganize productive operations profitably. Similarly, if a zone in a city-region becomes obsolete, the city not only finds its regional asset diminished, but its land asset generates less economic activity and less revenue, limiting their ability to recover the asset for economic growth. This vicious cycle explains, to a large extent, the problem of the city of Detroit, which in mid-2013 sought cover under the bankruptcy laws of the United States (The Economist, 2013).

The job of territorial governments has become more challenging with the advance of the forces that are “shrinking” and “flattening” the world. The large trade barriers of the past meant that the firms in one city were protected from international competition and seldom thought of relocating some or all of their activities to increase their competitive advantage. Greater connectivity opened the possibility of relocation for firms; faced with greater foreign competition many firms do in fact relocate their production activities. In these circumstances, local governments enter in a competition to retain local firms or attract others from outside in the hope of creating jobs and contribute to the well-being of the population.

Opportunities and threats of globalization for cities and regions

Greater connectivity and the possibility that firms now have to distribute their economic activities over several locations create big opportunities and big threats for city-regions that participate in the global production and distribution networks. The increased mobility of economic activity contributes to global job creation and, in theory, that is expected to promote global convergence of revenue. Regions that traditionally have had low economic performance and low employment levels now have the possibility of convincing multinational companies to establish certain economic activities in their jurisdiction, creating direct benefits in terms of greater revenue and employment, and indirect benefits to the extent that some of these activities can bring with them certain related activities. For example, the automobile assembly plants operating under “just in time” plans tend to bring with them their auto parts and component suppliers. Through this type of foreign investment attraction strategy, Costa Rica experienced significant growth in wealth and employment with the arrival of Intel (a microchip manufacturer) in the 1990s. Similar examples include the important industrial development of China since the 1970s, the arrival of major automobile assembly plants in the southern United States; and various cross-border plants (*maquiladoras*) in Mexico after NAFTA was signed in the early 90s.

Unfortunately, not all these experiences have been positive. Reiterating comments by Hudson (2001) on the transitional nature of production locations, Berger (2006) noted how some firms transfer activities across countries over time. High productivity and profits at these plants are no guarantee of their permanence over time, as illustrated by the case of Nissan in closing its plant

in the northeastern England in light of the dynamics and monetary/market tensions between the UK and the European Union (BBC, 2013).

While uncertainty over the permanence of industrial activity affects developing regions, the leading urban centers of the world continue to attract and create increasingly more industrial activities with long term commitments. The aforementioned arrival of Boeing's corporate headquarters in Chicago is a long term bet, as are the creation of all kinds of labs and research and development centers in Silicon Valley or Boston. The economic dynamics of these places continue to attract more investment, and to the extent that these industrial activities involve work that can only be done in the medium and long term, there is a strong commitment by firms to remain in place.

The reasons why certain places create longer term commitment on the part of firms are associated with: (i) cluster dynamics (figure 2) that allow activities seeking more benefits; and (ii) the fact that clusters are leading consumers and have sophisticated demands, and firms that located there tend to engage in constant innovation—similarly to the operating strategy of “customer service” in Lapide's triangle (see figure 3). As a result, clusters create virtuous circles that help sustain the production leadership position of given city/region.

In contrast, firms located in less favored places tend to have low commitment to that location. Often these firms are more advanced compared to local conditions that lack the capabilities to demand new, innovative products or to evolve or revolutionize production systems. Under those conditions firms have difficulty to recover the depreciation or erosion of their productive capital. In other words, firms tend to relocate to take better advantage of contextual factors that enable them to reconfigure their production assets or extend the time during which a particular product generates economic benefits.

Given the differences between unique, innovative products and commodities, city-regions have begun to supply production sites where firms have the possibility of choosing certain preferred (‘luxury’) sites to locate their more advanced activities. In contrast, the firms that produce undifferentiated products tend to make their location decision based on the costs and benefits offered at a given location. New York, London, Tokyo, Silicon Valley or Boston are examples of the first group, while most developing countries belong to the second group, seeking to attract investments through lower taxes or other cost-reduction incentives. This process creates some odd transfers as citizens of one region end up financing a good part of the inputs and advantages that the foreign firms use to generate more profits in their place of origin.

Cities are intrinsically complex and are constantly affected by global opportunities and threats. However, many city governments are not aware of these dynamics and tend to ignore municipalities, regions or countries just beyond their border. As local governments focus primarily on their constituents, they tend to have little comprehension of business dynamics and underestimate the impact that globalization might have on firms, and through firms, on the sustainability of economic activities and the urban structure itself.

Misunderstanding regarding global business dynamics is often combined with greater competition among jurisdictions to attract economic activity. This competition causes citizens to assume sizable medium and long term commitments to attract activities whose permanence may

be temporary. Thus, a very risky scenario emerges which might lead to the economic and physical deterioration of the city and to its obsolescence. The bankruptcy of Detroit was greatly affected by the city's inability to adapt to new conditions; instead, it continued to make more and more commitments that in the end could not be met (The Economist, 2013).

These risks highlight the importance of advancing the analysis of local and global business dynamics and understanding better how land markets are created in order to: (i) formulate economic and urban development strategies that enable a given place to become a “luxury” location for certain activities; and (ii) define better strategies to attract and to retain firms, maximizing local benefits and minimizing risky commitments assumed by citizens, taking into account the global competition to attract firms.

We close this section with five important conclusions:

1. The “shrinking” and “flattening” of the world and the possibility that firms have to relocating activities anywhere creates major opportunities to participate in wealth, but also poses the threat that activities performed locally may relocate elsewhere.
2. The greater connectivity and the flexibility associated with the location of production have created a market in which firms demand land for production, and local governments compete to provide it.
3. As in other markets for goods, there are “luxury” places for certain activities that command high costs, but that promise also large returns for those firms that can afford to locate in them. For other activities, there are “commodity” places which are all similar and prompt price driven location decisions, which in some cases force local residents to assume part of the costs in order to become or remain as an attractive option.
4. Cities are not only viable due to their (good and bad) internal dynamics, but are also exposed to outside forces. These forces need to be recognized and used in order to manage urban development.
5. Cities must foster a process whereby they recognize the impacts of local and foreign dynamics on local businesses. That will enable them to formulate strategies to become “luxury” production places, optimizing their attraction by maximizing local benefits and minimizing commitments and risks assumed by local citizens in the medium and long term.

Location of Economic Activities in Bogotá and Neighboring Municipalities

This section begins with a description of what we found in the literature about the actions of Bogotá and the neighboring municipalities with respect to industrial location. In its foreign investment promotion document (Invest in Bogota, 2012), Bogotá presents itself almost exclusively as a large market of consumers with considerable purchasing power. The authors of this document depict the city as more interested in attracting product sellers than industry, given

that in order to attract industry Bogotá would need to have some differentiating competitive factor or capability. This perspective seems to be reinforced by measures taken by local government which directly affect the operation of industrial activities and encouraged their relocation away from the city. A case in point is the restrictions imposed by the department of transportation on access or internal movement of cargo in the city. Notwithstanding this apparent agenda to discourage industrial activity, some documents from other local government entities view with misgivings the relocation of firms to other municipalities in Cundinamarca and the rest of the country (Secretaría Distrital de Hacienda, 2011).

In contrast, the neighboring municipalities have developed and introduced measures aimed to attract industry and other productive activities. They established industrial zones, granted tax exemptions, and took advantage of major developments in road infrastructure funded by the national government in their jurisdiction. The municipal governments believe that by attracting industry they foster the creation of jobs for the local residents and also gain other additional benefits, such as new residential and commercial activities. They expect the process to result in greater productivity, higher land prices, and ultimately greater tax revenue that can be used to build infrastructure and further stimulate the local economy and create more local wealth.

As mentioned earlier, the initiatives taken to attract firms have not been the result of a joint effort between Bogotá and its neighboring municipalities. Instead, local governments compete with each other, almost exclusively in reducing local taxes. In fact, municipal governments have few alternatives or resources to differentiate their jurisdictions, such as advantages in education, municipal public services or transportation. Other attraction factors such as major highways or the location of other large firms are normally beyond their power; highways are administered by the national government and the location of large firms is decided by the firms.

The economy of Bogotá and its interaction with Colombia and the world

The city of Bogotá is the political and economic capital of Colombia. As the political capital of the country it is the seat of the main governmental entities, including the president, the ministers, Congress, and the top judiciary authorities. Bogotá is also the economic capital: in 2011 its local economic activities plus those coordinated from the city accounted for 26.1 percent of Colombia's gross domestic product (DANE, 2013a). Table 1 show the impact of the economic power of the capital on the country's aggregate product. Bogotá alone accounts for 23 percent of the country's industrial value added, 32 percent of commerce, 27 percent of transportation, and 43 percent of services. Together, Bogotá and Cundinamarca—the state where the municipalities surrounding the capital are located, represent nearly 33 percent of the country's industry, commerce and transport activities, and 45 percent of its services.

Table 1. Comparison of Economic Performance in 2011: Bogotá and Main Departments

Territorial entity	% Industry	%Commerce	%Transport	%Services
Bogotá	23.1%	31.5%	27.3%	42.7%
Cundinamarca	9.0%	5.2%	5.0%	2.5%
Bogotá and Cundinamarca	32.0%	36.7%	32.3%	45.2%
Antioquia	15.8%	15.5%	12.4%	15.3%
Atlántico	4.6%	4.4%	4.7%	4.2%
Bolívar	7.0%	3.0%	4.1%	2.4%
Valle	12.8%	9.7%	10.6%	13.6%
Santander	11.8%	5.1%	5.8%	4.4%

Source: Prepared by authors based on DANE (2013a).

Haddad et al. (2008) analyzed the economic interdependence among the various departments of Colombia, and found strong “backward” links between Bogotá and the other departments that are not offset by corresponding forward links. Given that backward links reflect relationships with suppliers and forward links correspond to relationships with customer, the study leads to the conclusion that Bogotá is a place that consumes resources from the rest of the country. For those authors, the status of Bogotá promotes the economic polarization of the country as the capital occupies the central place and the other departments find themselves increasingly relegated to the periphery.

Extending this analysis of flows and interdependencies to the international market, one notes that Bogotá has traditionally been a receiver of products from abroad, as the city historically receives the largest volume and amount of imports in the country. This trend would be even more pronounced if we consider Bogotá and Cundinamarca a single economic unit (see table 2).

Table 2. Volume and Value of Imports in the Main Economic Centers of Colombia, 1998 and 2012

Territorial entity	1998			2012		
	Volume (Ton x 10⁶)	CIF Value (US\$ x 10⁶)	Unit Value (US\$/Ton)	Volume (Ton x 10⁶)	CIF Value (US\$ x 10⁶)	Unit Value (US\$/Ton)
Bogotá	2.5	2,883.8	1,158.1	9.4	27,321.0	2,891.4
Cundinamarca	3.1	5,036.4	1,610.6	2.3	6,096.0	2,667.3
Bogotá y Cundinamarca	5.6	7,920.2	1,410.0	11.7	33,417.0	2,847.7
Antioquia	2.0	2,045.9	1,007.9	4.4	7,167.0	1,628.5
Atlántico	2.0	886.7	450.3	2.6	3,061.3	1,180.6
Bolívar	1.1	654.1	600.7	3.2	3,611.2	1,136.7
Santander	0.5	220.8	417.0	3.5	4,850.0	1,375.9
Valle	2.0	1,703.0	857.1	1.0	938.8	920.5

Source: Prepared by authors based on DIAN (2013a)

Export statistics from Colombia’s customs authority (Dirección de Impuestos y Aduanas Nacionales de Colombia—DIAN) reveal that there is no offsetting between the flows that arrive and depart from Bogotá. The volume of cargo exported originating in the capital has traditionally been low, even though its unit value is high (see table 3).

Table 3. Volume and Value of Exports from the Main Economic Centers of Colombia, 1998 and 2012

Territorial entity	1998			2012		
	Volume (Ton x 10 ⁶)	FOB Value (US\$ x 10 ⁶)	Unit Value (US\$/Ton)	Volume (Ton x 10 ⁶)	FOB Value (US\$ x 10 ⁶)	Unit Value (US\$/Ton)
Bogotá	0.0	106.0	3,658.3	0.9	3,748.5	4,226.0
Cundinamarca	0.5	1,542.9	3,214.3	2.1	1,793.8	846.1
Bogotá y Cundinamarca	0.5	1,648.9	3,239.6	3.0	5,542.3	1,843.1
Antioquia	1.3	1,272.2	953.0	2.2	6,708.6	3,098.6
Atlántico	0.8	422.1	501.8	0.6	1,194.3	2,102.7
Bolívar	1.3	461.7	346.1	3.6	3,552.1	981.2
Valle	1.3	853.0	646.8	1.2	2,280.3	1,916.2
Santander	0.0	47.0	2,136.4	0.5	713.7	1,490.0

Source: Prepared by authors based on DIAN (2013b) .

Bonet and Meisel Roca (2006) note an increasing concentration of real income per capita in Bogotá and we expect that this trend will continue to grow in the future. Data presented in table 1 support this assumption, especially considering the large share of Bogotá in the national service sector and the economies of agglomeration that continue to favor service activities in Bogotá.

On an international economic activity map, the trend in product flows to and from Bogotá place the city as a “net consumer” of products. Applying the scheme shown in figure 1 to Colombia, Bogotá would be at the red center, Cundinamarca or the country’s mountainous zone in the orange circle, and the rest of the country in the blue rectangle zone. In terms of the arrows, both the black and green arrows would point to Bogotá, with only a few little arrows coming out of it.

This pictorial representation of Bogotá in the local, national and international context suggests three hypotheses. The first is that the firms that locate their production or distribution facilities in or around Bogotá expect to sell most of their output in Bogotá. This makes sense since Bogotá and its surrounding areas comprise a market with eight million inhabitants who have the highest per-capita purchasing power in the country (Bonet & Meisel Roca, 2006). A second hypothesis is that the firms that sell all their output to Bogotá have an incentive to remain in the city, while those that produce or sell to other zones in the country or abroad will seek a location with the infrastructure that facilitates their access to multiple markets. The third hypothesis is that domestic firms located in the region and facing competition from foreign firms will tend to prioritize cost-related criteria in their location decision, considering this a good way to control costs without resorting to economies of scale in production.

General Trends in Land Regulation and Land Use in Bogotá and Neighboring Municipalities

The industrial activities in Bogotá had an interesting evolution in the period from 2004 to 2010. As indicated by a recent government report (Secretaría Distrital de Planeación, 2010), during that period the number of buildings and blocks occupied by heavy industry declined and the number of buildings used for medium-scale industrial activity and craft production increased. Looking at

area occupied by each of these activities we observe a surprising and counterintuitive fact: there was a 10 percent increase in the area used by heavy industry and a small reduction in the area occupied by craft production. Together, the number of buildings dedicated to productive activities grew by 39 percent but the land area increased by only 11.3 percent.

There was a large expansion in the land area of commerce and service activities. Commercial activity grew by 18.4 percent and used 18.8 percent more land area. The number of buildings used for services (such as offices and clinics) grew by 13.4 percent together with an increase of 18.2 percent in occupied land area. Thus, there was a highly proportional building-to-land ratio in the evolution of commercial and service activities but the opposite trend is observed for industrial activity.

Economic activity in the municipalities surrounding Bogotá grew considerably since the year 2000. At that time, several municipal governments allocated large areas to industrial use in their master plans and offered incentives such as tax exemptions to firms willing to locate in their jurisdiction (Mora Ardila 2012). According to the District Financial Office (2011) in the year 2010, Cundinamarca was the main destination for firms relocating from Bogotá. This estimate is based on the fact municipalities in Cundinamarca received nearly 93 percent of the revenues lost by Bogotá. Studies of business trends in the Cundinamarca municipalities (SDP - UNCRD, 2011; Mora Ardila, 2012) give direct evidence of an increase in the number of firms that relocated to the state. Similarly, the analysis of trends in municipal revenue show that these municipalities experienced major revenue increases in recent years associated with the relocation of firms to their jurisdiction.

Mora Ardila (2012) reports an interesting finding from his analysis of the Western Industrial Corridor—from Calle 80 through the Medellín Highway, west of Bogotá. Firms located in this corridor include production headquarters as well as industrial and business parks. The large area occupied by these firms lends itself to storage and other production support activities; their location indicates logistics strategies that prioritize product flow (see figure 3).

The dynamics observed in Bogotá and its neighboring municipalities are reasonably compatible with the conceptual framework described in section 2. To reach production levels of a major firm requires codifying and automating a good part of the productive processes. It also requires technology and processes that conduce to the optimization of scarce production inputs, such as energy or water. The self-sufficiency that large firms have developed to produce, enables them to locate production anywhere they can gain the highest advantage from logistics costs, access to customers, or access to specialized inputs. From this perspective, the loss of major industries in Bogotá seems like an inevitable fate for the city.

The observed increase of medium-scale industry, craft production, commerce and services in Bogotá fits with the theories presented in section 2, and are compatible with the regional and urban economics literature. Sassen (2001) argues that as incomes rise, there will be a higher demand for personalized products whose manufacturing is more easily done by small and medium sized enterprises with their more flexible production systems (Utterback, 1994; Christensen & Raynor, 2003). To the extent that the competitive advantage of these firms is based on proximity to customers and on their ability to launch new or personalized products,

medium-scale industry and craft production will pursue logistics strategies that prize proximity to customers. Similarly, commercial and service firms that will also seek to be as close as possible to customers in order to sell their products successfully. The concluding evidence supporting this argument is the fact that the recent economic prosperity of Bogotá has prompted greater consumption of luxury or personalized products or brands, coupled with large increases in the cost of products and services as well as real estate.

Recognizing that location trends for industrial and commercial firms in and around Bogotá coincide with the global dynamics of industrial location (and relocation) is a key factor in restating the way Bogotá and its neighboring municipalities might collaborate and compete. For the region to offer “luxury” places for firms and further expand its productive activities, Bogotá and its neighboring municipalities should collaborate and compete to promote a better distribution land for production use and to reduce the negative externalities, particularly by ensuring the adequate supply of public services in the zones receiving relocating firms (Mora Ardila, 2012, págs. 44, 61; UT Julio Gómez - Grupo de Estudios Urbanos Ltda., 2008). A healthy competition among the local governments in the region would likely encourage the emergence and development of new activities that would contribute to reinforce a productive cluster.

Review of Studies on Industrial Location and Land Use Policy in Bogotá

The public sector and academia have both produced several diagnoses and recommendations for the region. Typically they conclude by recommending greater coordination local governments in the region; establishment of environmental preservation areas; making changes to the regional balance of land allocated for industrial, commercial and service use; and formulating and carrying out plans to expand infrastructure. Documents such as Municipal Master Plans (MOT) in the provinces of Sabana Centro, Sabana Occidente, and Soacha in Cundinamarca, or the Regional Urban Macro Project for the Area of Influence of the El Dorado Airport (MURA) focus their proposals on how economic activities should be spatially distributed within the region. However, these documents provide no thorough analyses of the local and global dynamics that may affect economic activities in the region. They also give no signs of having consulted private sector actors to inquire how willing they are to implement the vision, as they are the ones that can make it a reality through their investments.

The lack of interaction among the different public and private actors with regard to land use regulation and planning tools is perhaps the reason that for their poor implementation record. Moreover, the commitment to carry out such plans varies with each new administration. Experts in complex systems point out that, for socio-technical and collaborative systems such as regional production systems, the way in which changes takes place is as important as the change sought (Maier & Rechlin, 2009; de Weck, Roos, & Magee, 2011). In most cases, one or several of the actors involved in a process of change must feel that things are getting worse before they see the benefits from the change (Forrester J. W., 2007a; Forrester J. W., 2007b; Sterman, 2000).

Bateman (2010) gives an example of land use policy that recognizes the existence of local problems and suggests some of their causes but turned out to be inadequate because the policies were not validated by those that would be involved with implementing it. Bateman (2010)

explains the current dynamics of Bogotá by reference to other cities (e.g. Buenos Aires, New York) and other times, but does not show how dynamics of those other cities and times is relevant to the development of the metropolitan region of Bogotá. We also note that Bateman identifies the development potential of Bogotá by emphasizing how attractive the city is as a market with high purchasing power, but does not indicate specific factors that might give the region international comparative advantage for industrial location.

In reviewing the literature we found only two studies based on direct consultations with firms. The first, by the Chamber of Commerce of Bogotá has the objective to identify what determines the location of firms in Bogotá and in 17 municipalities of Cundinamarca (CCB, 2011). At first glance, this study seems to have the same objectives as this paper, since our analysis also seeks to understand what different types of firm value when deciding where to locate. The CCB study assembles a great deal of information to support a cross-sectional analysis but its findings are not reliable guide to formulate economic and urban development policy due to methodological problems. The first problem relates to way in which the sample was divided for the analysis, focusing only on characteristics such as firm's size or location. As Christensen and Raynor (2003) note, market studies that focus on the characteristics of the people or other objects of study fail to recognize that behind these "apparent" aspects there may be other, more subtle factors that are much more important in understanding consumer decisions.³ Secondly, the CCB study uses ranking as a tool to describe the reasons given by firms for their choice of location or relocation of their activities. Ranking systems are problematic because: (i) they define the order of importance of the reasons actors perceive as relevant for a decision, but do not give the magnitude or difference in weight that may exist between one motive and another; (ii) direct questions about reasons for location may create biases, since in complex systems like cities and firms, perceptions are more important than the realities (Maier & Rechtin, 2009); in other words, human reactions and perceptions are subject to mental models that precondition the interpretation and reactions by people in light of different external impulses (Stermann, 2000, págs. 17-19); and (iii) decisions do not result from individual or isolated factors, but rather from the complex mental process of assigning weights to different factors in order to reach a conclusion based on them (Saaty, 2012).

The second study that based on information collected directly from firms about the factors that influenced their location decisions is by Rubiano Briñez (2010) using data from the Survey on Industrial Location in the Bogotá Savanna (ELIS) conducted in 2009. This study presents similar weaknesses as those noted in the CCB study. Its first problem is to lack an analysis of the competitive conditions and functional interactions of the firms, focusing rather on the zone the firms are located. Another weakness is to rely on hypothetical scenarios when questioning respondents about the reasons for their location preferences. As mentioned above, this mode of questioning introduces biases in the responses. To increase the reliability of the analysis, the author would need to have some type of statistical control for these biases and also to recognize the complex structures of causality and decision. With these enhancements the study would be more useful as base to formulate and implement urban and economic development policy.

³ It is important to remember that in section 0 we note that in the current global context, governments often offer land to firms for carrying out their economic activity.

On balance, the review of studies focused on Bogotá shows several shortcomings that are apparent in the land use policies they recommend and the in their analysis of the decision making process of firms. The analyses have a very significant bias toward the domestic view of the region and its government jurisdictions, which as we pointed out in section 2 is not enough to understand how they act and develop in the new global context. For the most part, the studies are based on secondary information and interpretations by urban planning experts. They tend to focus more on what would be ideal rather than on what it is possible to achieve based on the city's vision and reality.

The few studies available are hampered by resorting in large part to perceptions or rankings. They do not provide comparative analyses of ex-ante and ex-post conditions of a location or relocation decision. They also do not identify other problems that emerge (and are resolved) in the process of industrial location or relocation decisions, but limit their attention to finding out whether the firms have fulfilled their location expectations. In sum, this type of analyses tend concentrate on the goals and the management of the public sector, looking more at products than at the results that might be generated by these products.

Methodology

This study seeks to better understand industrial location issues and contribute to the formulation of regional development policies articulated by public and private actors. We aim to make better use of what is known about the needs of firms, including their previous location or relocation experiences, to optimize land use in the Bogotá metropolitan region, to the extent possible. Specifically, the study was designed with two objectives: (i) to further the understanding of how the recent dynamics of globalization affect the way in which public and private entities perceive location and act with respect to it; and (ii) to propose a tool to help improve the analysis of private sector regional dynamics in order to improve economic and regional development strategies.

The first objective was mainly addressed in section 2, where we make two key observations that should be reiterated. First, the greater mobility of capital and connectivity in the current global context have resulted in a global land market for production in which governments are the suppliers and firms make demands; within that market there are “luxury” land niches in certain areas of the world that have high demand and high productive returns for goods and services. Concomitantly there is a larger market where undifferentiated land is negotiated and where firms making location decisions tend prioritize price. Second, local governments, as representatives of their constituents who are deeply rooted in the place where they live and spend more time there, fail to recognize and understand these external dynamics and the opportunities and threats resulting from them. That makes them behave erratically in their efforts to attract firms and generate wealth in their jurisdiction. In certain cases, governments inadequately absorb some costs associated the location in order to attract firms, even though firms will not have strong commitment to stay in that location due to its low capabilities and/or benefits.

To reach the second objective, we need to know the opinion of business owners directly from them, and for that, the most expedient way is to ask them how they make their location decisions.

With that goal, we designed a survey to gather information from firms that would allow us to determine the approximate weights that business owners assign to the various factors that influence their location decisions. We analyze these data using the Analytical Hierarchical Process (AHP) methodology, described in the following paragraphs. We believe that if local governments would use this methodology, they would be more effective in their efforts to retain and/or attract firms to their jurisdiction.

Survey design

We prepared the survey in three modules considering firm type, size, and location, and taking into account their competitive environment. Annex 1 presents the questionnaire used in the survey. In the first survey module we inquire about the characteristics of the respondent and the firm, specifying the sector of activity and the firm size. In this module we also included a question about the degree of competition faced by the firm, and whether the competition is primarily local, national, or international. We expect to obtain valuable information about the location patterns of firms exposed to competition. In the second survey module we seek information about the facilities used by the firm, which are our main unit of analysis, taking into account that many firms operate more than one facility. This module includes questions about the type of activity that is carried out the plant (whether administration, production, logistics, or other) and the location of the facility. As we want to identify the spatial pattern of commercial flows of the firm, respondents are asked what percentage of inputs and sales come from/go to specific cities and regions. Respondents are also asked to indicate where their workers are from, considering scarcity of skilled labor may be a problem in certain municipalities. The third and final module of the survey is dedicated to the AHP model, whose functionality and structure are discussed below.

AHP methodology

The Analytical Hierarchical Process (AHP)/Analytical Network Process (ANP) facilitates the analysis of complex decision-making processes, whereby the decision depends on multiple variables that are not easy to compare, often cannot be directly observed, and assume different weights depending on the person or group of people making the decision. In fact, from the simplest decision to the most complex, the process involves evaluating multiple criteria. For instance, the decision to buy a washing machine for home use involves considering factors such as electricity and water consumption, load capacity, design aspects, purchase price, among others. Similarly, a decision to drill a deep sea oil well must be based on technical, economic, environmental, and even political factors. In sum, any decision is a complex process that involves taking into account numerous criteria, factors, and determinants.⁴

The development of the AHP analytical hierarchical diagram can be summed up in a few steps, which must be followed in order to handle the decision-making process properly. First, the problem and type of knowledge sought must be clearly defined. Second, the decision hierarchy must be established, starting with the goal to be reached and continuing with the various criteria and possible sub-criteria deemed important to reach that goal; some alternatives options for

⁴ For more detail on the goals and areas of application of the methodology, we recommend reviewing Saaty (2012). A wide array of academic fields has made use of this methodology.

meeting the goal may also be included. Third, a set of pair comparison matrices must be build based on the criteria and alternatives identified.

The application of the methodology: The AHP methodology involves presenting the respondent with pairs of factors and obtaining an evaluation of such factors. For example, “compare factor i with factor j ” in a valuation scale that goes from -9 (in the case of an absolute preference for factor i) to +9 (indicating total preference for factor j), passing by 1 which indicates indifference between the two options. Table 5 presents the complete valuation scale used in our study.

Table 4. Comparison of Alternatives using the AHP Methodology

-9	-7	-5	-3	1	3	5	7	9
Exclusive preference for factor i	Factor i very strongly preferred to Factor j	Factor i strongly preferred to Factor j	Factor i moderately preferred to Factor j	Equal preference between the two factors	Factor j moderately preferred to Factor i	Factor j strongly preferred to Factor i	Factor j very strongly preferred to Factor i	Exclusive preference for Factor j

Source: Prepared by authors based on Saaty (2012).

The results of these comparisons are compiled in a matrix, which we call Matrix A. Note that if factor i is five times more important than factor j , then factor j is one-fifth more important than factor i . Therefore, the component ij in Matrix A is the inverse of component ji , and the factors on the diagonal are equal to one. Our objective here is not to present a full description of the methodology but to note that the AHP model is used to process the results of comparisons in order to obtain an absolute valuation (w) from the respondent: w_i y w_j for all i and j . This valuation is expressed as a percentage. The sum of the w 's for each factor must be equal to one, and the sub-criteria that explain each first-level criterion must also add up to one. Readers interested in the details of the calculation process can refer to Saaty (2012).

Consistency: The AHP method includes a consistency test. The consistency analysis is needed because a respondent may make some valuations that contradict others made earlier. For instance, the respondent may express preference for option A to option B, and option B to option C, but then say that he prefers A to C, which could be the result of an accidental error, a limited effort to evaluate the comparisons, or a mistake in the survey design.

In our study we collect as many factor-weights and as the number of factors surveyed, and before proceeding to the analysis we make sure that answers successfully pass the consistency test. It is generally accepted that a consistency test resulting less than 10 percent indicates that the answer can be considered valid. However, there are no explicit criteria to determine this limit. Once we have a set of consistent valuations, we can start carrying out different types of the analyses, such as those aimed to identifying how the average industrial firm values different location determinant factors.

The application of this methodology is an interesting, innovative job in the local environment, as it directly addresses some of the weaknesses identified in the previous studies of location decisions in Bogotá and its surrounding area. The AHP/ANP methodology does not discard a

factor because it is deemed to be insignificant in the decision making process, as is the case when studies ask the respondents to select the main reasons for choosing a location (from a list of other locations, or through other types of econometric analyses). Instead, the AHP/ANP helps determine the weight of each factor in the decision, and by doing that provides different perspectives to understand the decision. The greatest detail elicited by the AHP methodology derives from the method used to verify the consistency of the results, showing that complex, multidimensional decision processes involve different trade-offs for different types of firms.

Hierarchical structure used

In this subsection describes the factors that we identified as important to firms when making a decision about industrial location in the case of Bogotá and its neighboring municipalities. We identified these factors based on our review of the literature review, on the studies conducted in the Bogotá region, and on interviews with actors involved in the process of location or relocation of firms. We then build a two-level hierarchy, the first level of which is divided into three groups: operating costs, public infrastructure factors, and agglomeration benefits. The second level of the hierarchy consists of factors that explain those in the first level. Table 5 shows the resulting hierarchical structure used in this study, identifying the main goals, criteria and sub-criteria.⁵

In this study, we asked respondents to compare different factors that explain their location decision, as required by the AHP methodology. A complete application of the methodology would also include an evaluation by the respondents of different alternative locations. We did not ask respondents for this additional evaluation because our goal is not to determine the best location for each firm, but rather to evaluate which factors explain the chosen location.

Table 5 — Hierarchical Structure of the Problem being Analyzed

Criteria	Operating costs	Public-infrastructure factors	Agglomeration benefits
Sub-criteria	Transportation costs	Road infrastructure capacity	Local availability of skilled labor
	Local taxes	Accessibility to the airport	Proximity to suppliers
	Cost of land/leasing	Availability of basic public services (electricity, water, telecommunications)	Proximity to customers
		Public transportation that facilitates access by workers	

Source: Prepared by the authors

⁵ In the pilot test of the survey, we used a hierarchical structure consisting of four categories in the first level and twenty in the second. This resulted in a total of 69 comparisons, which turned out to be very difficult to analyze.

Data Processing and Analysis

The Survey questionnaire and the information gathering process

The survey form was distributed via an Internet survey service. It was sent to more than 80 owners of industrial, logistic, commercial and service firms whose facilities are located in the city of Bogotá and its neighboring municipalities in the department of Cundinamarca. The period in which information was gathered was from August 2013 through March 2014. To facilitate survey responses we used a combination of methods including sending e-mails, posting http links on trade association web pages, making in-person and telephone interviews, and collecting data during meetings of several business associations.

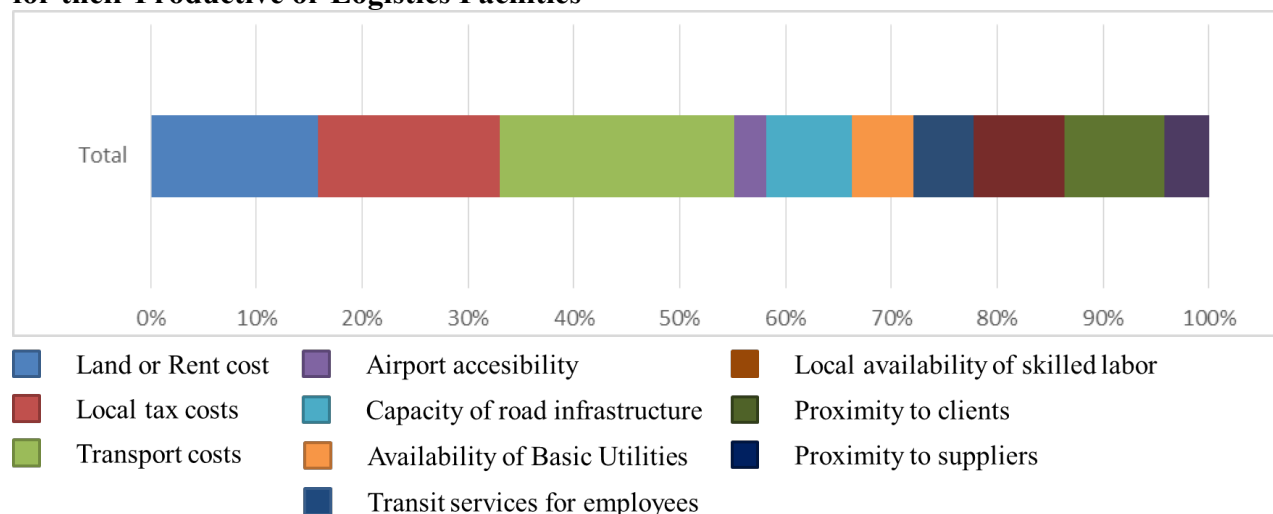
Of the survey form distributed, we received a total of 54 responses, of which only 28 could be used, equivalent to a 35 percent response rate. The discarded responses had major omissions that prevented the application of our analytical methodology. Even though the study tried to limit the number of firms considered by focusing only on those whose operations involved physical movement of cargo, the wide variety of foci and products that can be found among these firms led to a wide dispersion of results. Thus, we must point out from the outset that the results we present here cannot be considered statistically significant. Their usefulness resides in motivating discussions and in highlighting some interesting trends that suggest topics for further research. In future studies we would expect to have more resources to ensure a greater response rate on the part of business owners. We would also like to enlarge the scope of study to include comparisons between a region with “luxury” locations and another with “commodity” locations, as discussed in section 2.4.

The information gathered through the survey comprises the AHP comparisons, and also data on the characteristics of the firm (its size and economic sector), the characteristics of the facilities occupied by the firm (its physical location and building tenure status), and information about the firm’s competitive and operational conditions. Despite the limitations imposed by our sample size, the analysis of all these data provides many interesting ideas on the determinants of industrial worth exploring in greater detail in the future.

Weighting the various contextual factors in the location decision of firms

We start by examining the weights assigned by firms to contextual factors in their location decisions at the aggregate level. Figure 4 represents the relative importance of each factor by the size of each color segment

Figure 4. Average Weight Assigned to Contextual Factors by Firms Choosing the Location for their Productive or Logistics Facilities



Source: Prepared by the authors, based on the survey data.

Based on this aggregate result for the 28 firms in our sample, the municipalities surrounding Bogotá seem to have an important instrument for attracting firms to their jurisdictions by offering local tax exemptions. The importance of local taxes and the cost of land in the decision making process is only surpassed by the cost of transportation.

When firms know the costs associated with their productive or logistic activities they are in a better position to define their business strategies. The same is true for local governments that can make better policy decisions when they know the weight of each factor in the location decisions of firms. Unlike ranking systems that show the order of importance but not the magnitude of the differences in relative importance among factors—as that used by the CCB (2011) study—when governments known the weights attributed to contextual factors in the location decisions of firms they can estimate the cost-benefit of alternative policy interventions aimed at attracting or retaining productive activities in their jurisdiction. The distribution of factor weights show in figure 4 suggests that interventions to reduce transportation costs would have nearly 30 percent more impact than tax incentive in industrial location decisions in the Bogotá region. Therefore, if a comparative cost analysis shows that transportation improvements involve similar fiscal effort to that of providing tax exemptions, then the greater potential benefit of transportation improvements should tilt the balance in its favor. Other factors can be analyzed in similar way to help local governments identify which policy options more likely to attract (or retain) firms.

While analyzing aggregate results can help improve local government policy choices, aggregate results have the inconvenience of being “an average” that may not be applicable to any firm in particular. Likewise, the firms whose weights coincide with or are near the average value may not be the type of firm that a local government wants to attract. De Neufville and Scholtes (2011, pgs. 187–194) discuss the problems that local governments may face when formulating policy based on average values. Instead, governments designing policy should take into account a broad spectrum of possible scenarios, building-in enough flexibility to allow for policy adjustments to changing conditions, taking advantage of the new opportunities.

Changes in the weights of contextual factors depending on the characteristics of firms

In the section we show how different characteristics of the firm influence the weights assigned by them to contextual factors.

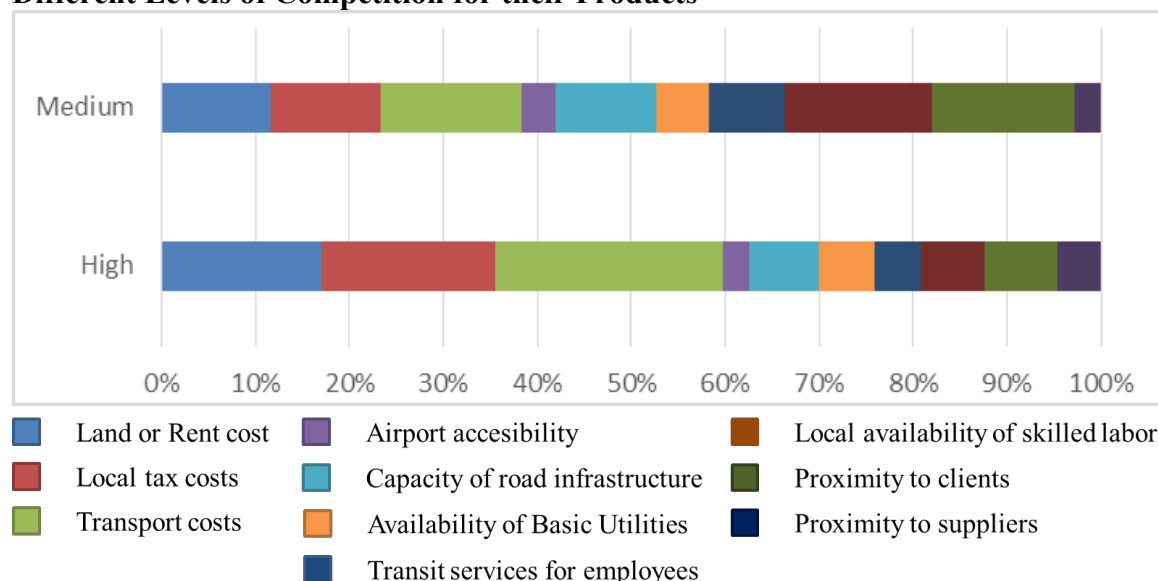
Changes in weights associated with product competitiveness

According to economic theory, firms and markets behave differently depending on the competition they experience for the products traded. Firms that participate in perfectly competitive markets must focus their productive efforts on pursuing and achieving efficiencies to be profitable and sustainable in a context in which price is the deciding factor. Differentiated products traded in markets with monopolies and other forms of monopolistic competition can generate higher profits or higher costs, depending upon how the quantity to be produced is defined.

Firms in competitive markets will tend to favor the “efficiency” and “asset utilization” approaches in Lapide’s triangle (see figure 3), while those enjoying exclusivity and product differentiation will tend to focus on Lipid’s “customer service” approach. In other words, one can expect that firms in competitive markets will tend to favor factors related to cost and flow, while those selling differentiated products will favor proximity to customers and attribute less importance to cost considerations.

Results from the analysis of the competitive environment of the firms surveyed in the Bogotá region reveal behavior consistent with this conceptual framework. Interestingly, we do not have in our sample any firm experiencing low competition. Among the highly competitive firms, contextual factors involving costs account for nearly 60 percent of their location decision; for competitive firms, the cost factor falls to 40 percent in determining the decision. The importance of accessibility and contact with customers tends to increase as the level of product competition declines. In fact, customer-proximity has twice the impact on the decisions of competitive companies compared to highly competitive ones. Transportation costs are less important for less competitive firms, but account for nearly one-fourth of the location decision among highly competitive firms.

Figure 5. Comparison of Weights Assigned to Contextual Factors by Firms Facing Different Levels of Competition for their Products



Source: Prepared by the authors, based on the survey data.

The lack firms facing low competition in our sample is consistent with the economic dynamics of Bogotá and Cundinamarca. This region is the main industrial zone of Colombia, accounting for a third of the industrial activity, and is also the main destination for imports. It receives nearly three-times the volume (tons) and 4.5 times the value of imports than Antioquia, the next most important region. Since Bogotá is such a big market, there is considerable competition among firms that produce locally, as well as among those and firms located outside of the region, either elsewhere in Colombia or in another country.

A high level of industrial competition suggests two important considerations. First, it appears that Bogotá and the savanna compete in undifferentiated global land market for industrial. With time, and in the absence of measures to control the supply and price of land, it is possible that industry will leave the Bogotá completely, causing serious employment problems and limiting wealth generation. Second and directly associated with the first consideration, is that industrial-development and land use policies for the Bogotá must take into account the global dynamics of industry. To the extent that industrial location analysis and related policies continue to focus primarily on domestic issues and on assumptions about the regional self-sufficiency, the risk that regional economic and land use policies will continue to be ineffective increases.

Changes in the weights associated with the importance of local sales

Competition among local and foreign firms in the Bogotá and Cundinamarca, plus the risks associated with inadequate public policies suggest that local industry may shrink to a minimum, causing social and economic problems. It is important therefore to understand better how firms of different operating configurations value contextual factors when choosing the location of their facilities. Presently, firms have greater freedom and flexibility in choosing the location of their productive activities. They have more flexibility as to the sources of inputs, production location,

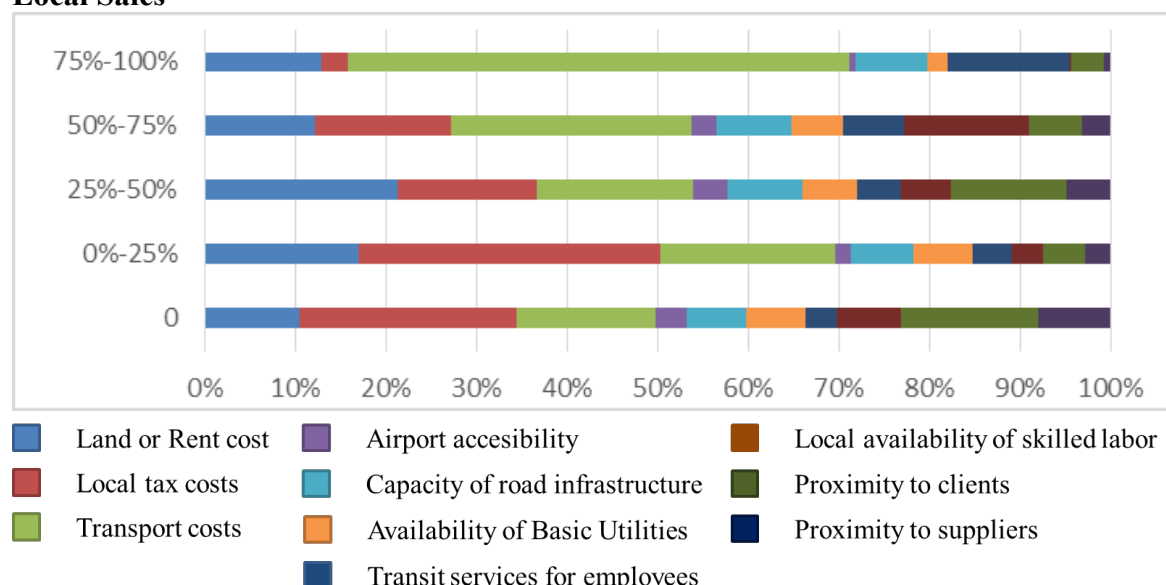
and target (geographic) markets. As noted by Berger (2006), there is not a single “best strategy” or “best structure” for a firm to succeed in the global market. It is up to the firm to define its productive strategy and to combine its assets as best as possible (including land) to achieve competitive advantage.

From an operating perspective, the variable of interest in this analysis is the percentage of the firm’s output sold in the local market. We attempted to take account also factors related to inputs from other regions, but the results proved to be more difficult to interpret in a context of high manufacturing flexibility, regional connectivity, and different operational strategies of firms. Our focus on the importance of the local market in relation to total output is expected to yield more relevant results for regional policy related to industrial development and land use management. From a theoretical perspective, one would expect that firms with relatively more sales on the local market will give priority to factors that can give them competitive advantages in that market. In the highly competitive market of Bogotá, this would imply greater emphasis on cost factors on the part of firms.

Figure 6 presents the results of this analysis, distinguishing four groups according to the proportion of output that firms sell in the local market. We find that as firms sell more of their output on the local market, the value they assign to costs in their location decisions increases. The greater relevance of costs shows a large increase in the importance of transportation costs and an apparent drop in local taxes and land costs. Possibly, less importance attributed to land and taxes correspond to differences in operating emphasis between “efficiency” and “customer service” in the Lapide’s triangle. Transportation cost, as a measure of accessibility and contact with customers, is more relevant compared with local taxes and land costs. This finding suggests that for a firm that produces mainly for the local market, the most important location factor is proximity to its customers, regardless of how high other costs may be.

Further, as the share of output sold on the local market increases, the importance of public services apparently drops in the location decision of firms. This finding is related to the cost of land and taxes and corroborates our view that, for firms with significant local sales the imperative is to have access to the market. Inadequate public services might be a problem that will be resolved further down the line.

Figure 6. Weights Assigned to Contextual Factors by Firms According to the Volume of Local Sales



Source: Prepared by the authors, based on the survey data.

Two other interesting trends emerge from this analysis. The importance of skilled labor availability seems to increase as the share of output sold on the local market increases. Theoretically, one may expect from firms two types of behavior regarding labor. Firms searching for location for specialized activities in the global market would favor those places where skilled labor is available—as may be the case in New York and London for financial or corporate activities, or Silicon Valley and Boston for firms that innovate in science and technology activities. At the other extreme, firms searching where to locate an automated manufacturing facility may not have particular need for skilled labor. In the context of Bogotá, our results suggest a trend toward this second type of behavior, reinforcing our view that the region competes with lands that are not especially distinct in the current global land market for production.

From an industrial development and land use policy perspective, Figure 6 provides a key insight that should lead to very sensitive monitoring systems: if the only firms you are attracting to your jurisdiction are firms serving the local market, a tax break competition among Bogotá and the municipalities should be scrapped its only relevant impact will be a lower revenue for all territorial administrations in the metropolitan area. However, if the firms arriving are catering mostly for national or foreign markets, there may be a real justification for keeping this policy.

An interesting caveat rises with this analysis: would these weights hold if the analysis was being carried out on one of the more “luxurious” locations like Silicon Valley or New England? The answer would be probably yes as production in these locations would be aimed primarily to the local, more sophisticated, market, and the benefits realized by locating in them would lead to local operation costs being of lower relevance to the decision. Large industrial complexes looking to establish here to serve foreign, and less sophisticated markets, would likely be more

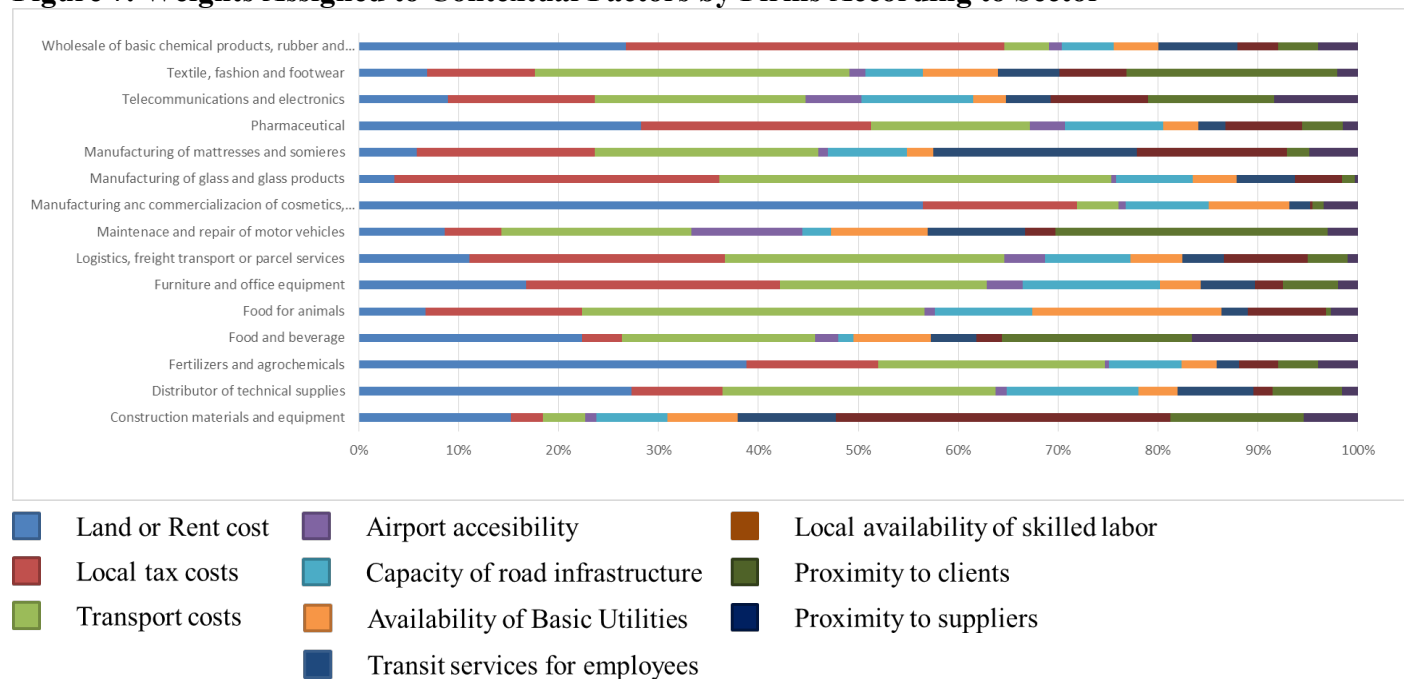
concerned with location and tax costs and probably be motivated to look elsewhere to locate their production facilities.

Changes in weights associated with the sector the firm belongs to

Another important variable is the sector to which a firm belongs. The sector has major implications in operational terms because production systems, tradability, duration and profit levels are distinct for each sector. We therefore expect that firms will assign different weights to contextual factors depending on the sector they belong to.

Among the results shown in figure 7 the most salient finding is the wide diversity of weights for the different sectors, and the contrast it poses in relation to the average weights discussed in section 0. Comparing the average weights (figure 4) with those shown in figure 7 clearly shows the problem of averages discussed by Neufville and Scholtes (2011) prompting one to ask: What impact can be expected of industrial development, regional development, and land use policies if they cannot differentiate location preferences among industrial activities?

Figure 7. Weights Assigned to Contextual Factors by Firms According to Sector



Source: Prepared by the authors, based on the survey data.

Scott (1998) and Johnson (2012) document well the problems created when government policies are based on averages or “one-size-fits-all” schemes. According to these authors, to govern their jurisdiction with the available resources governments have to make some assumptions and emphasize certain aspects of the issue they are addressing. Moreover, some government simplify even more when they define “average subjects” inside each target group and design and track their policies based of these.

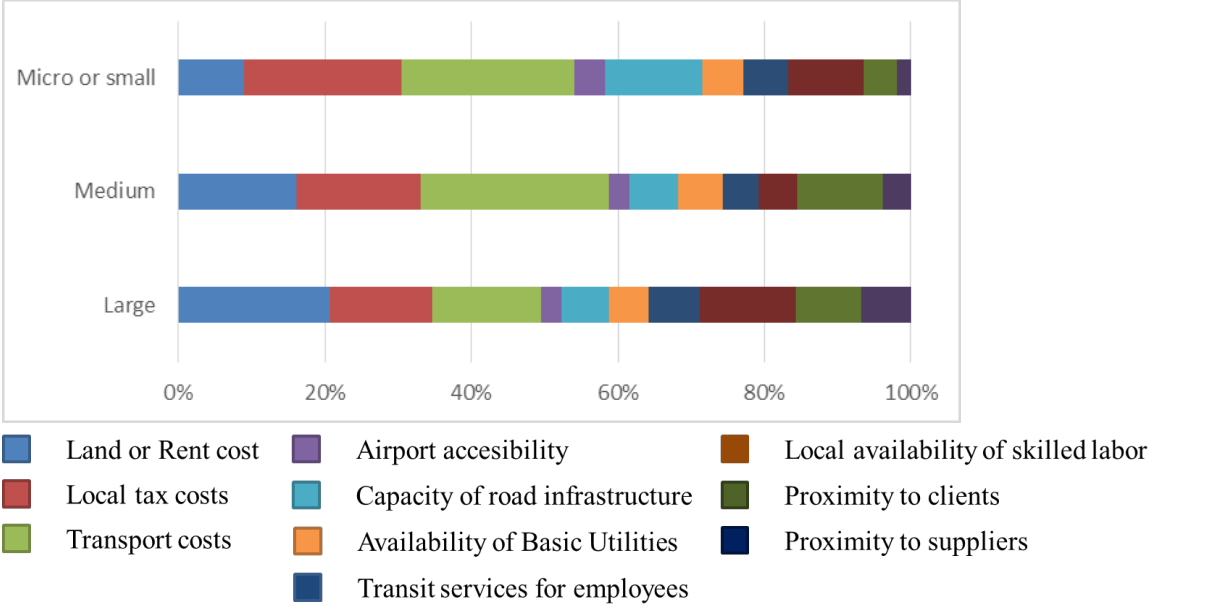
The same authors demonstrate how policy frameworks based on specific understandings about the individuals and the social groups they indents to impact lead to greater transformations than when traditional policy frameworks are used. When governments recognize and take advantage of knowledge about the diversity of firms, they are able to develop targeted policies that match the interests and operating conditions of firms, which in turn is conducive to the sustainable development of the economy and the jurisdiction.

Changes in weights associated with firm size

Theoretically, as firms increase their staff and assets changing from micro, small, medium to large size, they tend to have greater need for space, which leads us to expect variations in the weights they assigned to contextual factors when selecting a location.

Although in the case of Bogotá the differences in weights associated with firm size are not as marked as those observed regarding for other variables. We note some variation among weight for different cost factors but, at the aggregate level cost factors account for slightly more than 50 percent of the location decision. These results presented in figure 8 are consistent with theoretical expectations. Large firms tend to give relatively more importance to the cost of land and prefer locations where skilled labor is available. Compared to small firms, large firm give relatively less importance to local taxes, perhaps reflecting their better capacity to generate economies of scale and better land use. However, the differences in factor weights among small, medium, and large firms are not large enough to justify a more detailed analysis and are not very useful to inform public policy.

Figure 8. Weights Assigned to Contextual Factors by Firms According to Firm Size

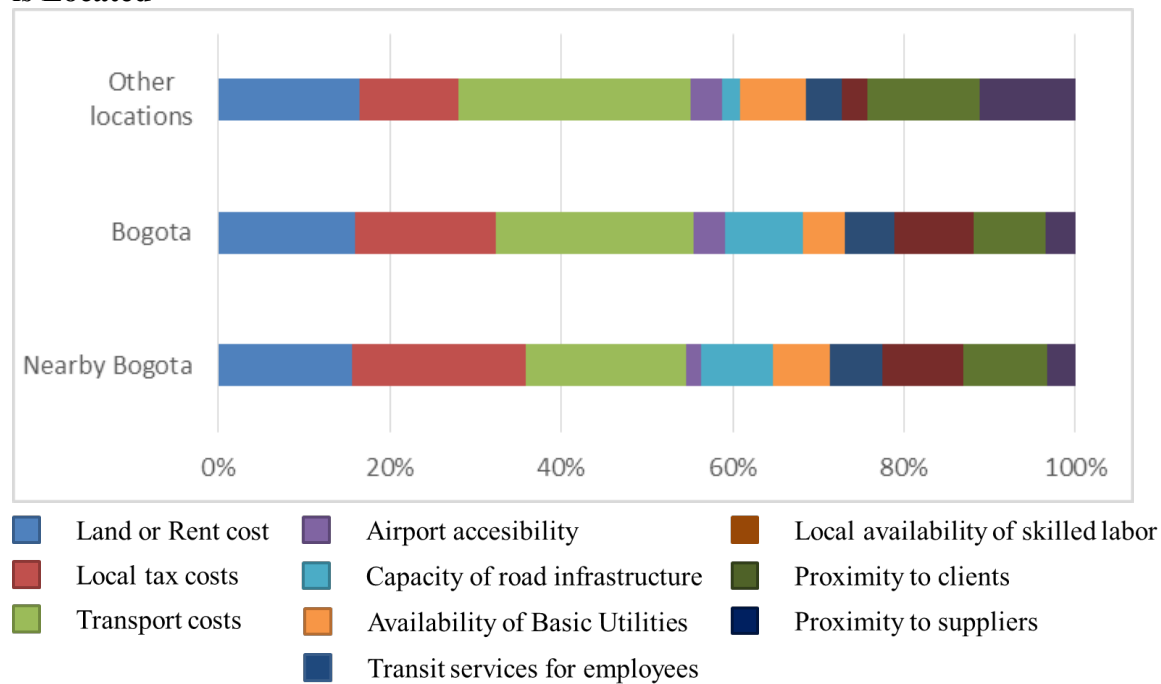


Source: Prepared by the authors, based on the survey data.

Changes in weights associated with the location of the firm

In analysis the present location of the firms our aim is primarily to identify which are the inherent benefits of those locations and to assess whether they offer competitive advantage to the firms located there. Figure 9 presents the results of this analysis.

Figure 9. Weights Assigned to Contextual Factors by Firms According to Where the Firm is Located



Source: Prepared by the authors, based on the survey data.

The evidence shows that whether a firm is located in Bogotá, in the neighboring municipalities (Nearby Bogotá), or other locations does not change factor weights significantly—a finding similar to that related to firm size discussed in the preceding section. Although the impact of land cost is similar in all three locations, the most striking similarities are those between firms located in Bogotá and the adjacent municipalities. The importance of local taxes is slightly higher in these municipalities than in Bogotá, but the difference is not large, and firms in Bogotá attribute a bit less importance to transportation cost. The weights for other factors are similar for firms located in Bogotá and in the adjacent municipalities.

We conclude from these data that there are no significant differences between the way in which firms located in Bogotá and the savanna value the factors that influence the choice of location for their activities. At the aggregate level, Bogotá and the savanna form a single functional unit offering land to firms for productive activities. From an industrial standpoint, the supply of land in Bogotá and the savanna is part of the same undifferentiated global land market (commodity).

Conclusions and Recommendations

The first conclusion that can be drawn from this study is that it contributes to improve our understanding how globalization of manufacturing production, consumption and advances in managing supply chains impact the structures and regional dynamics of city-regions.

Our analysis of the literature in section 2 makes several important points that help explain how local governments formulate and implement economic and regional development policy.

More flexible production technologies give firms the ability to decide where to locate each of their various activities. For their part, the aim of people organized in territorial jurisdictions and local governments is to optimize the way in which land is used to generate wealth and well-being. To the extent that wealth generation is associated with the economic activity by firms, and firms need space for their activities, there is a global market in which firms demand and governments offer production space.

In the second half of the 20th century we saw circulating the idea of the “death of distance” and the notion that advances in productive technologies and connectivity promotes a convergence in economic development. However, the experience of the past 30 years of globalization and regional integration, including the European Union, demonstrates the productive advantages of certain places that make them more attractive centers for industrial activity. These places take different names but generally include cities, regions, or countries, such as New York, London, Silicon Valley, Boston, Germany, Singapore and China. The interesting aspect of this trend is that places in high demand from industry have higher factor prices. The fact that these places continue to attract business despite higher costs indicates that within the global land market for production, as for other goods, there is a niche for luxury locations whose selection criteria is not cost, but rather other associated benefits. At the same time, there is also a market for undifferentiated production land (commodity) whose selection criteria is, and will continue to be, price.

A second interesting aspect deriving from globalization dynamics is that competition for a local market is not limited to firms that produce and sell locally. Nowadays, local firms compete directly with foreign ones in their own market, and they do so often under conditions that can be considered disadvantageous. While local firms are limited by the locally available resources, foreign firms can take advantage of different production locations, achieve greater economies of scale, and have better quality products and performance at similar or even lower costs. Since foreign firms are able to produce elsewhere, they can be free from restrictions or regulations that limit industrial operations in the markets where they sell their products, while local firms have no option but to comply with these regulations.

City-regions today are diverse, complex places where foreign and local firms do business, and support social activities that motivate the population to put down roots. It follows that modern cities can hardly be called self-contained regions, since they are being actively influenced by global forces. Economic dynamics can cause the collapse of a city that a few years earlier was a major development center—as shown in the case of Detroit bankruptcy in 2013. The experience of Detroit provides lessons applicable to Bogotá and the savanna. As the local governments in

the region compete to attract productive activities in a market of undifferentiated products, they need to rethink their strategies to become more attractive while avoiding medium and long-term financial commitments that tax payers are unable to meet.

A second contribution of this study is that it provides tools to help improve the decision making process of the public sector regarding policies and programs for economic development and for land use. The Analytical Hierarchical Process (AHP) used in this analysis helps explain how different economic actors value the various factors that might influence how they decide where to locate their activities.

In our study we focused on location decisions regarding industrial production, logistics, and product distribution activities in Bogotá. In reviewing studies about the region we noted several shortcomings. First, some studies make recommendations about regional land use planning based on “expert” opinion without taking into account the views of private business actors who will eventually implement the plans. Second, studies that focus on local problems and dynamics without considering how external dynamics may affect the industrial operating conditions result inadequate to inform policy. Third, studies that use ranking systems to report the value that firms give to factors influencing their location decisions, and/or present hypothetical scenarios to elicit responses miss important aspects of the decision process. Fourth, studies that select the sample based on the characteristics of the firms rather than on the operating conditions produce incomplete and less than reliable results.

Despite the limited number survey responses we were able to demonstrate in this study the potential benefits of a more detailed analysis of firm behavior has for the design of development policies. The application of the AHP methodology gave us information about how much firms value the various factors that affect their location decisions, and enabled us to demonstrate that it is possible to identify types of public policies and interventions that have the greatest impact on such decisions.

The aggregate results of our analysis show that local taxes and the cost of land are the second most important factors in industrial location decisions, after transportation costs. This means that the tax incentives introduced by municipal governments in Cundinamarca may indeed be an effective way to attract industrial activities to the savanna.

Knowing the relative value assigned to specific factors on location decisions opens the possibility to local governments to conduct cost-benefit analyses of policies aimed to increase the attractiveness of particular jurisdictions, to identify which specific factor should be the target of the policy. For instance, based on the aggregate results of the AHP we can compare the cost for the municipality of measures to reduce transportation cost with that of foregoing tax revenues to attract firms, thereby obtaining a preliminary cost-benefit measure of the impact of these factors on the decision making process of firms.

While aggregate findings are useful, the strength of the AHP method lies on the possibility of analyzing the needs of firms from different perspectives. Section 5.3 shows how AHP results change when approached from different analytical perspectives such as the level of competition

the firm faces, the proportion of output sold on the local market, the sector to which the firm belongs, the firm's size, and its physical location.

Even based on a small sample, our findings tend to be consistent with the relevant economic theory. For instance, the results shown in section 0 support Christensen and Raynor (2003) in their view that understanding in greater detail the circumstances of consumption or use of a product or service (in our case, land) may prove useful in designing innovative products that contribute to create or consolidate market differences.

An important consideration arising from this study is how difficult it is to gather business information, especially when the analysis requires the active participation of top executives to provide the answers. This study lead us to believe that it is worth continuing to develop the AHP tool, but in doing that it is important to seek out a persuasive ally who can be trusted to help gather information. For Bogotá and other Colombian cities that actor may very well be the Chamber of Commerce, not only for its resources, but also because it can provide additional data, including business records, operational permits, and the identity of the legal representative of firms. These data can be leveraged to produce much larger sample of firms with which to conduct the analysis.

In future research it would also be interesting to broaden the scope of analysis from only one city to include firms located elsewhere, especially global centers of economic activity where the various types of business are concentrated. That would enable us to identify similarities and differences regarding the factors that influence industrial location decisions, and examine the reasons that may explain such similarities and differences.

We close this paper reaffirming the importance for cities to understand that they are not self-contained entities that can make industrial or regional development policy decisions in isolation and expect these to be successfully implemented. Cities must acknowledge the global land market for production in which they participate. That will help formulate planning strategies applicable to the types of land use that firms need. In this way, cities will increase their chances to generate wealth for its population and to ensure that all necessary measures to promote economic and environmental sustainability are being taken.

References

- Alonso, W. (1964). *Location and Land Use*. Cambridge: Harvard University Press.
- Bateman, A. (2010). *Algunas notas sobre la salida de empresas de Bogotá y sus efectos sobre el fisco de la ciudad*. Bogotá D.C.: Secretaría Distrital de Desarrollo Económico.
- BBC. (2013, Noviembre 2013). *BBC News - Nissan Boss warns UK over possible EU exit*. Retrieved from BBC News: <http://www.bbc.com/news/business-24859486>
- Berger, S. (2006). *How We Compete*. Boston: MIT Press.
- Bonet, J., & Meisel Roca, A. (2006). *Poarización del ingreso per cápita Departamental en Colombia, 1975–2000*. Cartagena de Indias: Banco de la República.
- CCB. (2011). *Determinantes de la localización de las empresas en Bogotá y en 17 Municipios de Cundinamarca*. Bogotá D.C.
- Christaller, W. (1933). *Central Places in Southern Germany*. Jena, Germany: Fischer.
- Christensen, C. M., & Raynor, M. E. (2003). *The Innovators Solution: Creating and Sustaining Successful Growth*. Boston: Harvard Business School Press.
- Concejo Municipal de Cota. (2009). *Decreto No 223 de 1 de Diciembre de 2009*. Cota: Concejo Municipal de Cota.
- DANE. (2013a, Mayo 21). *PIB por ramas de actividad / 2000–2011 Provisional*. Retrieved Agosto 15, 2013, from Cuentas nacionales departamentales: http://www.dane.gov.co/files/investigaciones/pib/departamentales/B_2005/Ramas_actividad_2011_prov_29_13.xls
- de Neufville, R., & Scholtes, S. (2011). *Flexibility in Engineering Design*. Cambridge, MA: The MIT Press.
- de Weck, O. L., Roos, D., & Magee, C. L. (2011). *Engineering System: Meeting Human Needs in a Complex Technological World*. Cambridge, MA: The MIT Press.
- DIAN. (2013a). *Importaciones por departamento de destino*. Retrieved Agosto 15, 2013, from Sistema Estadístico de Comercio Exterior: [http://websiex.dian.gov.co/pls/siex/impo_depto\\$.startup](http://websiex.dian.gov.co/pls/siex/impo_depto$.startup)
- DIAN. (2013b). *Exportaciones por Departamento de Origen*. Retrieved Agosto 15, 2013, from Sistema Estadístico de Comercio Exterior: [http://websiex.dian.gov.co/pls/siex/exp_depto\\$.startup](http://websiex.dian.gov.co/pls/siex/exp_depto$.startup)
- Dicken, P. (1998). *Global Shift: Transforming the World Economy*. New York, NY: The Guildford Press.
- Forrester, J. W. (2007a). System dynamics — the first fifty years. *System Dynamics Review Vol. 23 No. 2/3*.
- Forrester, J. W. (2007b, Summer/Fall). System dynamics — the next fifty years. *System Dynamics Review Vol. 23 No. 2/3*, pp. 359–370.
- Friedman, T. L. (2007). *The World is Flat 3.0: A Brief History of the Twenty-First Century*. New York: Picador.

- Haddad, E. A., Perobelli, F. S., Bonet, J., & Hewings, G. J. (2008). *Structural Interdependence among Colombian Departments*. Bogotá: Banco de la República.
- Held, D., & McGrew, A. (2000). The Great Globalization Debate: An Introduction. In D. Held, & A. McGrew, *The Global Transformations Reader: An Introduction to the Globalization Debate* (pp. 1–45). Polity Press.
- Hudson, R. (2001). *Producing Places*. New York: The Guilford Press.
- Invest in Bogota. (2012). *Invest in Bogota | Agencia de promoción de inversiones de Bogotá*. Retrieved Julio 15, 2013, from Invest in Bogota | Agencia de promoción de inversiones de Bogotá: <http://en.investinbogota.org/>
- Johnson, S. (2012). *Future perfect: the case for progress in a networked age*. New York: Riverhead Books.
- Lapide, L. (2006). MIT's SC2020 Project: The Essence of Excellence. *Supply Chain Management Review* - April, 18–24.
- Maier, M. W., & Rechtin, E. (2009). *The Art of Systems Architecting - Third Edition*. Boca Raton: CRC Press.
- Marshall, A. (1920). *Principles of Economics*. London, UK: MacMillan and Co.
- Mora Ardila, L. A. (2012). *Corredor Industrial de Occidente: Nuevo modelo de industrialización - urbanización - regionalización sobre la autopista Medellín*. Bogotá D.C.: Universidad Nacional de Colombia.
- Porter, M. E. (1990). *The Competitive Advantage of Nations*. New York: The Free Press.
- Porter, M. E. (2000). Locations, Clusters and Company Strategy. In G. L. Clark, M. P. Feldman, & M. S. Gertler, *The Oxford Handbook of Economic Geography* (pp. 253–274). Oxford: Oxford University Press.
- Rubiano Briñez, M. (2010). Determinantes Endógenos y exógenos de la localización industrial metropolitana, un análisis no paramétrico para el caso de la Sabana de Bogotá. *Territorios* 23, 59–100.
- Saaty, T. L. (2012). *Decision making for leaders - Third edition*. Pittsburgh, PA: RWS Publications.
- Sassen, S. (2001). *The Global City: New York, London, Tokyo*. Princeton, NJ: Princeton University Press.
- Saxenian, A. (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press.
- Scott, A. J., Agnew, J., Soja, E. W., & Storper, M. (2001). Global City-Regions. In A. J. Scott, *Global City-Regions: Trends, Theory, Policy* (pp. 11–30). Oxford: Oxford University Press.
- Scott, J. C. (1998). *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*. New Haven, CT: Yale University Press.
- SDDE. (2011, Abril 14). *Política Pública de Productividad, Competitividad y Desarrollo Socioeconómico*. Retrieved Julio 15, 2013, from Secretaría de Desarrollo Económico:

<http://www.desarrolloeconomico.gov.co/archivo-de-noticias/862-bogota-presenta-politica-publica-de-productividad-competitividad-y-desarrollo-socioeconomico>

- SDP - UNCRD. (2011). *Lineamientos para una política de adaptación a la evolución de los asentamientos productivos de la estructura metropolitana y regional Bogotá - Sabana*. Bogotá D.C.: SDP - UNCRD.
- Secretaría Distrital de Hacienda. (2011). *Efectos fiscales del desplazamiento de empresas desde Bogotá a otros municipios del país*. Bogotá D.C.
- Secretaría Distrital de Planeación. (2010). *Expediente Distrital - Línea Base Segunda Versión*. Bogotá D.C.: Secretaría Distrital de Planeación.
- Sheffi, Y. (2012). *Logistics Clusters*. Cambridge, MA: The MIT Press.
- Steel, C. (2009, Julio). *Carlyn Steel: How food shapes our cities*. Retrieved Marzo 20, 2012, from TED.com:
http://www.ted.com/talks/lang/en/carolyn_steel_how_food_shapes_our_cities.html
- Sterman, J. D. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston: Irwin McGraw-Hill.
- Storper, M. (2003). Globalization, Localization and Trade. In G. L. Clark, M. P. Feldman, & M. S. Gertler, *Oxford Handbook of Economic Geography* (pp. 146–167). Oxford: Oxford University Press.
- The Economist. (2013, Julio 27). *Can Motown be mended?* Retrieved from Economist.com:
<http://www.economist.com/news/united-states/21582285-americas-biggest-ever-city-bankruptcy-starts-roll-can-motown-be-mended>
- The New York Times. (2001, Mayo 11). *Chicago, Offering Big Incentives, Will Be Boeing's New Home*. Retrieved Agosto 15, 2013, from The New York Times:
<http://www.nytimes.com/2001/05/11/business/chicago-offering-big-incentives-will-be-boeing-s-new-home.html>
- UT Julio Gómez - Grupo de Estudios Urbanos Ltda. (2008). *Formulación de un Modelo de Ocupación Territorial (MOT) Regional - Fase II: Estructuración del MOT*. Bogotá D.C.
- Utterback, J. M. (1994). *Mastering the Dynamics of Innovation*. Boston: Harvard Business School Press.
- Von Thünen, J. H. (1966). *The Isolated State*. Oxford: Pergamon Press.
- Weber, A. (1909). *Über den Standort der Industrien*. Tübingen: J.C.B. Mohr.

Annex 1: Survey Questionnaire

Encuesta sobre ubicación de actividades productivas y logísticas en la

Introducción

Bienvenido.

El propósito de esta encuesta es determinar cómo los empresarios ponderan diferentes elementos del entorno al momento de decidir dónde ubicar actividades productivas o logísticas de una empresa. La misma se enmarca en un proyecto académico de investigación financiado por el Lincoln Institute of Land Policy (www.lincolninst.edu), y ejecutado por la Universidad Sergio Arboleda (www.usergioarboleda.edu.co) y MoBiLé - Consultoría en Movilidad S.A. (www.mobile-cm.com.co).

La encuesta está dividida en tres módulos.

1 - Caracterización general de la empresa.

2 - Identificación de las instalaciones a las que se refieren las respuestas de esta encuesta.

3 - Módulo de "Procesos de Análisis Jerárquico" (AHP por su sigla en inglés) por medio del cual se determina la priorización de factores que afectan la localización.

Los resultados de la investigación serán utilizados con fines académicos, la información aquí recogida se manejará a nivel agregado para garantizar el anonimato y la confidencialidad de la misma.

En nombre del equipo de investigación y el Lincoln Institute of Land Policy, le agradecemos desde ya su colaboración.

Encuesta sobre ubicación de actividades productivas y logísticas en la

Módulo 1: Información del respondiente y la empresa

En esta página solicitamos alguna información general sobre usted y su empresa

1. Nombre de quien responde la encuesta

2. Cargo

3. Teléfono de contacto

***4. Correo electrónico de contacto**

5. Nombre de la empresa

***6. NIT de la Empresa**

***7. Actividad principal de la empresa (puede ingresar el valor de la casilla 46 del RUT)**

***8. Clasificación de la empresa según su tamaño.**

- ☐ Micro o pequeña
- ☐ Mediana
- ☐ Grande

***9. En relación con los productos/servicios que su empresa produce o comercializa, ¿qué tanta competencia tienen en el mercado principal en el que usted los vende?**

- ☐ Alta (muchos productos similares de varios competidores)
- ☐ Media (unos pocos productos similares de pocas empresas competidoras)
- ☐ Baja (producto es único en el mercado, no hay competidores)

Encuesta sobre ubicación de actividades productivas y logísticas en la

10. ¿De dónde provienen los productos/servicios que compiten actualmente con los de su empresa? Si actualmente el producto de su empresa no tiene mucha competencia, por favor señale abajo cuál podría ser el origen de eventuales competidores.

- ☐ De Bogotá
- ☐ Del resto de Colombia
- ☐ Del exterior

Encuesta sobre ubicación de actividades productivas y logísticas en la

Módulo 2: Detalles sobre las instalaciones a las que se refiere la enc...

Si su empresa cuenta con varias instalaciones, por favor escoja una de ellas, preferiblemente aquella en la cual se realicen actividades productivas o de logística (almacenamiento, consolidación / desconsolidación de despachos, reempaque o reetiquetado de productos, etc.)

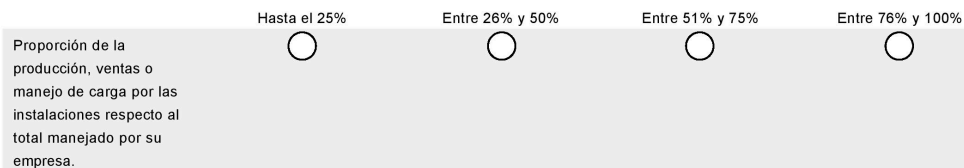
*** 11. ¿En qué municipio se encuentran estas instalaciones? Si están en Bogotá, por favor indique la localidad.**

12. ¿Qué tipo de actividades se realizan en las instalaciones? (Por favor marque todas las que apliquen)

- ☐ Actividades administrativas
- ☐ Producción
- ☐ Almacenamiento
- ☐ Consolidación de despachos
- ☐ Desconsolidación de pedidos
- ☐ Reenvase o reempaque de productos
- ☐ Reetiquetado de envases
- ☐ Punto de ventas/tienda

13. Indique el número promedio de empleados DIRECTOS permanentes en estas instalaciones

14. Indique la importancia de estas instalaciones en las operaciones de la empresa, en términos de producción, ventas o flujos de carga.



15. Con relación al predio en que se ubican estas instalaciones, la empresa es:

- ☐ Propietaria
- ☐ Arrendataria

Encuesta sobre ubicación de actividades productivas y logísticas en la

Módulo 2: Detalles sobre las instalaciones a las que se refiere la enc...

16. ¿Cuál es el valor del arriendo?

Encuesta sobre ubicación de actividades productivas y logísticas en la

Módulo 2: Detalles sobre las instalaciones a las que se refiere la enc...

17. En términos generales, ¿qué porcentaje de los insumos requeridos por las instalaciones proviene de los siguientes orígenes?

	0%	0%-25%	25%-50%	50%-75%	75%-100%
Bogotá D.C.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Municipios de la Sabana	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Otros municipios de Cundinamarca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nacional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internacional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. En términos generales, ¿qué porcentaje de los productos originados en las instalaciones se destinan a cada uno de los mercados señalados?

	0%	0%-25%	25%-50%	50%-75%	75%-100%
Bogotá D.C.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Municipios de la Sabana	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Otros municipios de Cundinamarca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nacional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internacional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. En términos generales, ¿qué porcentaje de los empleados proviene de cada uno de los orígenes a continuación?

	No sabe	0%	0%-25%	25%-50%	50%-75%	75%-100%
El municipio/localidad donde están las instalaciones	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Otro municipio de la sabana	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Otra localidad de Bogotá	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Otro	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Encuesta sobre ubicación de actividades productivas y logísticas en la

Módulo 3: Análisis de la ponderación de diferentes elementos...

En este módulo le vamos a solicitar que compare diferentes factores que se consideran importantes a la hora de decidir dónde instalar una empresa. Esto se logra a través de la metodología AHP, cuya mecánica se detalla en la página siguiente.

Los factores identificados como importantes pueden agruparse en tres categorías:

- Costos Operativos;
- Infraestructura Pública; y
- Beneficios de Aglomeración.

Estos constituyen el primer nivel. A su vez, cada uno de estos criterios se puede desagregar más, como se muestra en el siguiente cuadro.

Costos operativos:	Infraestructura Pública:	Beneficios aglomeración:
<ul style="list-style-type: none">• Transporte• Impuestos locales• Costo de la tierra/arrendamiento	<ul style="list-style-type: none">• Capacidad de la infraestructura vial• Accesibilidad al Aeropuerto• Disponibilidad de servicios públicos básicos.• Transporte público que facilite arribo de empleados.	<ul style="list-style-type: none">• Disponibilidad de mano de obra calificada• Proximidad a proveedores• Proximidad a clientes

Encuesta sobre ubicación de actividades productivas y logísticas en la

Módulo 3: Análisis de la ponderación de diferentes elementos...

En este módulo le solicitamos comparar la importancia de los diferentes factores que afectan la localización.

A modo de ejemplo, si comparamos la importancia de los "costos operativos" con la de la "infraestructura vial", la comparación aparecerá de la siguiente forma:

(-) Costos operativos || versus || Infraestructura pública (+)

De acuerdo con su preferencia por una u otra opción usted debe seleccionar un número entre -9 y 9, siendo:

-9 una preferencia exclusiva por los "costos operativos" (dado que está marcada con signo negativo en la pregunta);

+9 una preferencia exclusiva por la "infraestructura pública";

1 un valor que marca igual nivel de preferencia o indiferencia por las dos alternativas;

Por último, los valores positivos o negativos entre los puntos antes mencionados permiten seleccionar grados intermedios de preferencia.

En el cuadro siguiente se explica toda la escala de preferencias.

-9	-7	-5	-3	1	3	5
Preferencia exclusiva por Costos Operativos	Costos Operativos muy fuertemente preferido a Infraestructura Pública	Costos Operativos fuertemente preferido a Infraestructura Pública	Costos Operativos moderadamente preferido a Infraestructura Pública	Costos operativos e Infraestructura Pública son igualmente importantes	Infraestructura Pública moderadamente preferido a Costos Operativos	Infraestructura Pública fuertemente preferido a Costos Operativos

Encuesta sobre ubicación de actividades productivas y logísticas en la

Le solicitamos que aplique este mismo esquema de respuesta a los pares de comparación que se presentan a continuación, siempre teniendo en cuenta que el objetivo es determinar el peso de los diferentes factores en las decisiones de localización:

*20. Comparación entre los grupos de factores

	-9	-7	-5	-3	1	3	5	7	9
(-) Costos operativos versus Elementos de infraestructura pública (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Costos operativos versus Beneficios de aglomeración (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Elementos de infraestructura pública versus Beneficios de aglomeración (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*21. Comparación de factores agrupados en "Costos Operativos"

	-9	-7	-5	-3	1	3	5	7	9
(-) Costos de transporte versus Costo impuestos locales (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Costos de transporte versus Costo del terreno/costo del arrendamiento (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Costo impuestos locales versus Costo del terreno/costo del arrendamiento (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*22. Comparación de factores agrupados en "Infraestructura pública".

	-9	-7	-5	-3	1	3	5	7	9
(-) Capacidad Infraestructura vial versus Accesibilidad a aeropuerto (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Capacidad Infraestructura vial versus Transporte público que facilite acceso de empleados a las instalaciones (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Capacidad Infraestructura vial versus Disponibilidad de servicios públicos básicos (agua, energía, telecomunicaciones, gas) (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Accesibilidad a aeropuerto versus Transporte público que facilite acceso de empleados a las instalaciones (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Accesibilidad a aeropuerto versus Disponibilidad de servicios públicos básicos (agua, energía, telecomunicaciones, gas) (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Transporte público que facilite acceso de empleados a las instalaciones versus Disponibilidad de servicios públicos básicos (agua, energía, telecomunicaciones, gas) (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

*23. Comparación de factores agrupados en "Aglomeración"

	-9	-7	-5	-3	1	3	5	7	9
(-) Disponibilidad local de mano de obra calificada para el trabajo versus Proximidad de clientes (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Disponibilidad local de mano de obra calificada para el trabajo versus Proximidad de proveedores (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(-) Proximidad de clientes versus Proximidad de proveedores (+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Encuesta sobre ubicación de actividades productivas y logísticas en la

Muchas gracias por su tiempo respondiendo la encuesta.

Le estaremos enviando copia de los resultados de nuestra investigación, que esperamos contribuyan de manera importante a la discusión sobre desarrollo económico y sostenible de Bogotá y la sabana.