Climate change risk management: an analysis of opportunities for collaboration between local governments and businesses in Latin America

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Summary

Latin American cities will bear much of the impact of global warming, prompting municipal governments to design and implement their actions. However, they are also in an ideal position to cooperate with different sectors in order to find solutions to potential problems. The aim of this paper is to analyze the ability of local governments to identify and manage climate risks, as well as to identify opportunities for collaboration with the private sector to increase resilience through mitigation and adaptation measures. A qualitative study was carried out, based on the documentary research method. We examined the responses from 137 Latin American cities and more than 111 companies with operations in Latin America and that reported to CDP, the world's largest environmental disclosure system. The results show that 86% of cities and 82% of companies operating in Latin America recognize that the effects of climate change will present a threat to their populations and businesses. The study also reveals that cities which effectively collaborate with local companies are better positioned to reduce emissions and mitigate climate risks.

Key words: risk management, climate change, local governments, climate governance, collaboration

1. Introduction

Since their emergence more than 5000 years ago, cities have been centers of knowledge, but it was only in the last 250 years, with the phenomenon of urbanization, that they assumed the characteristics of modernity that we know today. Following the Industrial Revolution, the first wave of urbanization was accompanied by technological innovation based on the intensive use of fossil fuels. By the 1950s, more than 50% of the population in the more developed regions (Europe, Japan and The United States) lived in large cities. The second wave of urbanization is now occurring in underdeveloped countries with much greater speed. (Mills et al., 2010)

As of 2008, more than half the world's population lives in urban areas (UNFPA, 2007). In Latin America and the Caribbean, 80% of the population live in cities, and projections indicate that by 2025 this figure will be 83% and, by 2050, 88% (UN, 2014). This situation poses new challenges for sustainable development, as the environmental impact of urban centers and their dependence on natural resources increases in inverse proportion to population growth. This is because these cities have followed similar standards of development, characterized by disorderly occupation of space as well as production and consumption models strongly dependent on the use of fossil fuels (Mills et al., 2010).

Greater transparency and engagement are needed for managing the risks that cities face from climate change, as they present threats to a large and growing population that lives in the more vulnerable areas of urban centers, as well as the businesses operating in cities. The scale of these risks is largely influenced by the quality of urban infrastructure and by the governance´s structure which plan, coordinate, manage and implement public policies and services (MARTINS, 2010). Therefore, this paper aims to analyze the capacity of cities to identify and respond to these risks, as well as to examine opportunities for collaboration with the private sector to build resilience through mitigation and adaptation measures to combat climate change. The research was largely focussed on two questions: Do cities and businesses identify similar risks and opportunities in the face of climate change? and: What kind of successful collaboration has there been between local governments and companies in the face of climatic changes?

To that end, 137 municipal governments in Latin America provided responses to CDP Cities questionnaire on climate change in 2016. This data, which includes

megacities such as São Paulo, Buenos Aires, Mexico City and Lima, as well as other small and medium-sized cities, provides insights into the risks and opportunities that cities face due to global warming.

It was also possible to analyse additional information from 111 companies operating in these Latin American cities, which reported their environmental data to CDP. As data is analysed from these two sectors - local governments and companies – the objective is to present a clearer picture of how climate change affects cities and how municipal governments and companies are positioning themselves to reduce risks and maximize the related opportunities.

2. Review of the literature

As climate change increases, discussions on the development of urban centers have assumed even greater importance, as the infrastructure, quality of life, health and safety of city populations have become more vulnerable to increasingly frequent extreme weather events. Overall, 80% of the cities are located in coastal zones or in regions close to rivers, making them susceptible to a higher incidence of storms, floods and rises in sea level. (BURKELEY et al., 2009; BURTON, DIRINGER .

Although large urban centers are major emitters of greenhouse gases, they also have a unique potential for action and innovation as a result of the industries, infrastructures and populations which are concentrated within the city (Bicknell and Dodman, SATTERTHWAITE, 2009), making them key areas for understanding and solving the problems of climate change. However, much of the literature on political management in this area focuses on the global and regional domains of governance, prioritizing the development and implementation of international climate policies (MARTINS, 2010). These policies encompass the principles, norms and processes that govern international decision-making and governance (Burkelley & Betsill, 2010). However, climate change has an important local dimension, as many of the human activities that contribute to global warming and global environmental change take place at the local level, so it therefore becomes necessary to look at cities as fundamental arenas in which climate governance is being exercised (Bullockel et al., 2009; Wilkins and Kates, 1999).

For Bulkeley et al. (2009), the development of a local and urban approach to climate change mitigation and adaptation is intrinsically linked to the emergence of city and municipal networks at national, regional and transnational levels. As pioneers of the scheme, a number of local governments in North America and Europe joined in the late 1980s and early 1990s, initially to establish voluntary targets for reducing global warming, as well as to establish forums for the exchange of ideas, strategies and experiences related to combating climate change.

One of the most significant examples of the results achieved by such networks is the *Compact of Mayors*, which was relaunched in June 2016 as the *Global Covenant of Mayors for Climate & Energy*. This represents the largest global coalition of cities committed to climate leadership, co-chaired by former New York City Mayor and UN

Secretary-General Special Envoy for Cities and Climate Change, Michael R. Bloomberg, and European Commission Vice President, Maroš Šefčovič. It has the support of global and regional city networks, including the C40 Cities Climate Leadership Group, ICLEI - Local Governments for Sustainability, United Cities and Local Governments, Climate Alliance, Energy Cities and Eurocities. Such coalitions of cities and local governments work towards the long-term objectives of promoting and supporting voluntary action to combat climate change, of lowering emissions and making cites more resilient to extreme climatic events (Global Covenant of Mayors, 2017). More than 7000 cities have made commitments through the Global Covenant of Mayors, which includes reporting an annual progress (CDP, 2016).

Every year, the signatory cities of the *Global Covenant of Mayors for Climate & Energy* can report progress made on their commitments by way of public reporting platforms such as CDP. In this way, these global initiatives have encouraged a culture of transparency and cooperation between the public and private sectors to increase resilience to climate change. Transparency also contributes to improving the business environment in the city, as it reduces investment risks and provides access to new sources of private sector capital that have demonstrated an increasing interest in financing urban projects to mitigate the effects of climate change - KIC, 2016).

Reporting in this way enables companies to rapidly improve project development information to attract finance. The key step in increasing the interface between cities and financial institutions is to improve project development information and disseminate and communicate climate change-related projects to the finance industry (CDP, 2017).

3. Methodology

Considering the interdisciplinary nature of this study, it was decided that a qualitative research should be conducted, adopting documentary research methodology that uses materials that have not yet been analyzed, in other words, primary sources.

As Kelly clarifies (apud GAUTHIER, 1984: 296-297), it is a method of data collection that eliminates, at least in part, the eventuality of any influence – the presence or intervention of the researcher – in the set of interactions, events or behaviors under research, nullifying the possibility of reaction to the subject to measurement operation (Kelly apud Gauthier (1984: 296).

Therefore, this method proved to be suitable for an analysis of CDP database, consisting of primary information collected systematically using a standard questionnaire sent to cities and companies around the world. We examined the responses of 137 cities and more than 111 companies in Latin America that reported to CDP, the world's largest environmental disclosure system.

Other sources of public information, such as company sustainability reports, were also analyzed. In the case of city data, it was necessary to request additional information by way of email interviews.

For the treatment of the data the main strategy consisted of content analysis that proved to be adequate for the documental research since it allows identification of units of analysis or groups of representations for the categorization of phenomena. By doing so, it is possible to reconstruct meanings that present a more detailed understanding of the reality of the group studied (Silva et al, 2005).

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This method of analysis involves relating the frequency with which certain themes, words or ideas are cited in a text, in order to measure the relative weight attributed to a certain subject by its author. It presupposes, therefore, that a text contains hidden meanings and messages, which a reader can interpret by means of appropriate systematic techniques. The message can be comprehended by dividing the contents of the document into simpler fragments that reveal subtleties contained in a text. Fragments can be meaningful words, terms or phrases used in a message (Chizzootti, 2006).

4. Results

4.1 The threat to Latin American business posed by climate change

Analysis of CDP data shows that cities in Latin America face varying and specific risks due to higher temperatures. For some cities, such as São Luís and Recife in Brazil, the risk of catastrophic weather events is high. For others, the risks can be more subtle.

More than half of the respondent cities, for example, face the risk of flooding that can result in both material damage (infrastructure, transportation) and social damage (increased disease and death). All together, 86% of municipal governments in Latin America report that climate change represents at least some degree of risk to their cities**.**

Several municipalities have already noted significant changes in climate-related patterns, "an increase in sea level will impact on the infrastructure developed to support canal activities," reports Panama City, which could create serious problems for the city's economy, as an increase in channel-related activities/businesses is expected in the coming decades. Santa Fe, Argentina, reports that flooding poses a serious risk to the city's economy, as rainfall has a major impact on agriculture, thereby affecting food prices for the final consumer.

The responses from Panama City and Santa Fe highlight an important feature of the impacts of climate change: the ability to disrupt commercial operations in a city. In reporting to CDP, cities reveal that climate change already has a direct and significant impact on physical infrastructure and services in the urban areas of Latin America, with potentially harmful consequences for business. Approximately 69% of municipal governments in the region report that climate change will interfere with companies' ability to conduct operations in their cities. Local governments - such as those in São Gonçalo and Goiânia in Brazil, La Serena in Chile, Arequipa in Peru and Guadalajara, Mexico - report that climate change will impinge upon business in a number of ways by adversely affecting water and energy supplies, issues that directly interfere with agriculture and tourism, and among the main economic activities of these cities.

A widely reported risk of climate change is the rise in temperature, reported by 77 cities. This consequence of climate change can aggravate respiratory diseases, having a greater impact on the most vulnerable population, such as the elderly and children, and can also have an effect on the increase in water and energy consumption, as reported by the city of Rio de Janeiro.

Just as an excess of water causes problems in the cities, so the scarcity of this natural resource can impact negatively on business. Campinas, one of the business hubs of the south-eastern region of Brazil, located in the interior of São Paulo, experienced intense water demand as a result of unplanned urbanization. In 2014, the city suspended all new authorizations for water withdrawal by companies in order to combat the drought, affecting the development of new businesses in the municipality (Gomes, 2014).

Sorocaba, also in the interior of São Paulo, was forced to introduce water rationing, affecting 200 companies in the region (Tomazela, 2014).

According to ADASA (Water and Energy Regulatory Agency of the Federal District), the Brazilian capital Brasília has also introduced water rationing recently, as a result of 35% less rainfall than the previous years' average. However, other factors have contributed to water shortages, such as water losses of as much as 37% and population growth, an increase of more than half a million in the last decade. This problem has a direct impact on the commercial sector of the city, with a reduction of 13% reduction in sales (MARTINS, 2017). Torreón in Mexico reports to CDP, that the dairy industry is one of the main activities of the city and consumes 90% of the water in the region. "Not having a clear plan and not being prepared for the effects of climate change is considered to be a negative factor, as industries can look for other regions to expand their activities," the city reports.

Not coincidentally, Latin American companies reporting to CDP questionnaire in 2016 that the biggest risk to their business is the changes in extremes of rainfall and droughts. Of the reported risks, 38% are related to lack of water, according to Braskem, a Brazilian chemicals company which carried out a study in four regions of Brazil to evaluate the current water shortage and in future scenarios until 2040. The results highlighted the need to mitigate this risk by reducing water withdrawal and encouraging other stakeholders to monitor the river basin, such as local governments.

4.2 Cities and companies work in collaboration with the private sector towards a low carbon and more resilient economy

In response to the growing risks of climate change, cities are taking actions to become more resilient. Approximately 70% of Latin American cities reported to CDP that they are taking actions at least one action to adapt to the impacts of climate change.

Climate risk is not the only area in which municipal governments and businesses are interconnected. There are also opportunities related to climate change for cities and businesses to work together for their mutual benefit. Collaboration can lead to new business, revenue growth, more comprehensive operations and, in the future, low-carbon cities.

Cities participating in the 2016 *CDP Cities* expressed a high degree of ambition for climate change mitigation and adaptation, although there is still a need to work more collaboratively with a diversity of stakeholders to meet their emission reduction targets and to become more resilient to climate change, as well as to benefit economically and socially from a low carbon economy. In addition, most emissions in a city usually come from sources over which the city does not exercise direct control, for example in private transport or commercial and residential buildings (CDP Cities, 2016).

Analysis of CDP data also indicates that many cities are already actively pursuing alliances with the private sector in relation to climate change: the report highlighted a total of 720 climate change-related projects aimed at working together with businesses, with investment totalling US$26 billion. An example in Latin America is Quito, Ecuador, where the city is hoping to raise $800 million to implement a waste management and water resource project, which incorporates renewable energy generation from three hydroelectric plants with an installed capacity of 40 MW (CDP, 2016).

According to CDP data, 71% of all Latin American cities participating in CDP Cities in 2016 reported economic opportunities resulting from climate change, as shown in Figure 1.

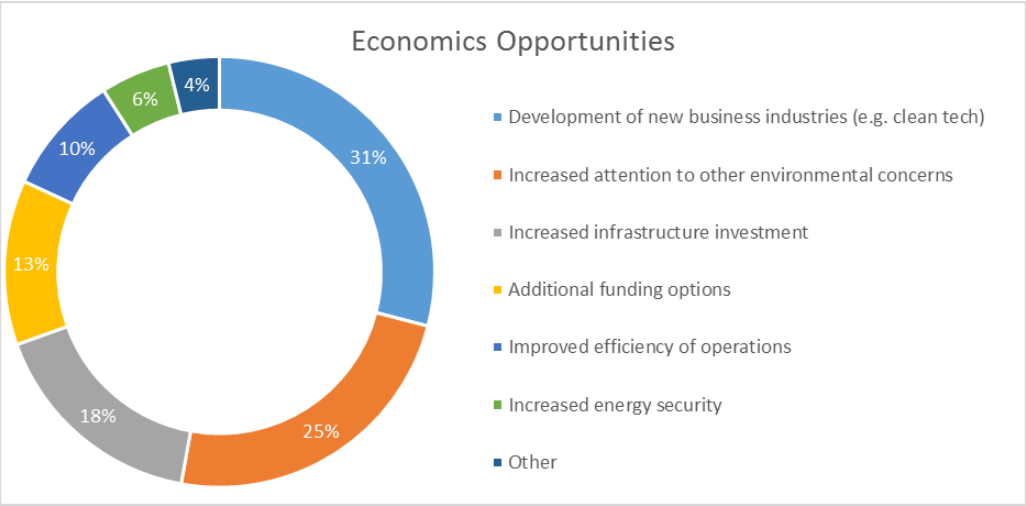

Figure 1: Economic opportunities reported by Latin American cities in *CDP Cities 2016*

The city of Sorocaba in Brazil revealed that due to the increased demand for wind energy in Brazil, two large companies have opened factories in the city to produce equipment to supply wind farms in north-eastern Brazil. The city believes that the geographical location, access to qualified professionals and an efficient supply chain in the region explain the companies' choice.

This analysis also includes 111 companies that do business in Latin American cities and respond to CDP. Approximately 18% of the economic opportunities reported by the companies involve the development of new low carbon products and services, which can help to reduce the city's emissions as well as to increase the number of green jobs and taxes raised by the city. This figure suggests that the companies and cities in which they operate can mutually benefit from collaborations, of which there are already many examples. At the same time, private sector companies are intensifying efforts to support cities in their efforts to become low carbon and more resilient, thus reducing the risks to their business.

According to CDP data, 65% of cities reported that they are working on collaborative projects with the private sector, such as project implementation, new business developments and knowledge sharing. Cali in Colombia has been encouraging local businesses to develop corporate greenhouse gases inventory, as well as the development of emission reduction strategies for low carbon products and services. In Brazil, cities such as Belo Horizonte have initiated projects to process and burn methane gas produced from the decomposition of waste in old landfills, with the resulting electric energy being purchased by the energy company that serves the city.

The city of Campinas has reported a partnership with the municipal water and sanitation company to improve efficiency in the water supply system, reducing emissions and helping the city to become more resilient to water shortages.

Another area of joint collaboration is transport. Mobility is an essential condition for urban residents, and as city populations continue to grow the demand for mobility increases, leading to a larger number of private vehicles in Latin America. In Brazil for example, while the population grew by 12.2% in a decade, the number of motor vehicles increased by 138.6% (Observatório das metrópoles, 2014).

Unsurprisingly, cities in Latin America reported 355 activities aimed at reducing greenhouse gas emissions, the most common of which were related to transport (35%), with more than 20% of these actions aiming to implement and improve alternatives for the use of non-motorized vehicles.

In Argentina, the Buenos Aires Bicycle Program promotes the use of bicycles as an ecological, healthy and fast means of transportation. The project includes the creation of a network of cycle paths and infrastructure for bicycle parking. More than 100 companies are encouraging their employees to use the bicycle as a means of transportation (CDP, 2016).

Another example of collaboration is Itaú-Unibanco, a private Brazilian bank that implemented a bicycle sharing system. The initiative is currently being run in six Brazilian capitals such as Recife and Porto Alegre, as well as Santiago in Chile, with a total of 815 collection points and 8,300 bicycles. According to the company's 2015 report to CDP, the system had more than 500,000 registered users in 2014 and there were more than 3.5 million rentals. It is estimated that the project has resulted in a reduction of 2800 tonnes of CO2, equivalent to 1.2 million litres of gasoline. According to the 2016 CDP report, the Recife local government intends to expand the cycleway network to 178 km by 2020, with an estimated reduction of more than 30,000 tonnes of C02e per year (Claro, 2016).

Renewable energy is another area in which a significant number of Latin American cities are taking action. In Mexico, a new wind farm called *Central Dominica II* is being built in San Luis de Potosí, with a planned investment of approximately US$150 million. It will have an installed capacity of 100MW, avoiding emission of more than 157,000 tonnes of CO2e (Enel Green Power, 2014). The direct positive effects for these cities are the jobs resulting from the construction and maintenance of the wind farm, and the reduction of CO2e due to the generation of electricity from renewable sources (BN AMericas, 2016).

The Paris Agreement calls for direct action to limit the temperature rise to well below 2°C, and to continue efforts to reach the target of 1.5°C. Although municipal governments around the world are demonstrating leadership in climate action, in order to achieve their goals, it is essential to increase collaboration between citizens, companies, investors and third sector organizations (CDP Cities, 2016).

5. Final considerations

Large urban centers are the focus of the global debate on climate change and sustainable development, as they account for 54% of the world's population and are responsible for 75% of the world's carbon emissions, requiring large cities to adapt more

quickly to the serious consequences of global warming and the scarcity of natural resources.

Managing climate change is a complex challenge, especially in the urban context. Municipal governments play an important role in climate risk management, since their effects are most felt at the local level.

Authors such as Satterthwaite et al. (2007), Dawson (2007), Tanner et al. (2009) and Martins (2010) argue that it is impossible to devise an effective program of mitigation and adaptation to climate change without a competent local government, sensitive to those who are most at risk. In this way, actions to combat climate change must be planned and implemented at the local level, where the risks and vulnerabilities associated with the impacts of climate change are interdependents and influence the international context.

However, most local governments (particularly in developing countries) have little institutional capacity to deal with both mitigation and adaptation to climate change, indeed to extreme weather events in general (Bicknell and Dodman, SATTERTHWAITE, 2009; Parry et al., 2007; Tanner et al., 2009).

In this context, coordination between municipal governments and business is essential to create resilient and protected cities. Cities and businesses face complex and interconnected risks and opportunities arising from climate change for which only a collaborative approach will suffice.

Having analyzed the responses of Latin American cities to CDP Cities 2016, we have concluded that municipal governments which collaborate effectively with companies are better positioned to reduce climate risks. These cities are also exploring opportunities to work more closely with the business community for their mutual benefit, especially in areas such as transport and renewable energy.

However, the challenges do not end there. Latin American cities will bear much of the impact of global warming, obliging local governments to implement their actions appropriately. They also offer the ideal conditions for the interactions of different actors for searching solutions to these problems, which will invariably imply the need to transform the modes of production and consumption, including that of natural resources, as well as adapting public policies and business models in the future. We recommend future research on models for the management of public-private partnerships and on how to catalyze investment in city projects which aim to mitigate and adapt to climate change.

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