Secondary Cities and Their Development Challenges: The Case of Central Chile Macro Region

J T Videla¹, B H Roberts², M Allué³, F Guerrero¹

¹RAIZ Consultores, Chile
²Emeritus Professor at the University of Canberra, Australia, and Director at Urban Frontiers Pty Ltd
³CFO at Copsa, Chile

E-mail: josetomasvidela@raiz.cl, broberts@urbanfrontiers.com, mallue@copsa.cl

Abstract. The performance of national and regional economies is dependent on a well-functioning system of secondary cities, but they face many development challenges and still receive proportionally lower levels of investment than primary cities. The case study of the Santiago and Central Chile Macro Region (SCCMR) provides interesting insights into a particular spatial typology of secondary cities, the metropolitan cluster, in a middle-income growing regional economy. Fresh thinking by all levels of government and stakeholders in the SCCMR is necessary to identify and formulate policies to address this macro region’s challenges and to support the development of its secondary cities. However, it is still unclear what the spatial structure and functions of this macro region are, and what type of governance arrangement is required. This short paper aims to discuss two general questions in relation to the above: i) what is the main spatial structure of SCCMR? and, ii) is the current administrative arrangement appropriate to manage that spatial structure? To answer these questions, we briefly review some recent and empirical approaches for defining spatial structures based on functional economic units (FEUs), as proposed by the OECD. We then compare that with the actual administrative areas, including also a recent official proposal for creating a metropolitan governance scheme. The FEUs approach shows that the spatial structure of the SCCMR is a combination of three metropolitan systems of cities, led by Santiago. This conclusion needs to be discussed further due to a lack of updated Travel-To-Work (TTW) flow data. Moreover, a more comprehensive system approach should be used to assess the macro region spatial integration, including employment, housing, infrastructure, social service and industry. We conclude this short paper with a critical assessment of the SCCMR governance arrangement and propose a fresh approach to address the governance of this important macro region.

1. Clustered secondary cities:¹ the case of Central Chile Macro Region

The growing inequity in the development of urban areas within countries is leading to recognition of the critical role of secondary cities, and a well-functioning system of secondary cities, in the overall development of regions. [1] However, secondary cities still receive proportionally lower levels of investment infrastructure and support services than larger metropolitan regions. [2][3]

¹ The term Secondary city is commonly used to describe a level of urban settlement below the primate city, which is “generally the largest city in its country or region, disproportionately larger than any others in the urban hierarchy” [11].
This case study of the Santiago and Central Chile Macro Region (SCCMR)\(^2\) seeks to provide some new insights into some of the challenges facing the development of a spatial typology of clustered secondary cities, within one of South America’s largest middle-income growing metropolitan regional economies. The SCCMR faces many challenges, particularly in the way the secondary cities have become integrated into the metro-region’s economy. In aggregate terms, SCCMR depicts a relatively diversified economy, with good access to major transport infrastructure, an increasing integration of labor and housing markets, and relatively high figures in human development. However, this picture covers an unequal distribution and access to infrastructure and services for citizens and businesses in secondary cities within a 100 km semi radius of Santiago. Moreover, SCCMR is facing new critical challenges, such as demographic, economic, as well as climate change impacts, which will affect its development potential if not managed appropriately.

Regional and local governments and stakeholders in the SCCMR are required to identify and formulate policies to address this myriad of challenges and leverage its development potential, especially for secondary cities. A 2009 OECD assessment of the country [4] concluded that Chile needs to move towards a territorial policy approach that capitalizes on the opportunities and needs of its territories. However, it is still unclear what the spatial structure and functions of SCCMR are, and what type of administrative and governance arrangements are required to manage it in the future.

This short paper aims to discuss two general questions facing the development of SCCMR: i) what is the main spatial structure of the region? and ii) is the current administrative arrangement appropriate to manage this macro region? To answer these questions, we briefly review some recent empirical approaches for defining spatial structures based on functional areas. We then compare the findings with the actual administrative areas, including a current official proposal for creating a new metropolitan governance arrangement.

2. Defining and comparing functional and administrative areas in SCCMR

2.1. Overview of the macro region

The SCCMR comprises Santiago and surrounding secondary cities, distributed in three sub-national regions with a population of around 10 million inhabitants. It represents about 55% of the country’s population [5] and 56-57% of the national GDP and employment [7]. SCCMR is dominated by the primary city of Santiago — one of the most prosperous cities in Latin America — followed by the secondary cities of Greater Valparaiso and Rancagua-Machali (see table 1). These three urban areas are defined as “Metropolitan areas” as they exceed the 250,000-inhabitant threshold set by the National Council of Urban Development (CNDU) [8].

| Urban area          | Population | Function                                            | Official administration area                                      |
|---------------------|------------|-----------------------------------------------------|-----------------------------------------------------------------|
| Greater Santiago    | 7 millions | Capital city and the seat of the central government, financing and manufacturing | 37 municipalities in four provinces within the sub-national Metropolitan region |
| Greater Valparaiso   | 1 million  | Transportation, manufacturing, tertiary education, tourism | 5 municipalities in two provinces within the Valparaiso sub-national region |
| Rancagua-Machali     | 0.3 million | Agriculture, mining                                  | 2 municipalities in one province within the O’Higgins sub-national region |

Source: Prepared by the authors based on [5]

The aggregated wealth and prosperity of the region is the product of rapid development in the last three decades supported by a diversity of macroeconomic activities, public administration and planning

\(^2\) Note: The research for the study was originally funded as a case study by the Cities Alliance for the joint working group program on Promoting Equitable Economic Growth in Cities for secondary systems of cities. https://www.citiesalliance.org/
policies implemented in the late 1970s and early 1980s. The Government of Chile implemented exogenous (export oriented) policies for the country to capture opportunities resulting from Foreign Direct Investment (FDI) and global value chains to boost national economic and income growth. On the other hand, public administration and planning reforms diminished the capacity and autonomy for endogenous policies of sub-national regions and local areas, and economic benefits were not spread equitably across the metropolitan and adjacent regions in Central Chile.

2.2. Quantitative definition of the functional urban areas based on labor market areas in SCCMR

In the last decades, cities have been studied as dynamic systems in order to simulate their functioning and evaluate the impact of urban development policies [9]. However, systems modelling is not well advanced in the SCCMR.

One practical way to measure and define the integration of urban areas across a region is the methodology developed by the OECD [10]. This method defines urban areas as functional economic units (FEUs), based on two types of information: “urban high-density clusters”, based on continuous spatial units of at least 1,500 inhabitants per km² clustered around an “urban core”, and travel-to-work (TTW) flows of at least 15% of the employed residents from an urban core to any other urban core, or 85% of “local self-containment” (see figure 1). Thus, this method and particularly its second criteria allow for the definition of polycentric spatial structures, based on population density and labor markets.

Figure 1. Travel-to-work (TTW) flows across SCCMR

Finally, the OECD propose the definition of urban “hinterlands” as larger “worker catchment area” outside the dense urban cores, also based in the 15% TTW flow from low-density areas (less than 1,500 inhabitants per km²) to any of the urban cores. A recent study proposed a more refined approach to define functional areas for Chile based on an optimization procedure called grouping evolutionary
algorithm (GEA) [11], which overcomes some deficiencies of previous methods based on non-optimizing procedures.

Both the OECD method and the GEA-based approach show that SCCMR does not operate as a single functional area. Instead, the SCCMR is encompassed of fifteen FEUs across three sub-national regions, which are closely linked to one of the three metropolitan areas shown in table 1. (It is note that Greater Santiago includes the non-contiguous secondary cities of Colina, Talagante, Buin, Paine and Curacavi, while the city of Melipilla includes several small towns). Moreover, the GEA-based approach shows 5 contiguous cities and other 5 non-contiguous cities as part of the Greater Valparaiso FEU, while Rancagua’s FEU depicts 7 non-contiguous small urban areas (see figure 2 next page).

The conclusion to the first question based on the OECD and the GEA-based approaches is that the spatial structure of the SCCMR does not function as a single large system of secondary cities clustered around Santiago and across sub-regional administrative boundaries. Instead, SCCMR is operating as three, somewhat, autonomous metropolitan system of cities. If that is true, the SCCMR may not be maximizing its economic potential to operate at a larger scale. Understanding how the SCCMR can be made to function as a more integrated, regional “system” of cities comprised of a set of non-contiguous dense urban areas and hinterlands, into a single labor market and economic entirety needs to be discussed further, because it is critical to enhancing the SCCMR competitiveness, development and sustainability. We return to this in section 3.

2.3. Comparing the spatial structure of SCCMR with its administrative areas

The administration of urban areas occurs at the communal (local) level. Although there are mandatory planning instruments at the metropolitan level that could be used as an appropriate reference, these instruments only coordinate general regulations such as urban limits, urban expansion areas and main road infrastructure, but do not define an actual administration nor a governance scheme at the metropolitan level. There are three such metropolitan planning instruments in the SCCMR area: PRMS for Greater Santiago, PREMVAL for Greater Valparaíso, and the PRI Rancagua-Machali.

 Nonetheless, a legislative proposal is currently being discussed in the National Congress (law 21,074) that puts forward a governance scheme for metropolitan areas, based on a proposal prepared by the CNDU. [8] To spatially explore that, Figure 2 shows a comparison between FEUs based on the GEA approach—as proxy of a spatial structure- and the metropolitan governance arrangement proposed by CNDU. (The cities’ urban footprints is also shown as well as metropolitan planning instruments areas).

A first general conclusion is that the proposed governance scheme covers relatively well the FEUs, although in the case of Greater Santiago the governance scheme includes cities and small towns outside its actual functional area (i.e. Melipilla). It is important also to point out that current metropolitan planning instruments generally cover cities inside functional economic areas, except for Limache and Olmué in Greater Valparaíso.

What is relevant is that the GEA-based approach recognizes, in addition to the aforementioned three metropolitan areas, another twelve FEUs in the SCCMR, with three of them (represented by Los Andes, Quillota and San Antonio) closely linked to Greater Santiago and/or Greater Valparaíso. These three ‘non-metropolitan FEUs’ include 9,000 urban hectares\(^3\) but do not have, and will not have in the short term, a comprehensive governance scheme that could manage the actual functions of the whole area. Along these “secondary” urban areas, there are relevant secondary cities that play an important role in the economy of SCCMR, such as San Antonio, Calera, Quillota, Los Andes, San Felipe and San Fernando.

\(^3\) The areas of these three ‘non-metropolitan FEU’ are: San Antonio 5,700 hectares (Ha); Los Andes 1,900 Ha; Quillota 1,700 Ha. As a reference, the FEU of Rancagua has 4,800 Ha; Greater Valparaíso about 15,000 Ha, and Santiago 62,000 Ha.
Figure 2. Comparison between cities urban footprints (in black), GEA-based functional economic areas (yellow boundaries), metropolitan planning instruments areas (dark colors) and metropolitan governance arrangement proposed by CNDU (lighter colors).

Source: Prepared by the authors, based on data from [8], [10] and [11].

3. Current limitations and complementary approaches

3.1. The need for a more updated flow analysis in the SCCMR

The previous section discussion was based on functional economic units or areas, which combine population density and travel-to-work (TTW) flow as a way to define the spatial structure of the SCCMR. However, it is noted that the analysis, which used both the OECD method and the GEA-based approach, is based on TTW flow data from the 2002 census. Subsequent censuses did not include such data, while recent TTW surveys do not consider detailed information about destination outside the administrative boundaries of sub-national region.

The authors reviewed recent primary data from road tolls located between Greater Santiago, Greater Valparaiso, Rancagua and other secondary cities, and the preliminary results indicate a significant increase in the flow of traffic between urban cores, of cars, buses and trucks. For example, the inflow and outflow of cars, wagons and motorcycles through the road connecting Greater Santiago with westward cities such as Curacavi and Greater Valparaiso increased 85% (inflow) and 77% (outflow) between 2009 and 2019, while the inflow and outflows coming from southward cities, particularly Rancagua, increased 95% and 105% respectively, as shown in table 2 next page. The flow of buses and trucks also increased. Although this is a preliminary result that needs further investigation, it suggests a relevant tendency towards integration of Santiago’s FEU with the other two metropolitan areas in the macro-region, and other secondary cities, and consequently, implies that analysis based solely on TTW flows does not cover other ways for the region’s transport system to be integrated, as is discussed below.
Table 2. Estimated vehicle and commuters flow between Santiago and secondary cities located southward and westward, for a typical weekday in 2009 and 2019.

| Flow with southward cities | 2009 | 2019 | 2009-2019 variation (%) |
|---------------------------|------|------|-------------------------|
| type of vehicle           |      |      |                         |
| cars, wagons and          |      |      |                         |
| motorcycles               |      |      |                         |
| vehicles                  | 9,035| 8,480|                        |
| people*                   | [15,601]| [14,645]| [30,421]| [29,970]| 95% | 105% |
| buses                     |      |      |                         |
| vehicles                  | 877  | 957  | 1,339                  |
| people*                   | [17,338]| [18,920]| [26,472]| [27,243]| 53% | 44%  |
| trucks                    |      |      |                         |
| vehicles                  | 4,287| 4,053| 5,745                  |
| people*                   | [21,490]| [21,273]| [21,945]| [21,233]| 34% | 36%  |
| total                     |      |      |                         |
| vehicles                  | 14,199| 13,490| 24,722                |
| people*                   | [32,948]| [33,565]| [56,893]| [57,213]| 74% | 80%  |

| Flow with westward cities | 2009 | 2019 | 2009-2019 variation (%) |
|---------------------------|------|------|-------------------------|
| type of vehicle           |      |      |                         |
| cars, wagons and          |      |      |                         |
| motorcycles               |      |      |                         |
| vehicles                  | 7372 | 7467 | 13,623                 |
| people*                   | [127,54]| [129,18]| [23,568]| [22,834]| 85% | 77%  |
| buses                     |      |      |                         |
| vehicles                  | 1087 | 1076 | 1,110                  |
| people*                   | [21,490]| [21,273]| [21,945]| [21,233]| 2%  | 0%   |
| Trucks**                  |      |      |                         |
| vehicles                  | -    | -    | -                      |
| people*                   | [34,244]| [34,191]| [45,513]| [44,067]| 33% | 29%  |
| total                     |      |      |                         |
| vehicles                  | 9,230| 9,324| 17,403                |
| people*                   | [34,244]| [34,191]| [45,513]| [44,067]| 89% | 81%  |

*: people-per-vehicle ratio used in calculation was 1.73 for cars and 19.77 for buses. **: data was not available.

Source: Prepared by the authors-based road concession companies ‘data

3.2. A more comprehensive analysis is required

The method proposed by OECD, and refined through the GEA-based approach, is important to the definition of functional economic units of the SCCMR, and consequently its spatial structure; however, this is only one dimension of development in the region that needs to be considered in planning and policy development. Other dimensions of development such as economic concentration and specialization, allocation of housing and infrastructure, the provision of social services, and the location and logistics of main industries are essential when considering a systems approach to formulating policies to support the sustainable development of the region. These other dimensions of development are discussed briefly, as follows:

- Employment: Variations in the flow of Foreign Direct Investment (FDI) to sub-national regions in Chile changed the composition of their economic base and employment, creating a high migration between sub-national regions during the 1980s and 1990s. Later, long-distance commuting emerged as an alternative to migration, particularly affecting small secondary cities with high unemployment rates within the Santiago metropolitan region and, to a certain extent, in Greater Valparaiso and Rancagua, in which the economic effects of FDI have been marginal [12]. Thus, the integration of secondary cities into the functional area of Greater Santiago does not guarantee an increase in jobs opportunities for the whole area but could lead to a decrease of local employment opportunities as a result of economic concentration and specialization. Moreover, the automatization of some jobs could affect even more the labor conditions in secondary cities. The challenge for the SCCMR is how supply chains, logistics, labor pools and skills and economic zones can be more strategically concentrated and integrated to reduce externality and transaction costs within the SCCMR.

- Allocation of housing and infrastructure, and provision of social services: There was an increase in the housing deficit in 1970s and 1980s, coupled with high net migration between sub-national regions. This put pressure on the growth of Chilean cities, accompanied by an increase in the number of households living in precarious or informal settlements. Since the 1990s, the government has played an active and successful role in reducing the housing deficit in Santiago and across sub-national regions. However, the growth in housing occurred in secondary cities far from activity
centers, such as Maipu and Puente Alto in Greater Santiago, and Villa Alemana in Greater Valparaiso, and this was not usually accompanied by the provision of essential public services, transport, job opportunities and amenities. Moreover, the provision of critical public services such as basic healthcare and primary education is, often, not effectively and efficiently delivered by the local governments in which most housing has been allocated. Additionally, low- and medium-income households have few locational options as they usually use social housing.

- Logistics of main industries: Mining and agriculture-related exports are significant for the economies and employment of the sub-national regions of Valparaiso and O’Higgins (city of Rancagua), with important implications in terms of infrastructure and logistics: mining operations and agricultural areas are located in the region’s hinterland but need good accessibility to the ports of San Antonio, Valparaiso, and Quintero to expand their export potential (see Figure 3). There is an increasing need to enhance the efficiency of the infrastructure and logistics to increase the region’s productivity; a recent report [13] noted that logistics in Chile account for about one-fifth of total product value in the manufacturing sector, which is twice the OECD average. Supply chain systems can be improved through the development of strategically located regional and sub regional multi-modal transfer and common-user distribution warehousing and logistics breakdown and assembly hubs.

**Figure 3.** Location of firms with exports above US$100 million in 2012, representing and 85% of all exports in the SCCMR

Source: Prepared by the authors based on primary public data collected from companies.

Note: Codelco and Anglo American, two mining firms not located in the Santiago metropolitan region, accounted for 52% of all exports in this region (upper area in the figure). Noticeable, most headquarters are located in inner Santiago.
4. A final proposal: Collaborative governance of SCCMR

The SCCMR lacks a clear and coherent set of integrated policies needed to manage current and future development challenges of the region. The challenges, and also loss of opportunities, are due primarily to the complexity and constraints of the institutional arrangements and responsibilities for planning, funding, developing and managing regional and urban projects and services. Nonetheless, in recent years Chile has made significant efforts to build a more comprehensive national urban framework, with the establishment of the CNDU and a series of policy and legislative proposals which aim to improve regional and metropolitan planning through greater policy capacity and institutional coordination and integration, at the regional and local level. These efforts, if implemented, will address several of the challenges and governance constraints pointed out in the previous section.

Despite these efforts, two gaps will remain in place. First, as the SCCMR is made up of three sub-national regions and several small and medium-sized secondary cities, challenges such as commuting and collaboration between cities that are not part of a recognized metropolitan area or, moreover, are not part of the same sub-national region, will continue. This is the current case for cities such as San Antonio, Melipilla, Quillota, Los Andes and San Felipe, among others. As discussed in section 2.3, there is mismatch between the actual spatial structure of the macro region, and its current and proposed planning and governance scheme.

Second, given the prominent role of the private sector in Chile for delivering infrastructure and social services, initiatives focused solely in the public sector cannot adequately address many of these challenges. The creation of endogenous and exogenous capacity for improved governance in the region and the ease of the constraints for the implementation of related policies will come only through better dialogue between the macro region’s various institutions and stakeholders. An option which has proved successful in the other areas of Chile for addressing these and other regional challenges, is the creation of a collaborative and independent governance arrangement, such as a Regional Committee, based on a series of chapters comprised of representatives of local, regional and central level stakeholders that participate in the planning and provision of infrastructure and services in the region. This could be set up as a legislative requirement or a voluntary scheme combined with financial incentives.

In the case of the SCCMR, the Committee should not pursue structural changes, e.g. replace existing organizations or legislative frameworks. Its focus should be on enabling the necessary conditions for more inclusive, participatory and cooperative governance, leading to the creation of instruments and mechanisms that integrate the entire process of planning and delivery of infrastructure and social services. In the short and medium term, such a Committee could expand the metropolitan forums led by CNDU into regional forums, which are an effective mechanism to build trust among institutions and community interests. Finally, in the medium to long-term, a regional committee should facilitate the development of a common-user management information system (MIS) platform for regional data and information collection and sharing. This could become the catalyst for vertical and horizontal cooperation and engage with the various levels of government through the development of policy recommendations; key areas include economic growth, and integrated planning provision for infrastructure, housing, and transport.

References
[1] World Bank 2009 Systems of Cities Integrating National and Local Policies Connecting Institutions and Infrastructure. Washington, D.C.
http://siteresources.worldbank.org/EXTLACREGTOUPURBDEV/Resources/UrbanStrategy_English.pdf: World Bank.
[2] Roberts BH 2014 Managing Systems of Secondary Cities: Policy Responses in International Development. Brussels, Cities Alliance.
[3] Roberts, BH 2019 Connecting Systems of Secondary Cities: Brussels, Cities Alliance/UNOPS: 106.
[4] Organisation for Economic Co-operation and Development (OECD) 2009 Territorial reviews: Chile 2009. Paris: OECD.
[5] INE. 2012 Compendio Estadístico [Statistical compendium]. Santiago.
[6] INE. 2002 Censo de Población y Vivienda [Population and dwelling census]. Santiago.
[7] Central Bank of Chile 2014 Cuentas Nacionales - Evolución de la Actividad Económica en el Año 2013 [National accounts – Evolution of economic activity for 2013] Santiago: Banco Central.
[8] CNDU 2017 Propuesta para una nueva institucionalidad para la gobernanza urbana Santiago: CNDU
[9] Batty M 2008 Cities as Complex Systems: Scaling, Interactions, Networks, Dynamics and Urban Morphologies Centre for Advanced Spatial Analysis, University College London.
[10] OECD 2012 Redefining "Urban": A New Way to Measure Metropolitan Areas, OECD Publishing, Paris, https://doi.org/10.1787/9789264174108-en
[11] Casado-Díaz JM Martinez-Bernabéu L and Rowe F 2017 An evolutionary approach to the delimitation of labour market areas: an empirical application for Chile, Spatial Economic Analysis, 12:4, 379-403, DOI: 10.1080/17421772.2017.1273541
[12] Rowe F 2014 Micro and macro drivers of long-distance commuting in Chile: The role of spatial distribution of economic activities and population. WRSA 2014: 53rd Western Regional Science Association. San Diego, CA, USA.
[13] OECD 2015 Diagnostic of Chile’s engagement in global value chains. Paris: OECD Publishing.
[14] Goodall B 1987 The Penguin Dictionary to Human Geography London: Penguin.