Housing Forms and Functional Rurality (density-travel time) within the Urban Macro Region of Chile: Toward a Social Mixity in Peri-urban?

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Abstract

The key elements to analyze the social mixity of suburbs or inter-metropolitan areas are mobility -within the context of the social territorial transformation process in the peri-urban space at the Metropolitan Region of Santiago and Valparaiso (Chile)- and the form of a new extended urban region. This research looks for establish the existing relationships between the social-economical conditions of population, finding the different forms of housings (social, gates communities, social-rural spaces), and the demographic density; the transportation time to its respective regional capitals and main markets (rural functionality). The relations between these two variables are obtained through GIS, overlapping and crossing layers of information at the scale of census detail (2002). A cluster analysis of the social-economic and social-professional classifications is added in order to determine the spatial conditions of social mixity in this inter-metropolitan border. These results confirm dissociation among the use of land, the kind of inhabitants, and public policies, which can be understood as the expression of inter-territorial changes and the formation of an inter-metropolitan space within the urban macro region of Chile. The existence of a social structure and a functional use of the space are recognized as the result of subjects like the expansion of the regional central crowd, the pressure of property development and the transformation of border agriculture on last decades. The research shows the results of project Fondecyt n° 1100999 (2010) “The new functional rurality (density and travel time): relation to economic activities, natural resources and poverty in the metropolitan areas of Chile, Comparison of Valparaiso Region, Bio-Bio and Metropolitan Santiago”; Fondecyt n°11060310 (2006) “The new metropolitan rural areas: resizing, periurbanization and impacts on rural territorial development of the Santiago Metropolitan Region 1992-2002” ; and Fondecyt n°1095222 (2010) “The transformation of the CBD: business restructuring and residential elitism (gentrification). The case of Santiago, Valparaíso and Viña del Mar”.

Keywords: Peri-urbanization, social mixity, functional rurality, housing forms.
Introduction

Nowadays the metropolitan areas of Latin American Cities are the main components of various territorial transformations associated to the process of globalization and to the implementation of neoliberal development policies. A significant part of the debate over this subject is focused in the thesis of a global city, which considers that social polarization and duality, arise as part of a natural form of transformation within these kind of cities, this situation in the practice means a bigger presence of groups that have high and low incomes, reducing groups with medium salaries (De Mattos, 2007). Nevertheless, this thesis has been debated by some studies that mention that this process not necessarily leads to an increase in polarization and segregation, by contrary it would originate new forms of territorial integration: social mixity.

Particularly in the case of Chile, the metropolitan areas have had peri-urbanization as the result of the development of urban limits, new incomes in rural areas next to these borders, the decrease of distances in relative terms and the localization of new socio-economical groups in the suburbs looking for a better standard of life (amenities). In this way, these spaces of urban-rural transitions are the place for a social transformation associated to the way of a new expanded urban region.

The present research, within this context, looks for establishing the social mixity of the peri-urban spaces in the Metropolitan Region of Santiago and Valparaíso through the analysis of the relationships among the social and economic conditions and social professionals within the population, the different classifications of housing (particularly social housings, condominiums, and rural residences), demographic density in these metropolitan areas and the transportation time to the respective regional capitals. In practice the last ones are integrated within the analysis of the concept of rural functionality and lately are related within the suggested analysis of clusters.

The hypothesis presented in this work is that peri-urban spaces have significant levels of social mixity as the result of the development of urban borders in the metropolitan area, the improvement of access and people mobility, which reinforce the fact of economically accommodated groups in these areas that were traditionally occupied by agricultural activities. Nevertheless this social mixity answers different spatial, social and institutional logics that give place to a dynamical configuration for each one of the areas in analysis.

Theoretical framework: housing forms and urban sprawl

One of the most significant change processes that affect the metropolitan spaces has to do with its social and cultural demographic structures. The new metropolitan territorial model in Latin America is characterized by a physical expansion, never seen before, fragmentation, specialization and growing complex space near the periphery (Rojas, Muñiz and García López, 2009). Likewise, it can be observed accelerated growth of the urban population, extension of its size and the development of each time more complex methods of transport. (Palomares, 2008; Partridge and Rickman, 2008).

The metropolitan areas of Santiago and Valparaíso, in this context, present a process of a growing process of urban sprawl, in different ways, apparently without regulation in the periphery. The first evidence of this is social housing groups in areas that are isolated in social and functional terms from urban conglomerates. Hidalgo (2007) in the case of AMS, indicates that this kind of housings were within the urban cluster until 1970. Lately the localization of social housings was moved to areas that were traditionally poor within the cluster, abandoning the more accommodated areas. From 1990 the building of new social housings becomes an engine of the sub-urbanization phase and for the central cluster expansion.

1 This research shows the results of project Fondecyt n° 1100999 (2010); n° 11060310 (2006) and n° 1095222.
This kind of fragmented urban development has its origin in a new social housing policy based on subsidies by demand, which leaves the localization of social housing complexes in hands of private town planners that look for incomes and accelerated revenues. These housings are frequently placed in the periphery of the already existing accommodated urban areas. (Hidalgo and Zunino, 2011).

Secondly, it highlights the process of urban sprawl and physical expansion of the metropolitan areas toward the peri-urban zones building housing through condominiums for medium, medium high and high classes, which moved to these areas looking for new residential spaces, bigger and immersed in a different environment than the modern metropolis (Salazar, Hidalgo and Páez, 2011; Nates and Raymond, 2007).

By other side, Hidalgo and Borsdorf (2009) mention that the groups with more incomes may buy a second residence in rural areas far from the urban centers, mainly in the form of rural residency properties, in areas that have more than 5000 m² where they built houses with individual design and consider accessories as swimming pools. This kind of housings can also be structured under the shape of complexes, similar to closed condominiums with security systems.

This process responds to the phenomenon of migration motivated by amenities, among other factors, because of environmental quality, beautiful landscape, great size of housings, good access in comparison to AMS and AMV justified by connectivity and less transportation time. That is why this form of residencies becomes the main modifier agent in the rural habitats, mainly by its surface features, and the reason of various urban-rural problems, due to the change in the use of soils and its constant diffuse fragmentation (Salazar, Hidalgo y Páez, 2011; Delaunay, 2007).

However, regarding to the time of trips, there is no doubt that the territorial transformations before described touch directly and indirectly the patterns of mobility, activities and the densification of peri-urban spaces of both central clusters, as in the rest of regional space (World Bank, 2005; Partridge and Rickman, 2008).

The increase in mobility denotes not only a more frequent number of displacements, but also distances and the time of trips. Then the temporary variable acquires a special interest from the perspective of the time that the population dedicates to mobility, given the relativization of distances (Palomares, 2008). The subject previously exposed produces an increase of densities in highly connected peri-urban sectors.

In the light of this context, there arises the concept of rural functionality, a methodological proposal that helps to improve the approximation toward the vision of a rural urban functional integrity (Salazar y Osses, 2008). This rate enables to describe 12 ordinal classes, with different features of density and trip times, which denotes gradually the spaces that are clearly urban and rural space, suggesting with that an alternative classification to the traditional rural/urban dichotomy, as it was shown in the previous debate (Salazar y Osses 2008). Each classification is detailed in table 1.
Table 1. Categories of functional rurality considering density and travel time.

<table>
<thead>
<tr>
<th>Type</th>
<th>Density (inhab/km²)</th>
<th>Time (Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>150 and more</td>
<td>0-1</td>
</tr>
<tr>
<td>2</td>
<td>150 and more</td>
<td>1-3</td>
</tr>
<tr>
<td>3</td>
<td>100-150</td>
<td>0-1</td>
</tr>
<tr>
<td>4</td>
<td>100-150</td>
<td>1-3</td>
</tr>
<tr>
<td>5</td>
<td>50-100</td>
<td>0-1</td>
</tr>
<tr>
<td>6</td>
<td>50-100</td>
<td>1-3</td>
</tr>
<tr>
<td>7</td>
<td>25-50</td>
<td>0-1</td>
</tr>
<tr>
<td>8</td>
<td>25-50</td>
<td>1-3</td>
</tr>
<tr>
<td>9</td>
<td>25-50</td>
<td>3 and more</td>
</tr>
<tr>
<td>10</td>
<td>0-25</td>
<td>0-1</td>
</tr>
<tr>
<td>11</td>
<td>0-25</td>
<td>1-3</td>
</tr>
<tr>
<td>12</td>
<td>0-25</td>
<td>3 and more</td>
</tr>
</tbody>
</table>

Source: Salazar y Osses, 2008.

These categories consider population densities, calculated from a census database (2002) in detail to the rural village level, and travel times from each of these locations to the central gathering and distribution of agricultural products in the region and metropolitan areas under study (Santiago and Valparaíso Region). In both cases these are located around the existing urban boundary. The velocities used to calculate travel times described above are the following: Highway 100 km / h, main road 70 km / h, secondary road 30 km / h and 5km / h for areas that have no infrastructure.

The integrated analysis of the different classifications of functional rurality and variables relative to the socio economical and professional groups present in the research areas, allows doing an approximation towards the recognition of different levels of social mixity (concept consolidated in France as the answer to different ways of urban fragmentation and the increase of spatial disparities).

**Materials and method: principal aspects**

At this point it is important to highlight that to analyze social mixity, it is not enough to observe the level of participation of each social economical or social professional group, because this rate only originates a gross rate that does not reflect the relations or associations within a regional context.

Thus, in order to incorporate this variable in the analysis, two social economical groups were built by the methodology suggested by ADIMARK 2002 - which identifies five social economic groups\(^2\) (GSE) crossing the information about the kind of education that the leader in the home had with the goods in the house upon the records of the National Census 2002. The five socio professional groups\(^3\) (GSP) were built upon the National Census 2002, and the codes related to the Census data base,

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\(^{2}\) This classification considers the groups: ABC1 for an accommodated group; C2 medium-high; C3 medium; D medium-down y E for the lowest group.

\(^{3}\) This classification considers the groups: GSP 1 Managers and professionals; GSP 2 Professionals and technicians; GSP 3 Employees of shops and services, GSP 4 Farmers, workers and agricultural laborers and GSP 5 Workers.
adapting the methodology of De Mattos, Riffo et al (2007). The all economically active population in each unit of the Census is expressed in percentages (Salazar y Osses, 2008, pg.10).

By other side, the cluster analysis corresponds to a multivariable statistics technique that automatically classifies the records. In concrete this is an analysis of distances or similitude of records in different variables, in order to gather information or cases with similar conditions, within one variable or among all the variables analyzed. This study considered the analysis by clusters- in the records of the Census -for all the levels of “rural localities”, considering the variables of percentage participation of each one of the five socio economic and professional groups that belong to the scale of this analysis.

It should be highlighted as methodological method, that the results of cluster analysis are only a representation of the record sets in which this method was applied. For this reason the study suggests a particular analysis of each region with separated samples, in order to represent the results of the regional reality in each area of study.

Also, by the characteristics of the set of records, it was used the “analysis of clusters in medias K”, because as Pérez details (2004), this method represents several features that make it suitable and useful for this research, as for example forming groups after consecutive tests, which contrasts the effect that each change in each case at each group has over its residual variation considering the minimum value of variation per group in order to form the final sets and the analysis of big data files (generic feature for all the no hierarchical methods of cluster) within other potentialities.

After building clusters at each rural locality, the data bases were registered into the digital cartographic base of the 2002 population and housing census. The results of the statistic analysis were annexed and this allowed the spatial display of this information. The results of the analysis for the cluster were overlapped with relative information of accessibility and distribution of the gross density of the population to calculate the different levels of rural functionality (Salazar, Hidalgo y Páez, 2011).

**Main results**

Later in this paper there are three groups of simplified results: the first one considers the analysis of the socio economical and socio professional groups in relation with the different levels of rural functionality; the second one mentions the classification of housing related to the same category of functional rurality and finally the analysis of clusters. Each analysis was done as in the Metropolitan Area of Santiago as in Valparaiso.

**Social economic, professional groups and functional rurality**

The results obtained in this work show that the areas of study have a high differentiation among the localization patterns of both groups. By one side, the Metropolitan area of Santiago shows more heterogenic trends in comparison with the concentration of population within the category of functional rurality, Valparaiso is just the opposite with evidence of much more heterogenic distributions.

In practice, the spatial distribution of the socio economics groups in AMS (Figure 1) shows a clear concentration of all the other groups within the category that embraces high densities and reduce times of transportation. The functional rurality number five is the one that has more preference in terms of localization, doing reference to medium densities (50-100 inhab/km2) and transport times to urban centers in less than one hour. It can mainly be observed here groups with more incomes if compared with lower categories. In contrast categories associated to low densities and transportation times in the range of three hours have a clear predominance of groups with reduced incomes due to agricultural activities developed in the suburbs of AMS.
Figure 1. Percentage of total people per socio economic group considering the peri-urban area of the Metropolitan Region of Santiago based on the levels of functional rurality.

The Metropolitan area of Valparaíso (figure 2), shows that the population, independent of the socioeconomic group to which it belongs, is mainly located in the peri-urban sectors of the region, associated with the rurality categories two, six and eleven in descending order considering number of people. These sectors have intermediate densities and travel times (50-100 inhabitants per km² and between 1 and 3 hours respectively).

In each one of the categories of rural functionality it can be observed a certain level of homogeneous distribution of the social economical groups within the territory. Besides it can be noticed a bigger concentration of the ABC1 group in class two and also the group with less incomes (group E) in class six (50-100 inhab/km²: 1-3 hrs). Both categories have similar features which at first sight show that this region has a higher level of social mixity in regard to AMS.

Figure 2. Composition of socio economical groups in the peri-urban area of the Region of Valparaíso, according to each level of functional rurality.

Finally for this point, the socio professional groups in both areas repeat the localization patterns observed in the socio-economics groups. In the case of AMS (Figure 3), the most qualified groups are placed in the areas with higher density associated to less transportation times in ranges lower than one hour and those less qualified in places with intermediate density and trips time between one and three hours. The AMV (Figure 4) highlights again by its heterogeneity within each category of functional rurality and because the GSP 1 and 2, that is to say directors, professionals and associates respectively are at more than three hours of the regional center.

This can be because these professionals at regional level are related to the agricultural production that is present mainly in the rural region, resolving their needs of services and market in the intermediate cities near to the productive cluster. Finally the GSP4 (farmers, workers and agricultural employees ), in opposition to what happens at AMS, is located in areas that present intermediate densities and trip times, situation that matches with the socio economic and territorial characteristics of the AMV.

Figure 3. Composition of socio economical groups in the peri-urban area of the the Metropolitan Region of Santiago, according to each level of functional rurality.

![Figure 3](image)

Figure 4. Composition of socio professional groups in the peri-urban area of the Region of Valparaíso, according to each level of functional rurality.


**Housing forms and functional rurality**

The second phase of the analysis, as the first one, confirms differences between the socio territorial configuration of the Metropolitan Area of Santiago and Valparaíso. In the case of AMS (Figure 5), the classification of higher functional rurailities show lower densities in regard to different ranges of time transportation and that higher densities mixed with the same ranges, represent lower levels of rurality. Based on that it can be said that the different classification of housings are placed mainly in territories where the transportation times are reduced, which corresponds to the criteria and needs of the real state development.

As Salazar, Hidalgo and Páez (2011) mention, more than the 60% of the social housings are in the suburbs of AMS, associated to the first classification of functional rurality, that is to say, spaces that shelter high densities of population and that have an optimum access. Later the classification number ten is the one that presents the second preference with a 30% placed in this category. This class has the same characteristics of access than the first one (but with less densities and it is likely that the cost of soil be lower).

By contrary, the condominiums placed outside of AMS have an opposite distribution in comparison to social housings. Nearly a 60% of the condominiums are in the classification 10 of rurality while nearly a 35% in the classification number one. The rural residencies are concentrated in a 50% in the classification of rural functionality number ten (0-25 inhab/km2: 0-1 hrs). It is remarkable that this is the only housing group placed in classification eleven, characterized by low densities.
Figure 5. Housing forms and Functional Rurality in the Metropolitan Region of Santiago (RMS).

![Figure 5](image)

Source: Project Fondecyt nº 1100999 (2010), nº 11060310 (2006) and nº 1095222

The distribution of the different classifications of housing at AMV (Figure 6), the same as AMS, is present in different categories of functional rurality one and ten. In the first one there are a high percentage of social housings located in areas with high density (70%) and low time of transportation, with fewer costs in equipments and framework. Later in the same category, condominiums are nearly 20% down and rural residencies are absent. The second classification is more homogenized with a small predominance of social housing and later rural residencies.

The category two highlights a high quantity of condominiums, with low presence of social housings. This classification is associated to intermediate transportation times, which is characteristic of peri-urbanized territories. It can be observed a clear predominance of rural residences in the other categories, with low densities and intermediate transportation times toward commercial centers and regional services.

Figure 6: Housing forms and Functional Rurality in the Peri Urban Area of Valparaiso.

![Figure 6](image)

Source: Project Fondecyt nº 1100999 (2010), nº 11060310 (2006) and nº 1095222
The social mixity in the peri-urban metropolitan areas

Finally, is this phase of the analysis what allows to determine the level of social mixity through the integration of the records obtained in the two previous ones. In the case of Santiago (Figure 7), the different classifications of clusters obtained locally by census, indicate that this area, in global basis, has a high mixity in three of the seven clusters (four, five and seven). They are placed in areas closed to AMS, particularly in the north east sector of the region.

By other side, the main focus of concentrations may be observed in the south west area, with socio professional groups based in their preferences of localization within the territory. Within these clusters (one, two, three and six) can be observed certain levels of spatial segregation, which is explained by the information previously presented.

Figure 7. Cluster analysis according to Socio Professional Groups in the Metropolitan Region of Santiago.

The situation is significantly different within the Region of Valparaíso (Figure 8) in regard to what was described for Santiago. The analysis of clusters shows that, only two of the seven one, present a more homogeneous distribution within the territory. They are located in coast border of the region near the city of Valparaiso.

The rest of the categories present the clear predominance of social professional groups, in opposition to the rest. The cluster two highlights with a high presence of GSP2, and number five with GSP3. Finally the cluster four has a regional predominance with more homogenous characteristics in its GSP and in regional distribution. This is positive in terms of the social mixity present and explain a more balanced urban distribution in the intermediate cities with the predominance of peri-urbs mixs, in social economic and professional terms and in the form of housings, among the most important factors of territorial configuration for this study.

Figure 8: Cluster analysis according to Socio Professional Groups in the Region of Valparaíso.

Final considerations

The urban growth still happens in the way of a sub-urbanization, where the social housing is a key element for the development of the city. The presence of a social structure and the functional use of space, are the results of factors as expansion of the central regional core (CBD), the pressure of the real state business (gate communities) and the technification of the peri-urban agriculture.

From this perspective, the results obtained in the three phases of the analysis allow to confirm that the variables (GSP, GSE, Density, Travel time) chosen were useful to quantify the social mixity inside the Metropolitan Region of Santiago and Valparaíso. It could be observed that the peri-urban has significant levels of social mixity as direct result of the expansion of urban limits toward metropolitan
areas, the location of high-income groups in these sectors and the own spatial dynamics of each housing form.

In the specific case of the AMV, social mixity levels are related with the productive configuration associated to primary activities (agriculture) and their service intermediate cities that have a high peri-urban component (mid densities and mid travel time). This allow that diversity is greater than the AMS, of both socio-economic and socio-professional groups, where the process is reversed as a result of the huge centripetal force and the provision of transport service and infrastructure to facilitate urban concentration.

These factors, taken together, are related to the formation of extended urban regions, changes in population mobility and residential options and, in turn, highlights the importance of inter-territorial scale between two growing urban agglomerations in Macro urban region of Chile.

In this context, it appears that the social mixity described for each case has its origin in the main urban practices that are rooted in social housing policy that builds towards the periphery and the housing boom associated with higher and middle-income condominiums in these sectors.

Following this, the apparent duality of the global city itself becomes meaningless and leads to a process of homogenization and dispersion on the location of different social groups. This agrees with the statement of Preteceille (2003:66), which states that "the differences in the socio professional levels between administrative areas are not organized on the form of an opposition between different groups clearly recognizable, but on the form of a structured continuum where you can find, among the different extreme situations, a range of intermediate social situations”.

Finally, it can be seen a dissociation between the use of land and their housing forms. Salazar, Hidalgo and Páez (2011) say, the metropolitan rural areas form a gradient, that become part of a future studies to plan better peri urban areas.

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References


