Land Use Diversity and Socioeconomic Welfare: the Case of the Barcelona Metropolitan Region

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Introduction

In the last decades, we have witnessed a substantial shift in the way economic networks are configured, reaching a point where it is adequate to talk about a truly global economy, one in which all regions of the globe play a prominent role. Some scholars have pointed out that this tendency will result in a scenario where "*the world is flat*", where the technical and human capital conditions tend to homogenize and equate without taking into consideration any geographical factor (Friedman, 2005).

However, other leaders have refuted this notion, arguing that globalization is the dawn of a new economic paradigm oriented towards activities of higher level, sectors that tend to be geographically highly localized (Florida, 2009). Finance, and especially venture capital, tend to follow this pattern (Florida et Hathaway, 2018), but also most knowledge-intensive activities (Katz et Wagner, 2014). As Florida puts it, the world is far from flat, it is instead characterized by peaks and valleys, that is by places that concentrate a share of economic power disproportionately to its population or territory (Florida, 2005).

In addition to this globalization process, the modern economy finds itself in a transitory stage, where profound changes will redefine our very conception of the whole model, and especially, of the notion and relationship between economy and places. We are now foreseeing a future in which technical innovations continue to be defining for the success of economies, but these inventions are no longer the most important feature. Human capital and creativity will play the central role, as we metamorphose from *industrial* to *thinking* economies (Ruelas-Gossi, 2020).

Those cities and regions that succeed at completing this journey satisfactorily will lead the new global economy, and those that fail to adapt to the new reality will suffer serious social and economic unrest (Ruelas-Gossi, 2020). The key question is, then, how do we prepare our cities and regions for this new model, and how do we build innovative habitats for this human capital and creativity to thrive.

Many authors remark how innovation and economic growth in urban environments can be attributed to diversity. Some comment on the several benefits of economic heterogeneity (Florida, 2009), or on social diversity as the predominant driver for social and economic development in cities.

Others, however, consider the variety in land use as a fundamental prerequisite to achieve this advancement (Jacobs, 1961) (Kaplan, 2023).

On this note, the main purpose of this article is to analyze the correlation between land use diversity and socioeconomic welfare in 133 municipalities in the Barcelona Metropolitan Region. This study not only can be useful to prove whether there exists a correlation between these variables, but also to evaluate the preparedness of the selected territories for the new economic model.

Methodology

In order to achieve our goal, we have designed an empirical approach based on the confection of a land use diversity indicator. After researching existing indexes, we came across a modification of the Simpson Index of Diversity to measure land use diversity in Durham County, North Carolina. However, we preferred constructing our own indicator, since we wanted to include the proximity between different land uses in the equation.

Our very own Index of Land Use Diversity experienced the following process: in the first place, for every block of single-use land, we computed the use of its nearest block. Secondly, for each one of the 133 selected municipalities, we calculated the proportion of nearest relationships established between different uses over the total number of connections. The result, then, is a value in the range (0 - 1).

Once the measurement for land use diversity has been designated, we chose to employ the Territorial Socioeconomic Index (IST or *Índex Socioeconòmic Territorial*), built by the Statistical Institute of Catalonia, to measure the socioeconomic level of each municipality.

To evaluate the correlation between the Index of Land Use Diversity and the IST, we used the Pearson Correlation coefficient.

Results

After computing the Index of Land Use Diversity for each municipality in the Barcelona Metropolitan Region, and as depicted in Figure 1, we have observed that the highest scores tend to concentrate on two main areas: the heavily industrialized frontier municipalities in the east of Vallès Occidental county and the west of Vallès Oriental county, and the southeastern part of Baix Llobregat county. Additionally, there are also isolated high scores in some other regions of Baix Llobregat and Maresme counties. A complete list of municipalities and its Index of Land Use Diversity can be found in Annex A.

Figure 1: Index of Land Use Diversity by Municipality in the Barcelona Metropolitan Region in 2022

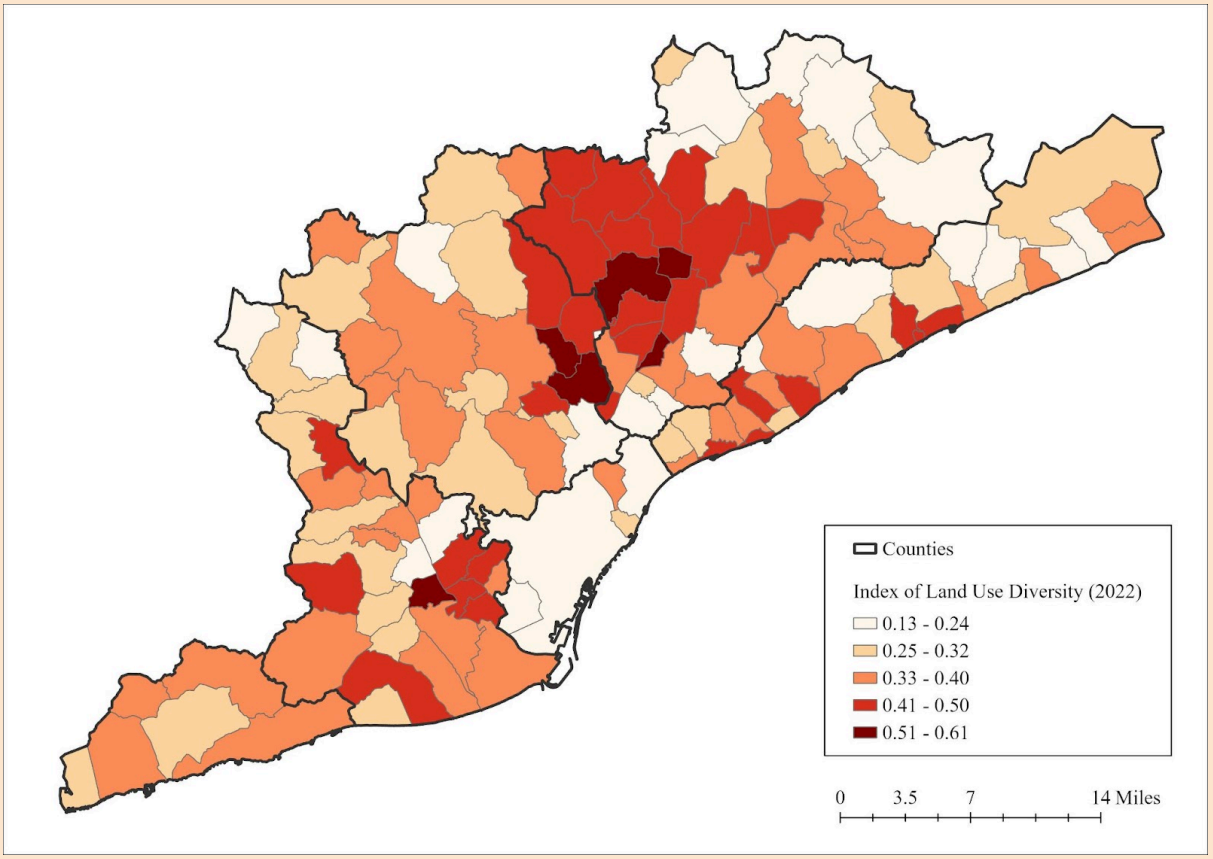


Figure 2: Territorial Socioeconomic Index by Municipality in the Barcelona Metropolitan Region in 2020

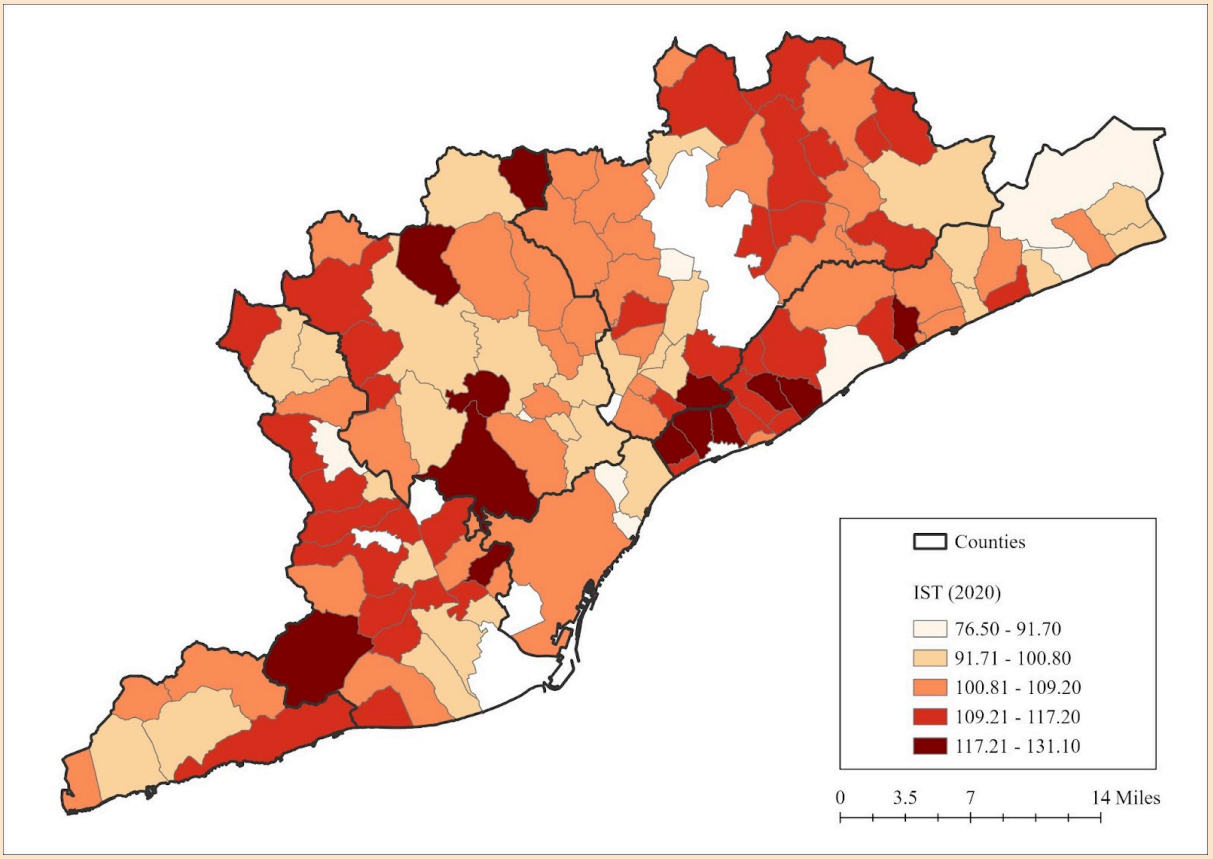


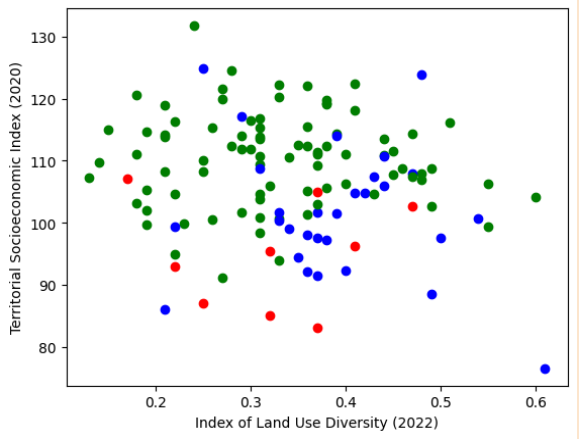
Figure 2 illustrates the distribution of the Territorial Socioeconomic Index throughout the Barcelona Metropolitan Region. In this case, there is no evident spatial pattern followed by this indicator. A complete list of municipalities and its Territorial Socioeconomic Index can be found in Annex A.

The value of the Pearson Correlation coefficient (-0.14) proves that there is no correlation between the Index of Land Use Diversity and the Territorial Socioeconomic Index for the selected 133 municipalities. As can be seen in Figure 3, the distribution of each territory in the graph does not follow any pattern, as confirmed by the correlation coefficient. Moreover, if we classify the municipalities in three groups according to their population density, there is still no sign of correlation.

The coefficient for low-density settlements (with less than 2000 inhabitants per square kilometer) is -0.04, for medium-density settlements (with a density between 2000 and 6000 inhabitants per square kilometer) is -0.19 and for high-density settlements (with more than 6000 inhabitants per square kilometer) is 0.02. Figure 4 shows the graph of Index of Land Use Diversity and Socioeconomic Territorial Index scores, with the municipalities selected classified by density.

Figure 3: Graph of the Index of Land Use Density and Territorial Socioeconomic Index for the 133 selected municipalities in the Barcelona Metropolitan Region

Figure 4: Same graph as in Figure 3, classified by settlement density. Green corresponds to low-density, blue to medium-density and red to high-density municipalities



Conclusion

The results obtained in this article show that there is no evident correlation between the land use diversity and the socioeconomic scores of a municipality in the Barcelona Metropolitan Region, even if population density is taken into consideration. However, there is another possible interpretation of these findings.

Firstly, since we are analyzing a metropolitan region, there are strong mobility ties between the territories. This phenomenon generates the following scenario: people that benefit from high land use diversity and have more available income (one of the parts that make up the Territorial Socioeconomic Index), but choose to live in low land use diversity municipalities. As a result, these places of residence score disproportionately high values in socioeconomic indicators when compared to their land use diversity. However, this is not always the case, therefore there is no general pattern.

A possible solution, in order to verify the correlation between the land use diversity and the socioeconomic indicators, is by changing the scope of the analysis. Instead of focusing on municipalities in the Barcelona Metropolitan Area, we could study metropolitan areas in Spain or in southern European countries and compare them.

In second place, and if we accept the validity of the theoretical beneficial outcomes of land use diversity, we can conclude that territories with high land use diversity in the Barcelona Metropolitan Region have been unable to capture its benefits. It has probably something to do with the way how (or rather, how not) different land uses are integrated, not only spatially, but in a broader notion; economically and socially. The Barcelona Metropolitan Region, as a whole, is not prepared for the new economy, and will not be until some action is taken that guarantees that land use diversity is at the service of economic and social development.

At the beginning of this article, we asked ourselves how do we build innovative habitats that are prepared for the new economy, for the human capital and the creativity to thrive. The first step is by leveraging land use diversity as a fundamental public policy tool. And although the magnitude of the impact of land use diversity in socioeconomic indicators is still to be determined, we are confident it will play a major role in the shaping of the new economic paradigm. ■

References

Florida, R. (2005, Octubre 3). The World is Spiky. *The Atlantic Monthly*, (296), 48-51.

Florida, R. (2009). *Cities and the Creative Class*. Routledge.

Florida, R., Hathaway, I. (2018). Rise of The Global Startup City: The New Map of Entrepreneurship and Venture Capital. Center for American Entrepreneurship.

Friedman, T. (2005). *The World Is Flat: A Brief History of the Twenty-First Century*. Farrar, Straus and Giroux.

Jacobs, J. (1961). *The Death and Life of Great American Cities*.

Katz, B., Wagner, J. (2014). The Rise of Innovation Districts: A New Geography of Innovation in America. Metropolitan Policy Program at Brookings.

Ruelas-Gossi, A. (2020). Thinking Cities vs Doing Cities. *Nuevas Tendencias*, (103), 14-19.

Seth, K. (2023). Fragile Neighborhoods: Repairing American Society, One Zip Code at a Time. Little, Brown Spark.

Appendix A

Municipality	Index of Land Use Diversity	Territorial Socioeconomic Index
Abrera	0.32	106
Aiguafreda	0.29	111.9
Alella	0.27	120
Arenys de Mar	0.42	104.8
Arenys de Munt	0.31	104.7
Argentona	0.37	111.1
Badalona	0.22	92.9
Badia del Vallès	0.32	85.1
Barberà del Vallès	0.41	104.8
Barcelona	0.17	107.1
Begues	0.33	120.2
Bigues i Riells del Fai	0.48	108
Cabrera de Mar	0.41	122.4
Cabrils	0.38	119.8
Caldes d'Estrac	0.47	107.9
Caldes de Montbui	0.47	107.5
Calella	0.37	91.4
Campins	0.15	115
Canet de Mar	0.37	101.6
Canovelles	0.61	76.5
Cànoves i Samalús	0.25	108.2
Canyelles	0.38	105.7

Cardedeu	0.45	111.6
Castellar del Vallès	0.31	110.8
Castellbisbal	0.31	109.4
Castelldefels	0.31	108.7
Castellví de Rosanes	0.39	114.4
Cerdanyola del Vallès	0.37	109.2
Cervelló	0.29	114
Collbató	0.21	119
Corbera de Llobregat	0.25	110.1
Cornellà de Llobregat	0.41	96.3
Cubelles	0.31	103.8
Dosrius	0.18	111.1
el Masnou	0.42	nan
el Papiol	0.38	nan
el Prat de Llobregat	0.37	nan
Esparreguera	0.26	100.5
Esplugues de Llobregat	0.37	104.9
Figaró-Montmany	0.19	102
Fogars de Montclús	0.21	108.2
Gallifa	0.33	122.2
Gavà	0.43	104.7
Granollers	0.5	97.5
Gualba	0.28	112.4
l'Ametlla del Vallès	0.41	nan
l'Hospitalet de Llobregat	0.19	nan

la Garriga	0.5	nan
la Llagosta	0.46	nan
la Palma de Cervelló	0.4	nan
la Roca del Vallès	0.37	nan
les Franqueses del Vallès	0.46	nan
Lliçà d'Amunt	0.55	106.3
Lliçà de Vall	0.47	114.4
Llinars del Vallès	0.4	106.2
Malgrat de Mar	0.36	92.1
Martorell	0.49	88.5
Martorelles	0.29	101.6
Matadepera	0.24	131.8
Mataró	0.4	92.3
Molins de Rei	0.19	114.7
Mollet del Vallès	0.35	94.4
Montcada i Reixac	0.22	95
Montgat	0.39	114
Montmeló	0.54	100.6
Montornès del Vallès	0.33	93.9
Montseny	0.22	104.7
Olesa de Montserrat	0.19	99.7
Olivella	0.36	105.1
Òrrius	0.18	120.6
Palafolls	0.33	100.7
Palau-solità i Plegamans	0.46	108.7

Pallejà	0.38	112.4
Parets del Vallès	0.44	106
Pineda de Mar	0.21	86.1
Polinyà	0.6	104.2
Premià de Dalt	0.36	112.3
Premià de Mar	0.47	102.7
Rellinars	0.34	110.5
Ripollet	0.32	95.4
Rubí	0.36	98.1
Sabadell	0.38	97.2
Sant Adrià de Besòs	0.25	87.1
Sant Andreu de la Barca	0.33	100.3
Sant Andreu de Llavaneres	0.26	115.3
Sant Antoni de Vilamajor	0.44	110.9
Sant Boi de Llobregat	0.34	99.1
Sant Cebrià de Vallalta	0.19	105.3
Sant Celoni	0.23	99.8
Sant Climent de Llobregat	0.31	115.3
Sant Cugat del Vallès	0.25	124.9
Sant Esteve de Palautordera	0.3	116.5
Sant Esteve Sesrovires	0.31	113.5
Sant Feliu de Codines	0.49	102.6
Sant Feliu de Llobregat	0.43	107.4

Sant Fost de Campsentelles	0.14	109.8
Sant Iscle de Vallalta	0.13	107.3
Sant Joan Despí	0.44	110.8
Sant Just Desvern	0.48	123.9
Sant Llorenç Savall	0.31	100.8
Sant Pere de Ribes	0.31	98.3
Sant Pere de Vilamajor	0.37	111.4
Sant Pol de Mar	0.3	111.8
Sant Quirze del Vallès	0.27	121.6
Sant Vicenç de Montalt	0.41	118.1
Sant Vicenç dels Horts	0.22	99.4
Santa Coloma de Cervelló	0.51	116.2
Santa Coloma de Gramenet	0.37	83
Santa Eulàlia de Ronçana	0.49	108.7
Santa Maria de Martorelles	0.21	113.8
Santa Maria de Palautordera	0.37	103
Santa Perpètua de Mogoda	0.55	99.3
Santa Susanna	0.18	103.2
Sentmenat	0.48	107
Sitges	0.35	112.5
Tagamanent	0.21	114.2

Teià	0.38	119.3
Terrassa	0.37	97.6
Tiana	0.28	124.5
Tordera	0.27	91.1
Torrelles de Llobregat	0.31	116.8
Ullastrell	0.38	119.1
Vacarisses	0.31	113.8
Vallgorguina	0.4	111.1
Vallirana	0.45	107.7
Vallromanes	0.36	122
Viladecans	0.33	101.6
Viladecavalls	0.36	115.5
Vilalba Sasserra	0.36	101.4
Vilanova del Vallès	0.22	116.3
Vilanova i la Geltrú	0.39	101.5
Vilassar de Dalt	0.44	113.6
Vilassar de Mar	0.29	117.2