GENTRIFICATION IN THE MONTERREY METROPOLITAN CENTER, 2010-2020

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El objetivo del siguiente estudio es identificar áreas posiblemente gentrificadas o en proceso de gentrificación mediante una tipología localizada de dos componentes, el rejuvenecimiento e incremento en la calidad de vida. Esta tipología puede ser aplicada en investigaciones similares. El escrito aborda el caso del Centro Metropolitano de la Ciudad de Monterrey (CMM), Nuevo León, México. Los planes actuales de regeneración urbana y aumento de densidad habitacional en el CMM han ocasionado un "boom" inmobiliario vertical de torres departamentales y potencializado el surgimiento de un proceso de gentrificación de la zona, entendido aquí como la disminución del rezago social (incremento en la calidad de la vida) a través del tiempo, con aumento de jóvenes adultos (25 a 34 años) respecto a los adultos mayores (60+ años). El artículo sugiere un procedimiento para medir la gentrificación mediante el cruce del Índice de Rezago Social (IRS) al nivel de cada Área Geoestadística Básica (AGEB) con un índice de rejuvenecimiento al nivel de secciones electorales en el periodo 2010 – 2020. Ambos, la disminución del rezago social (2010-2020) y el rejuvenecimiento (2010-2020), se articulan analíticamente en años censales sucesivos para generar una tipología localizada del proceso de gentrificación.

Palabras clave: gentrificación, rejuvenecimiento, Monterrey, rezago social, tipología localizada.

The purpose of the study is to identify areas that are possibly gentrified or in the process of being gentrified, through a localized typology of two components: youthification and an increase in the quality of life. This typology can be applied in similar investigations. Thisd paper addresses the case study of the Metropolitan Center of the City of Monterrey (CMM), Nuevo León, Mexico. The current urban regeneration plans and the increase of housing density in the CMM have caused a vertical real estate "boom" of apartment buildings and have strengthened the emergence of gentrification in the area, understood here as the decrease in social backwardness (increase in the quality of life) over time, with an increase in young adults (25 to 34 years-old), compared to older adults (60+ years-old). This article suggests a procedure to measure gentrification by overlapping the Index of Social Backwardness (ISB) at the Basic Geostatistical Area (AGEB) level, with a youthification index at the electoral section level between the 2010-2020 period. Both the decline of social backwardness (2010-2020) and youthification (2010-2020), are analytically articulated for successive census years, to generate a localized typology of the gentrification process.

Keywords: gentrification, youthification, Monterrey, social backwardness, localized typology.

I. INTRODUCTION

Cities are changing daily, and one of the social phenomena that are emerging from this urban transformation, is gentrification, a complex process that involves many aspects related to the displacement of low-income social groups through property market mechanisms or public policy. In these mechanisms: a) the demand (e.g. young families without kids, higher occupation of dwellings occupied by their owners) and supply (e.g. increase of housing offer for higher-income groups, property tax) of the housing market (Finio, 2021), and b) public policy incentives for densification, re-urbanization, or recovery of socially depressed areas, stand out. Gentrification measurement, just like many aspects of applied research, is conditioned by the information available at different geographical aggregation levels (e.g. municipal, basic geostatistical area AGEB, or electoral section in the case study). In this context, it becomes necessary to turn to complementary procedures and inevitable reductions. While some authors measure gentrification with several indicators (Bournazou, 2015), others limit this multidimensional phenomenon to just two variables, the average per bedroom income of the home, and the population with higher education (Revington, Zwick, Hartt & Schlosser, 2021), or overcrowding (homes with three or more people per room), and the population with university studies (Díaz Parra & Apaolaza, 2020). The lack of data to measure the social phenomenon leads to measurements being expanded upon with complementary information. This information not only rounds off the concept of gentrification, but also guides the study towards specific interest issues, such as youthification, studentification, the property market, touristification, or digitally augmented geographic dimension (Revington *et al*., 2021; Sánchez Zárate, 2021; Less, Slater & Wyly, 2008). The revision of this bibliography shows that there is not just one way to address the complexity of the term and that there are very few empirical studies for Latin America with methodologies that are feasible to replicate.

The purpose of this research is to identify areas that are possibly gentrified or are undergoing gentrification in a case study, the metropolitan center of Monterrey (CMM), where the public sector has encouraged new vertical property developments. These actions, without correct urban planning, increase the value of an area and encourage the housing offer for young people or small families with a high purchasing power, fostering the expulsion of the current inhabitants (Moos, Filion, Quick & Walter-Joseph, 2019). An additional result of the study is the preparation of a methodology to address gentrification which can be repeated in other cities.

To achieve the goal set out, the work combines two components of gentrification: quality of life and the youthification of the population. There are several methodological options to address gentrification in the case study. One option is to merge the variables into a single gentrification index that can be mapped (Bournazou, 2015; Hammel & Wyly, 1996). Other alternatives consist in combining geo-referenced variables to typify the geographic space by overlapping thematic layers, statistically analyzing the information, or combining both procedures (Revington *et al*., 2021).

This proposal suggests a methodology to classify gentrification in the study area by overlapping thematic layers, Google Earth images, fieldwork, and drone photography. The research data comes from the population and housing censuses of the National Institute of Statistics and Geography (INEGI, in Spanish) and the National Electoral Institute (INE, in Spanish). Said typology can be replicated in similar case studies that look to improve the city.

Specifically, the writing is laid out in seven sections focused on reaching the purpose set out: 1) Introduction; 2) Theoretical Framework; 3) Case Study; 4) Methodology; 5) Results; 6) Discussion; and 7) Conclusion.

II. THEORETICAL FRAMEWORK

Evolution, mutation, and adaptations of the concept of gentrification

The notion of "gentrification" can be understood as the attraction generated by property developers for residents that can pay higher rents, like the gentry, a phenomenon that encourages the expulsion of inhabitants with fewer resources (Gottdiener & Budd, 2005). The British sociologist, Ruth Glass, used the term in 1964 to describe an urban process with four traits: retrofitting of precarious areas; transition of rented housing to owned housing; increase in property prices; and displacement of low-income groups by middle-upper class people (gentry), from outside the area (Lees *et al*., 2008). It is likely that Glass used the word sarcastically or ironically (Hamnett, 2003) or in a pejorative sense (Vestri, 2020), as downtown London showed, in her opinion, an embarrassment of riches.

Gentrification, in its origin, is a process that involves a change in the urban land use, where new higher-income users are accompanied by the restoration of the environment through private capital investment (Clark,

2005). But it can also be seen as a structured result of land and housing use, where private capital has a return on higher investment (Smith, 1979).

Gentrification can be induced by government branches through a given ideology, or, fostered by private capital. As a result of the implementation of the neoliberal ideology, gentrification has its immediate example in some cases of the United States (for example, the famous case of Kelo v/s City of New London, taken before the Supreme Court of Justice). As an instrument of power of property capital and/or corruption of the public official, it has different versions, depending on the particular aspects of each property development.

Gentrification processes take place in cities around the world without this name being referred to. The term was adopted by the French as embourgeoisement or "social requalification", and as "embourgeoisement" "aristocratization" and "residential elitization" by the Spanish (Lees, 2011; García Herrera, 2001). The terms do not mean the same thing because they mutate and the manifestation of the process is distinct in the different cities of the world, including Mexico and the rest of Latin America. The original meaning of "gentrification" changed and evolved to refer to or be associated with not only the remodeling and "invasion" of central areas by the gentries, but also the construction of new buildings (re-urbanization); art and anesthetization of areas of the city (Lin, 2019); the settling of the "creative class" (Romero Renau & Lara Martin, 2015); the conversion of commercial areas targeting high-income groups (Sánchez Zárate, 2021; Rodríguez Barcón, 2020); touristification (reconfiguration of activities to serve tourists; Vestri, 2020); the super-gentrification (gentrification of already gentrified areas; e.g. Shi, Duan, Xu and Li, 2020; Lees *et al*., 2008); the studentification (domain of the student population, Revington *et al*., 2021; Prada, Cornejo & Quijada, 2020); and youthification (Moos, Revington, Wilkin & Andrey, 2018). All these manifestations or definitions of gentrification imply a cultural and socioeconomic transformation of areas linked to urbanism induced or dominated by private capital.

All gentrifying actions have, regardless of the name, a common denominator: the profit of private capital disguised as modernity and the common good. These actions do not just displace the population from the area, but rather "they sell" property developments as creative efforts, of rebirth or urban triggers of the first polygon of the city. Following this narrative, society as a whole is "indebted" to these benefactors, whether investors or public administrators. Whoever dissents or resists these actions is automatically labeled as

backward and irresponsible on being against social wellbeing.

The presence of gentrification in different cities manifests the importance of studying the phenomenon addressed in this article. The emergence and evolution of gentrification are uncertain because there are multiple and varied contexts (social hybridity and/or neighborhood resistance) and, on some occasions, the expulsion of its current inhabitants does not happen.

It is worth stating that this exploration does not discuss gentrification as an ideology of the speculation and profit process of the property capital cycle. The case study classifies the areas of CMM as a result of a dual process, youthification and the increase in quality of life. In recent analyses, youthification results, in fact, from a component associated with gentrification (Revington *et al*., 2021; Moos *et al*., 2018). On the other hand, the evolution of quality of life is a multivariate component that summarizes social mobility and change in habitability, as Bournazou (2015) and Díaz Parra and Apaolaza (2020) suggest.

Looking in-depth at the mechanisms that started this gentrification process and the political and social marketing strategies involved, are outside the purpose of this research. This limitation does not imply that the classification of gentrified areas or those undergoing this is a naïve technical exercise that ignores gentrification from lucrative processes, materialized in projects that symbolize modernity and social progress.

III. CASE STUDY

The case study comprises the polygon that the Metropolitan Center of Monterrey (CMM) forms (Figure 1). Nowadays this area shows a clear decadence in the residential constructions. The population and housing census of 2010 revealed the presence of 5304 abandoned dwellings, from a total of 17,078 located in the sector. The abandonment of dwellings fosters the creation of focal points of insecurity, deterioration of existing urban space and infrastructure, and makes it less attractive to buy and/or live in the sector (Figure 2).

To encourage property development in the CMM, government officials have made changes to the current Urban Development Plan 2013-2025 (Municipal Government 2012-2015). The main attraction is the sites located in Transport Focused Development
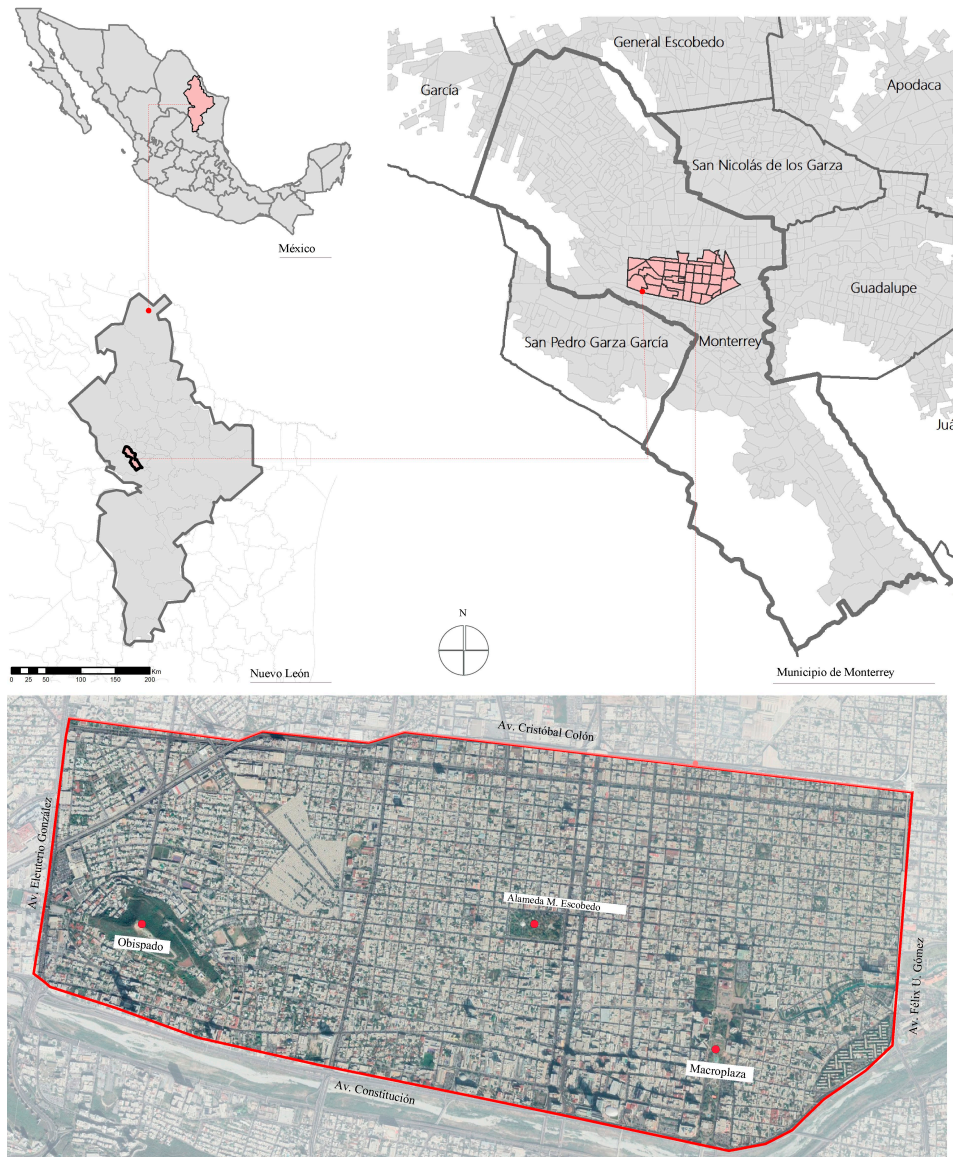
Figure 1. Metropolitan Center of Monterrey (CMM). Source: Preparation by the Authors using ArcGis 10.5 and Google Earth Pro.

Figure 2. Abandonment of dwellings in CMM. Source: Preparation by the authors with Google Earth Pro.

Figure 3. Metropolitan Center of Monterrey (CMM). Source: Preparation by the Authors with ArcGis 10.5 and Google Earth Pro.

Areas (D.O.T. in Spanish), mainly due to the following two premises:

1. Increase in habitation density to 150 dwellings per hectare in lots over 1000m^2 in surface area, found along the high impact corridors (Av. Colón to the North, Av. Félix U. Gómez to the East, Av. Constitución to the South, and Av. Gonzalitos and Av. Revolución to the West).

2. Reduction of number of parking spaces, by 50% in regards to building permits, for sites located within a fringe of 500 meters on both sides of the Metro Line and the Eco-route.

Currently, there are some examples of the new property developments in the sector, created under this government densification plan in the CMM, such as: Kyo-Constella, with a total of 169 apartments, close to Alameda de Monterrey, and the Histórican development, with 150 apartments, on Avenida Hidalgo, while "el Semillero", with 240 apartments, and the Obispado Towers (T.O.P. in Spanish) are on Avenida Constitución, cataloged as the highest tower in Latin America, at 304.8 meters tall (Figure 3).

IV. METHODOLOGY

This work uses a quantitative methodology with the support of the ArcGIS 10.5 program. The study recalculates the Social Backwardness Index (IRS) by the main components, with information from the National Council for the Evaluation of Social Development Policy (CONEVAL). The procedure uses stacked data so that the data are compatible with the 2010-2020 period. The indicators are: a) Education; b) Access to health services; c) Quality and space in the dwelling; d) Basic housing services; and

e) Assets of the home. This allows making a comparison in the evolution regarding improvements, backwardness, or decline in the socioeconomic level of each Basic Geostatistical Area (AGEB) in the study area. This longitudinal comparison can be seen as an analysis of the evolution of the quality of life at the level of individuals settled in the area (Bonatti, Ivaldi & Soliani, 2017). These two components register social and demographic variables for consumption (Finio, 2021), used to represent the basic concept of gentrification in recent empirical studies (Bournazou, 2015; Díaz Parra & Apaolaza, 2020).

After this, a youthification index is generated at an electoral section level in the 2010-2020 period (INE): The Potential Dependence Index (ISP) is estimated, where the numerator is young adults (popularly called Millennials) and the denominator, older adults, which has the purpose of measuring the ratio of the group of 24 to 35-year-olds per 100 people of 60 and over (Ofori, Zoomer, Curtis, Zoungas & Gambhir, 2017). That is to say, the higher the ISP value is, the higher the concentration of young people in the electoral section compared to the older adults. (This research began before the publication of the results of the 2020 census, and this option is kept because of its usefulness for intermediate intercensal studies).

Both social backwardness (IRS2010-IRS2020) and youthification (ISP2010-ISP2020) are analytically connected in successive census years to create a typology of the gradual progress of gentrification in the area (Figure 4). The research suggests a classification of areas by combining these two components to represent different degrees of gentrification without implying a cause-effect relationship. Finally, the study collected qualitative and quantitative complementary information on the urban environment of the polygons, especially about the vertical housing offer, the existence of a student population, and the

a) Evolución de la calidad de vida (IRS), 2010-2020

IRS 2010

IRS 2020 Estrato	MA	A	M	B	MB
MA					
A					
M					
B					
MB					

Mejora
Estable
Empeora
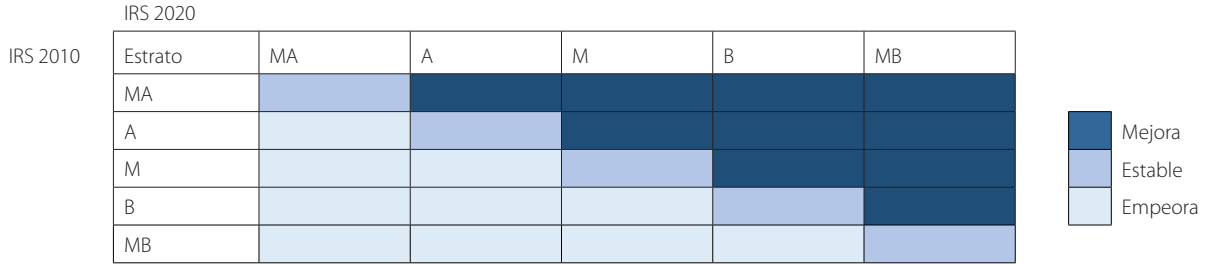
b) Evolución de la proporción de jóvenes respecto a los adultos mayores (ISP), 2010-2020

ISP 2010

ISP 2020 Estrato	MA	A	M	B	MB
MA					
A					
M					
B					
MB					

Rejuvenece
Estable
Envejece

Figure 4. Classification of areas by the evolution of the social backwardness (IRS) and the age groups (ISP), 2010-2020. Source: Preparation by the Authors. Stratums obtained by Jenks natural breaks with ArcGis 10.5. Note the inverse classification of the quality of life by the negative connotation of the social backwardness. MA = Very High; A= High; M = Medium; B = Low and MB = Very Low.
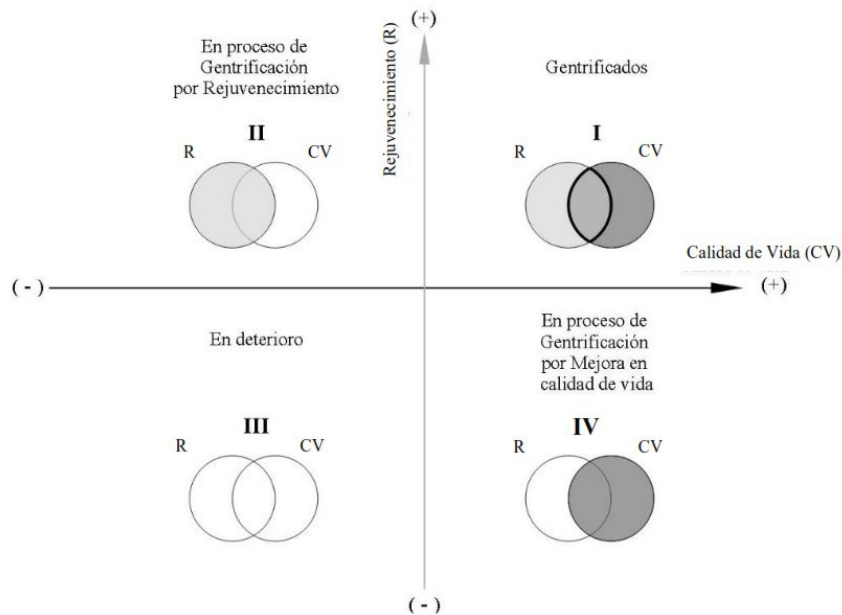
Figure 5. Non-Spatial Classification of Gentrification (Social Backwardness and Youthification). Source: Preparation by the Authors. The colorless section (in white) in the circles indicates a reduction in the variable(s) that they represent.
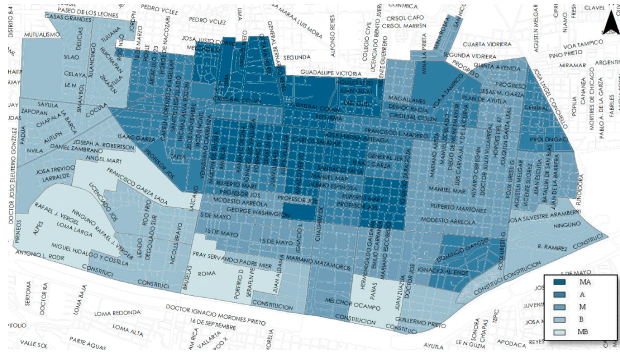
Figura 6. IRS 2010.
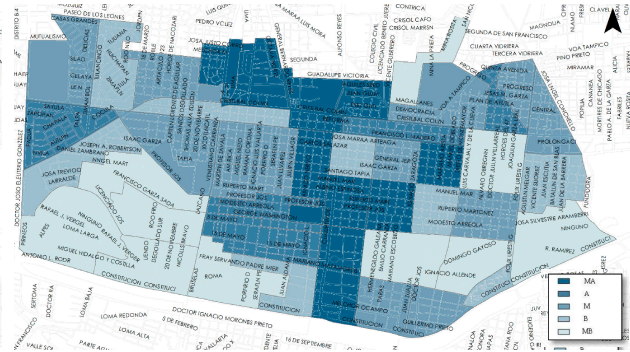Source: Preparation By the authors using ArcGis 10.5

Figura 7. IRS 2020.
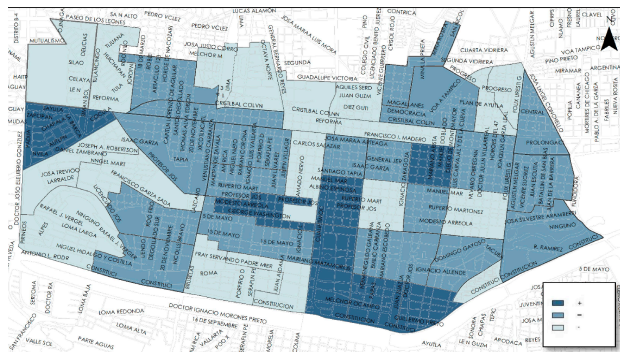Source: Preparation By the authors using ArcGis 10.5

Figura 8. IRS 2020 contra IRS 2010.
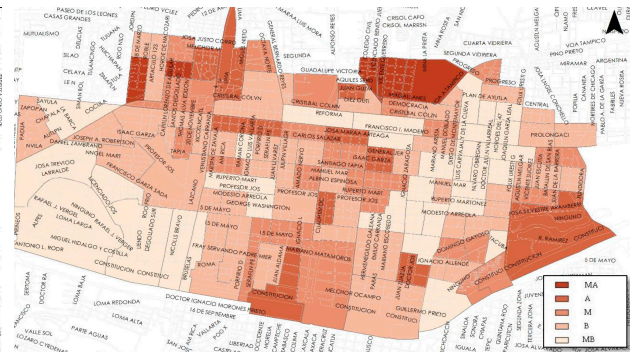Source: Preparation By the authors using ArcGis 10.5

Figura 9. ISP 2010.
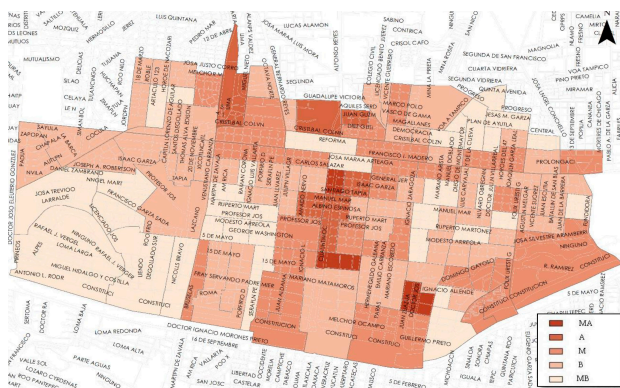Source: Preparation By the authors using ArcGis 10.5

Figura 10. ISP 2020.
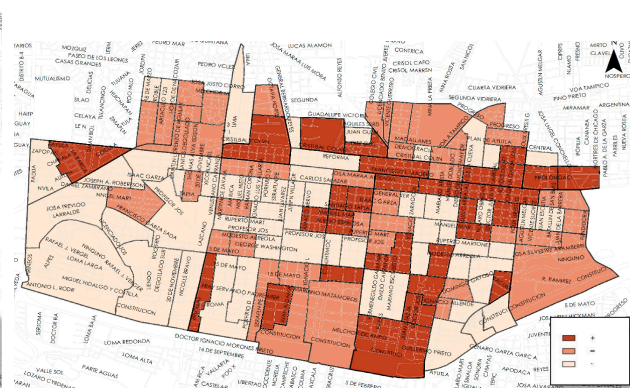Source: Preparation By the authors using ArcGis 10.5

Figura 11. ISP 2020 contra ISP 2010.
Source: Preparation By the authors using ArcGis 10.5

location of the new property developments. This information comes from the Google Earth Pro tool, from trips by car, and a drone photographic survey.

As can be seen, the combination of social backwardness and youthification defines gentrification in this research. The reduction of social backwardness implies an improvement in the quality of life. On crossing these two components, a classification of areas emerges in four types or variations of the gentrification process (Figure 5). Each type is illustrated with photographs taken by a drone, controlled from a motorized vehicle in each area.
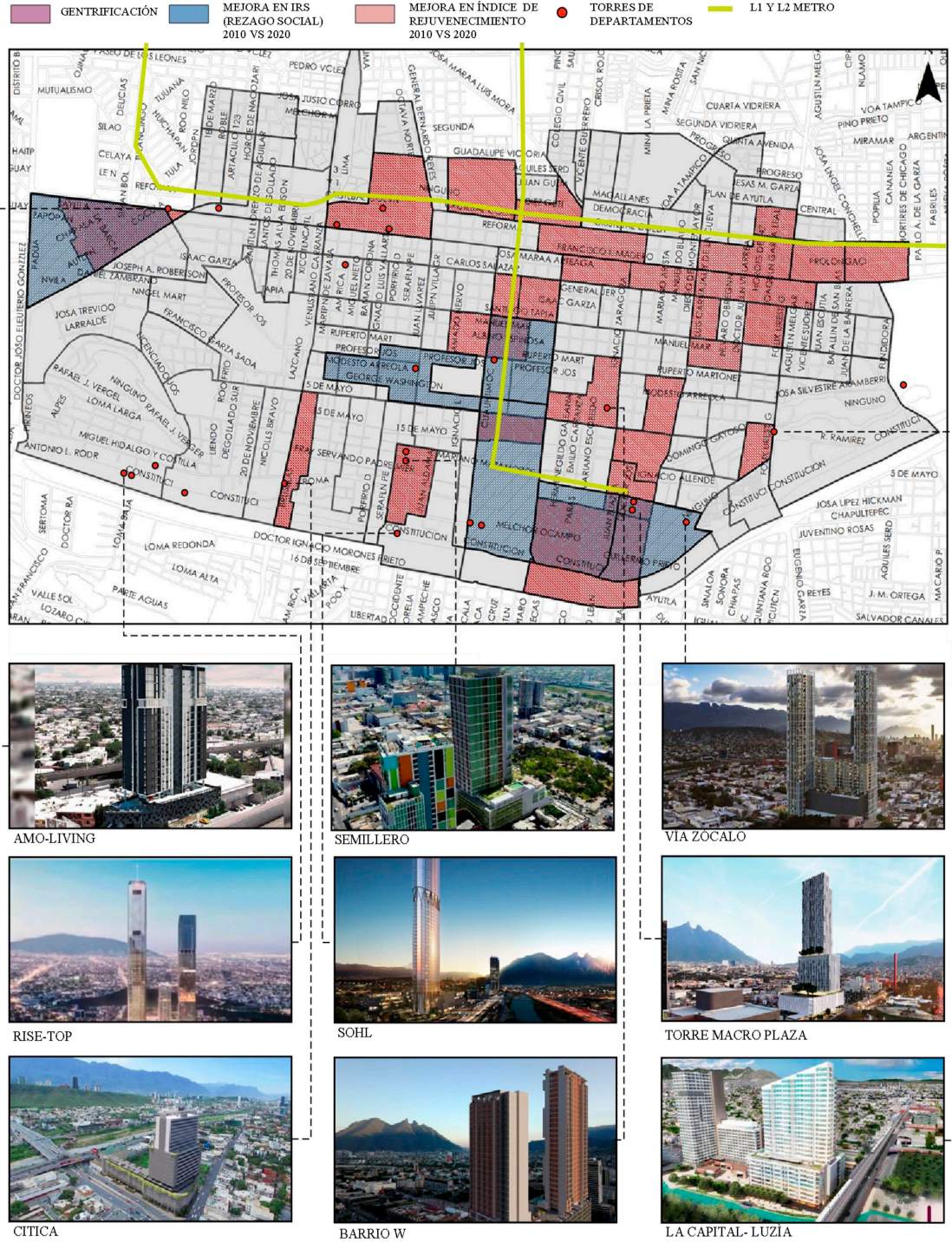
Figura 12. Gentrification in the CMM with apartment building developments. Source: Preparation by the authors with ArcGis 10.5 and Google Earth Pro.

Figure 13. Medicine Campus Area. (Av. Calzada Madero – Av. Insurgentes). Source: Photographs by the authors using a drone flight and from a vehicle.

V. RESULTS

The overall result of this section is the typology that generates the crossing of areas that rejuvenate with those that report improvements in the quality of life. This crossing is possible when, first of all, there is a typology of the social backwardness index over time and, then, of another typology of young people/older people proportion in the areas of the CMM. The crossing of both tools provides a classification of areas in the case study. The longitudinal comparison of social backwardness in the 2010-2020 period identifies areas where the quality of life improves, worsens, or remains stable. The details of the case study are presented below.

The IRS in the CMM includes 44 AGEBS. The stratification method is governed by natural breaks, to be classified into 5 divisions: Very High (MA), High (A), Medium (M), Low (B), and Very Low (MB). 2010 reports the following stratification for the IRS: MA (9), A (11), M (10), B (10) and MB (4) (Figure 6). In 2020, it has MA (9), A (5), M (13), B (7), and MB (10) (Figure 7). The following area classification is shown for 2010 and 2020: Improves: Drop in stratum +); Stable: remains in the same stratum (=); and Worsens: Goes up in stratum (-). In the analysis area, 8 AGEBS improve (+), 17 are stable (=), and 19 worsen (-) (Figure 8).

The time comparison of the age groups of people settled in the CMM determines whether their areas age, rejuvenate, or remain stable. In the case study, the CMM contains 123 electoral sections. The study calculates the ISP for the 2 aforementioned years, 2010 and 2020). The partition of the ISP by natural breaks generates the following stratums: Very high (MA), High (A), Medium

(M), Low (B), and Very Low (MB). The crossing of this stratification likewise allows a numerical comparison of stratums with the Social Backwardness Index (described in the previous paragraph). 2010 reports the following stratification of 123 electoral sections: MA (6), A (10), M (27), B (50), and MB (32) (Figure 9). While 2020 registers: MA (3), A (7), M (23), B (57), and MB (33) (Figure 10). The comparison of the stratums in the period has 39 aged (-), 56 stable (=), and 29 rejuvenated (+) districts (Figure 11). Finally, the crossing of the areas that rejuvenate with the improvements in the quality of life, generates gentrification in the areas of the CMM (Figure 12).

Quadrant I: Gentrified

Increase of quality of life (reduction of social backwardness) and increase of Youthification Index (ISP). Characterized by an improvement of social backwardness index indicators and a considerable increase of young adults over older adults. Quadrant I can be seen with the images taken by the drone flights (Figure 13). Two examples are the following:

a) The intersection of Av. Calzada Madero and Av. Insurgentes. Nowadays, the development of mixed-use AMO-living is in the construction stage. This emerges within an area alongside the Medical Campus of the Autonomous University of Nuevo León.

b) Barrio Antiguo Area. Here the Torre Macroplaza and Via Zócalo complexes are found, whose construction took place despite resistance from the neighbors. These complexes have already altered the spatiality of the area, even though they are currently being built (Figure 14 and 15).

Figure 14. Vía Zócalo Tower. Barrio Antiguo Area. Source: Render taken from http://topsidefront.com/index.php/portfolio/via-zocalo/.
Figure 15 Barrio Antiguo Area. Source: Photographs by the authors using a drone flight and from a vehicle.

Figura 16. Purísima Area. (Calle Hidalgo – Calle S. Peña). Source: Photographs by the authors using a drone flight and from a vehicle.

Quadrant II: Undergoing gentrification through youthification.

Does not increase the quality of life (Social Backwardness) and increases the Youthification Index (ISP). There is an increase of young people compared to the current inhabitants, in an area that has not improved its social backwardness indicators. This process strengthens the socioeconomic segregation of the current inhabitants and creates a gap in the land rent (Smith, 1979). The areas where photographic surveys were made are located on Calle Miguel Hidalgo y Costilla, at the intersection with Serafín Peña, on the esplanade of the Iglesia de la Purísima Church. Today there are high-rise apartment buildings, like Semillero Purísima Tower 1 and 2 (Figure 16).

Quadrant III. Declining.

Does not increase the quality of life (or reduce social backwardness) and does not increase the Youthification Index (ISP). The natural tendency is to move towards Quadrant II (reduction in quality of life with youthification, unless unforeseen actions occur that displace the area to quadrants I or IV). The Obispado TOP Tower is in this area, on Av. Hidalgo, which seems to house its first inhabitants. In the polygon, the RISE Tower is being built on Av. Constitución, a highly gentrifiable area (Figure 17).

Quadrant IV: Undergoing gentrification because of improvement in quality of life.

Increases the quality of life (reduces social backwardness) and does not increase the Youthification Index (ISP). In these areas, the social backwardness index indicators improve between 2010 and 2020, and the number of young people over older adults has not changed spatially. The natural tendency is to move towards Quadrant I (increase in quality of life accompanied by a youthification of the area). The photographic survey was

Figure 17. Obispado Area: Rise-Top Tower. Source: Render and design by Pozas Arquitectos (http://www.pozas.mx/)
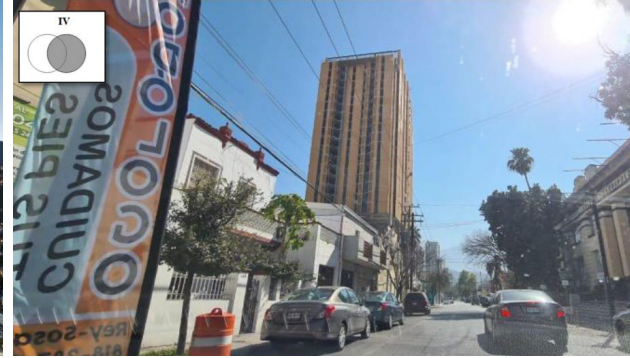**Figure 18**. Historicah. Alameda Area. Source: Photographs by the authors using a drone flight and from a vehicle.

made in this area (Av. Washington and Av. Pino Suárez), which may be affected by buildings like Históricah and Icónicah and the surrounding universities like the Regiomontana University (U-ERRE) (Figure 18).

VI. DISCUSSION

Gentrification, just as has been described in the preceding paragraphs, refers to demographic changes expressed in the supply and demand of housing in the market. In the United States of America, demographic changes brought a rise of 11 million people in the 25-30 age group between 1965 and 1976. Currently, this age group has been affected by the change in lifestyles, characterized by more work opportunities for women, and a supply of smaller-sized housing (Ley, 1986). Apartment buildings, in this case study, offer this type of housing for middle and high-income young people.

The increasing rise of young people in urban centers is known as youthification (Moos, 2016). There is little analysis of the socio-spatial impact of this group. The youthification process occurs as young adults increase their participation in the total population in neighborhoods surrounding work hubs (Moos, 2016). The goal of the property market is to attract young buyers with high purchasing power through loft-type apartment complexes, creating an offer focused on satisfying the demand for small dwellings (Skaburski, 2006). This is the housing offer in the CMM, and this age group will dominate in the area if demand exists or is generated.

Youthification is spatial segregation between two main age groups: young adults and older adults. In the former (between 25 and 34 years old), interests tend to be focused on education, leisure activities, building a family, or, on the other hand, delaying or abstaining from marriage. The great majority of those in this

group are trying to enter the housing and job markets for the first time (Lee, 2018). On the other hand, the second group (60 and above), is focused on social security policies, attention and services for older people, leisure activities related to aging (Winkler & Klass, 2012). This social phenomenon is characterized by being present in central high-density areas of the Metropolitan Centers.

Another factor that contributes to the rise in young people in the urban space, is related, broadly speaking to the presence of universities or educational centers. Nearby residential areas attract an important number of young adults that affect the setup and evolution of the urban environments (Moos. 2016). This phenomenon is called studentification because it refers to the presence of students in a neighborhood or urban environment around campuses. Said presence brings changes in the physical and economic environment around its location (Smith, 2005). This is seen in the surroundings of the medical campus of UANL, formed by the Faculty of Nutrition, Medicine, Psychology, and Veterinary Science, and around U-ERRE, described in the areas of Quadrant IV.

The presence of young adults in urban centers is a reality. Today it can be seen in the offer of property developers in the Metropolitan Center of Monterrey. It is worth remembering that some emerging housing complexes are not within the D.O.T. quadrant, which causes repercussions on the traffic where they are located.

In this research, gentrification is characterized by the increase in the quality of life of an area and the increase of young adults (25-34) over the older adults (60+). This happens amid the emerging land occupation by multifunctional and housing towers of different varieties. The improvement in the quality of life and youthification do not always converge in the space. But when these two components converge, gentrification occurs.

VII. CONCLUSIONS

This article classifies land, simultaneously considering social backwardness and youthification. This classification is accompanied by the geolocalization of high-rise property developments that take place in the heart of Monterrey. The study suggests that this combination of variables (reduction of social backwardness, youthification, and vertical growth) facilitates the gentrification of CMM. This process should take place under public social cohesion policies between the current inhabitants and new residents, under a location layout on the main transportation lines of the area. The results identify "gentrified" areas in places away from the collective transportation systems. This means to say that, without proper planning, mobility in motorized vehicles will continue to be a priority in the area. Likewise, the arrival of new inhabitants in the area ("millennials") must be linked to offering services and facilities for their specific age group.

The results of this research provide a localized approach to the areas that have gentrification traits in the Metropolitan Center of Monterrey. Despite not detecting the specific expulsion of the CMM's inhabitants, areas that foster gentrification more are detected, which are undergoing gentrification due to youthification (Quadrant II), or on reducing social backwardness (Quadrant IV). On the other hand, some areas see a decline in youthification and the quality of life (Quadrant III). However, the presence of high-rise towers in an advanced stage of construction (Obispado and Rise Towers) indicates a trend in the displacement towards Quadrant II (undergoing gentrification due to youthification) or Quadrant I (Gentrified).

In general, the typologies or classifications describe and are pretty useful for a specific end, but they do not explain a phenomenon or statistically prove any hypothesis. The typology of this study identifies different degrees of the gentrification process through the combination of two components suggested by the bibliography revised in the theoretical framework. The statistical significance of the quality of life and youthification over time and space is a subject for future studies. These studies imply running tests of hypotheses through descriptive statistics (T-tests for related or paired samples, for example) on the change in the quality of life and youthification, and to identify agglomerations through spatial auto-correlation techniques (e.g. Moran's local index). This statistical work can be done thanks to the information generated in this study, but it is part of another paper to avoid profusion and confusion of the results.

VIII. BIBLIOGRAPHICAL REFERENCES

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