Housing Abandonment in Mexican Metropolitan Areas:

Analyzing planning strategies to reduce housing abandonment in the Metro Area of Guadalajara

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Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements for the Degree of

Master in City Planning

at the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
June 2017

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ABSTRACT

This thesis examines the potential impact and limitations that current metropolitan efforts on urban planning in the Metropolitan Area of Guadalajara could have in reducing the high rates of housing abandonment the city currently faces. Previous efforts to reduce housing abandonment in the city have not delivered the expected results, and the metropolitan government of Guadalajara has laid out a new Metropolitan Urban Development Plan (POTmet) that seeks to rethink housing allocation and reduce home abandonment.

In this document I analyze POTmet's housing allocation and abandonment strategies through interviews with key stakeholders involved in the elaboration process of the plan. I create a narrative around these interviews to understand how stakeholders' interests translate into the final strategy outlined in the POTmet. Later, I contrast these findings with previous efforts to reduce housing abandonment in Guadalajara and with the factors that are currently understood as determinants of the abandonment problem. I discuss what the success and limitations of the POTmet could be in reducing housing abandonment and conclude that, while the POTmet successfully brings together key stakeholders that could work together to reduce home abandonment, previous interests that have driven the abandonment problem in the city are still present in the new proposal. The POTmet also fails to target important contributing factors of abandonment, diminishing its potential for success. I discuss these findings and propose new lines of research and action that the City of Guadalajara can take to achieve its objectives to reduce housing abandonment.

Thesis Supervisor: Diane E. Davis
Title: Head Urban Planning Department, Harvard Graduate School of Design

ACKNOWLEDGEMENTS

This work means nothing if I don't recognize all those who believed in me, helped me get where I am and supported my ideas through MIT.

First, DUSP HQ, Griselda Gómez from MISTI, Alyson Hynd from the PKG Center and the Rodwin Fund, that collectively supported this thesis and helped me develop my research. I hope you can continue helping future students on their own projects. Likewise, CONACyT Mexico and Alianza Fiidem who financially sustained my studies at MIT. Truly, I'm very grateful for this opportunity. Sandra Wellford and Ellen Rushman, thanks for making my path through MIT a great and smooth experience. Kira Intrator, Sarah Williams, Chris Zegras, Onésimo Flores, Justin Steil and David Hsu, thanks for believing in me and giving me the opportunity to get involved in your academic or professional projects that shaped my understanding of planning.

To all my classmates and friends I had the opportunity to meet during my two years at MIT: Francis and Valeria, who drove me crazy more than once, but helped me keep my feet on the ground. My years at MIT would have not been the same without you. I will keep your friendship always with me, very close to my heart. Thank you for sharing your life with me.

Chris, thanks for reading my thesis and teaching me that to achieve success, I need to stay focused. David Gómez, thank you also for reading my thesis and for your insight. Thank you for laughing with me about the uncertain future. Diane Davis, I will forever be indebted to you. Thank you for giving me the opportunity to work with you, being my adviser and believing in my project, and for all your recommendations both in life and professionally. Thanks for teaching me a new way of thinking critically, and for making me push harder until the very end. You will always be a reference in my life, and I hope one day I will be as good at researching as you are.

Tia Malena y Tío Gabriel. Gracias por creer en mí. Son como mis padres, no lo duden nunca. Rodri, Papi, los amo. Quién sabe qué haría yo sin ustedes, ruego a Dios que nunca me falten.

Por último y más importante, mi madre, Alma Rosa Campos. Mamá, que sin dudarlo ni una sola vez, estuviste todos los días a mi lado, pensando en mí, desprendiéndote siempre de cuanto fue necesario para que yo alcanzara mi sueño. Que nunca dudaste ni un solo momento en cambiar tu vida para mejorar la mía y la de Rodri. Que te tragaste sufrimiento y cansancio cada vez que me iba de casa y cada vez que era más incierto mi regresar. Que esta tesis que dejo aquí en MIT sea testimonio del amor tan grande que te tengo, y de la deuda impagable con la que siempre estaré ante ti. Que quienes vengan y se sirvan de esta tesis estén seguros que siempre habrá alguien apoyándoles, como tú me has apoyado toda tu vida. Muchas gracias por todas y cada una de tus acciones y palabras de amor. Cada una de las palabras que hoy escribo en esta tesis te las dedico a ti. Te amo.

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GENERAL OVERVIEW AND THESIS

After many years of unregulated municipal housing planning that has resulted in a significant number of abandoned homes in Mexican cities, this thesis examines one case of current metropolitan planning efforts that seek to enhance how affordable housing planning is done in cities and to reduce home abandonment in metropolitan areas. The case in study is the Metropolitan Area of Guadalajara, and particularly, it's recently developed and implemented Metropolitan Urban Development Plan (POTmet) and its strategy to improve affordable housing allocation. I examine interviews with key stakeholders involved in the elaboration of the plan to understand the rationale behind the abandonment strategy. I later compare this analysis with an analysis of the history of home abandonment in Mexico, data on home abandonment in Guadalajara and previous efforts toward reducing abandonment in the city. With this, I assess whether these efforts bring new perspectives and solutions to the home abandonment problem in Guadalajara or if they face limitations.

This thesis will mainly focus on understanding what this new plan is and how this plan represents new opportunities of planning to address the issue of housing abandonment in Guadalajara. Broadly speaking, this thesis aims to answer the following questions:

1. What accounts for the reality of addressing abandonment in Guadalajara, and broadly speaking, in Mexico?
2. Are Guadalajara's planning efforts different from previous attempts on home abandonment reduction in Mexico? What can we learn from the POTmet?
3. What types of planning strategies can help achieve Guadalajara's goals to reduce home abandonment?

The structure of this thesis is as follows. The first chapter introduces the problem of abandonment in Mexico. The chapter presents evidence on why the current state of planning will never be successful enough to reduce the urban phenomenon of abandonment. Here, abandonment

is portrayed as the result of poor affordable housing planning policies, representing challenges for planning in three different dimensions: economic, social, and urban. The chapter examines the history of abandonment in the country and introduces the idea of the housing allocation system based on a supply-demand credit strategy.

The second chapter aims to answer the question, "What does the housing abandonment phenomenon look like in Guadalajara?" The first section of the chapter will explain how the spatial form of Guadalajara has been shaped by the current provision system and how the effect of abandonment is geographically visible. A second section will introduce current efforts for better planning, and what limitations these mechanisms have faced in reducing abandonment. Lastly, I introduce an analysis of data on home abandonment in Guadalajara, using descriptive and GIS analyses. I later discuss and interpret the results of the analysis.

Moving towards the first evidences of regional planning in Mexico, the third chapter of this thesis introduces the Metropolitan Area of Guadalajara (MAG, Guadalajara) as a case study for developing a regional affordable housing plan that aims to reduce housing abandonment. The chapter studies the political figure of the Metropolitan Planning Institute (IMEPLAN) and the different stakeholders that participated developing the metropolitan urban development policy. Here I present a roadmap to understand how municipal coordination took place in Guadalajara, and how the metropolitan plan aims to reduce housing abandonment.

The fourth chapter of this thesis presents an analytical framework to examine interviews of key stakeholders in the affordable housing market in Guadalajara to understand how the POTmet was developed and the interests that drove its creation. Also, the framework aids in understanding how these interests were translated in the final proposal of the POTmet. These interviews are further analyzed and feed the final conclusions in the fifth chapter of this thesis.

The last chapter of this thesis discusses how the City of Guadalajara and IMEPLAN can move beyond the proposed strategies of the POTmet, and describes future research and limitations of this study.

I want to close by expressing how much I hope this thesis will bring new knowledge on the matter, building on previous efforts done by researchers like Diane Davis and Paavo Monkonnen, who have studied the political and economic aspects of affordable housing planning in Mexican cities. Particularly, I want to draw on one of Monkonnen's conclusive arguments about future research in affordable housing planning in Mexico and the problem of home abandonment:

> *"...Careful research is also needed to address the growing debate over the houses and neighborhoods produced by the (INFONAVIT) new system. All urban growth generates problems, thus it is essential to understand what aspects of housing policy are contributing to observed problems and which of these are ameliorable. Housing policy is a world of second bests (...). Precisely because of this, analysis and debate of housing policy must be based on evidence (Mclellan and More 1999). The impact of the new high-density housing developments, their homogeneity, or the lack of access to urban amenities must be considered against realistic alternatives rather than normative ideas of what housing should be. Problems with new housing developments must be clearly identified and attempts made to determine their sources–whether they result from attempts to make housing affordable, incomplete markets, or government restrictions. Far too frequently housing policy is made and evaluated based on ideological principles or visual symbols rather than careful, evidence-based analysis." (Monkkonen 2009).*

I hope this thesis will help to bridge this gap, and help reach our objectives of securing better housing for Mexican families.

CHAPTER 1: The Affordable Housing Market and the Problem of Housing Abandonment in Mexico

What determines the phenomenon of home abandonment in Mexican cities and how current urban planning programs in Mexico are dealing with it? To answer these questions that will be later examined in this thesis through the case study of the Metropolitan Area of Guadalajara, it is important to first understand what abandonment is and how it happened.

The first chapter of this thesis examines the history of affordable housing planning in Mexico building patterns that can explain the nature of housing abandonment in the country. The chapter explains how affordable housing provision works in Mexico, and how its singular housing market has created an environment where abandonment easily happens. This chapter also includes an analysis of how the needs of this market have driven a massive housing construction system that evolved into the current problem of abandonment. In telling this story, I outline the different phases of the evolution of the problem and how key actors have allowed the phenomenon to perpetuate. The effects of the phenomenon in cities and in families are also discussed.

With this analysis, I seek to understand what triggered abandonment initially, settling the ground for a conversation on where our current and future efforts to reduce abandonment should lie, and how we can learn from the history and nature of abandonment in the country.

1. The Largest Affordable Housing Market in Latin America

Currently, Mexico holds the largest affordable housing market in the Latin American region and several reasons explain this situation. By 2020, the World Bank estimates that Mexico's population will reach 135 million people, representing 20% of the total Latin American population (World Bank 2017); further, since 1950, yearly migration from rural to urban areas has steadily increased, clustering almost 80% of the total Mexican population in urban areas (INEGI 2010).

Additionally, Mexico has a poverty gap that displaces 45% of the Mexican population into poverty (CONEVAL 2015), requiring an affordable housing market that can cover this population. With all these conditions, it is no surprise that provision of affordable and social housing for low-income families is a priority for the Mexican government and that in fact, the current National Housing Program[1] elevates, stating that creating a diversified market of affordable housing solutions to reduce the housing deficit is a key objective for the foreseeable future.

Being the largest affordable housing market, however, is a title that is not easily earned, as there needs to exist a strong supply scheme that can ensure constant housing provision across the country. It is within this context that INFONAVIT, the Institute for the National Worker's Housing Fund, takes a leading role in the affordable housing market. Since its creation in 1972, INFONAVIT had a simple task: to help comply with the constitutional right that all Mexican workers must have access to affordable housing. How would it do this? For each worker, the Institute would create a savings fund equal to 5% of the workers' wages as a contribution from their employers. These savings, plus an INFONAVIT credit and the worker's personal savings would allow the worker to buy a house (See Diagram 1). A humongous task delegated to the Institute, it centered its goal in allocating as many credits as possible under the premise that, the larger the number of credits allocated, the larger the reduction in the housing deficit. By 2016, INFONAVIT had allocated almost 9.5 million credits in Mexico, turning itself into the largest mortgage lender in Latin America (see Graph 1)

[1] The National Housing Program is the key instrument used by the Mexican government to implement strategies that help reach the objectives of the National Housing Policy.

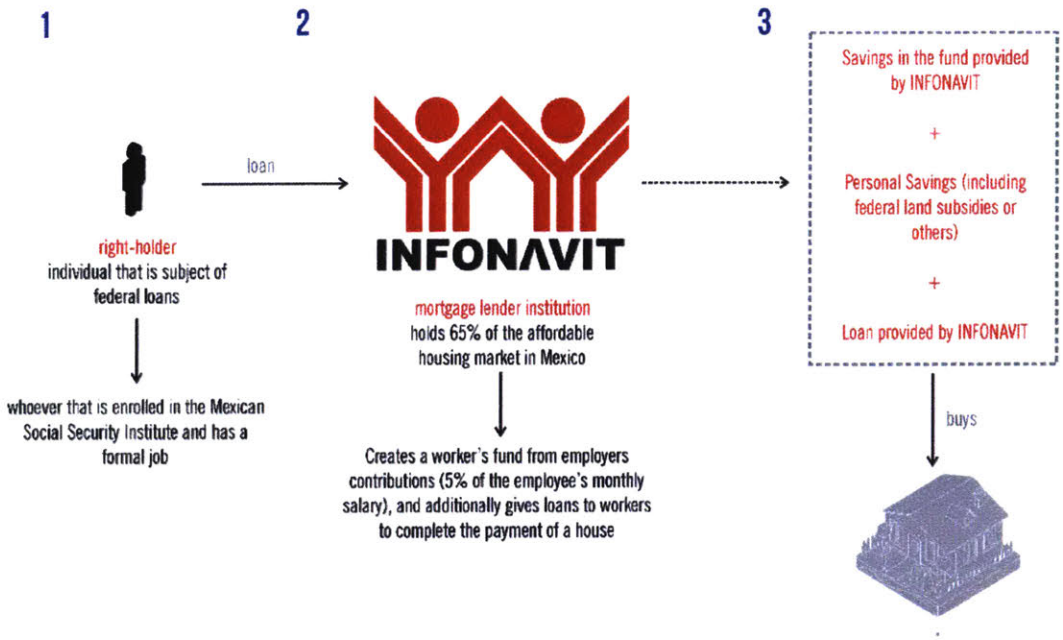
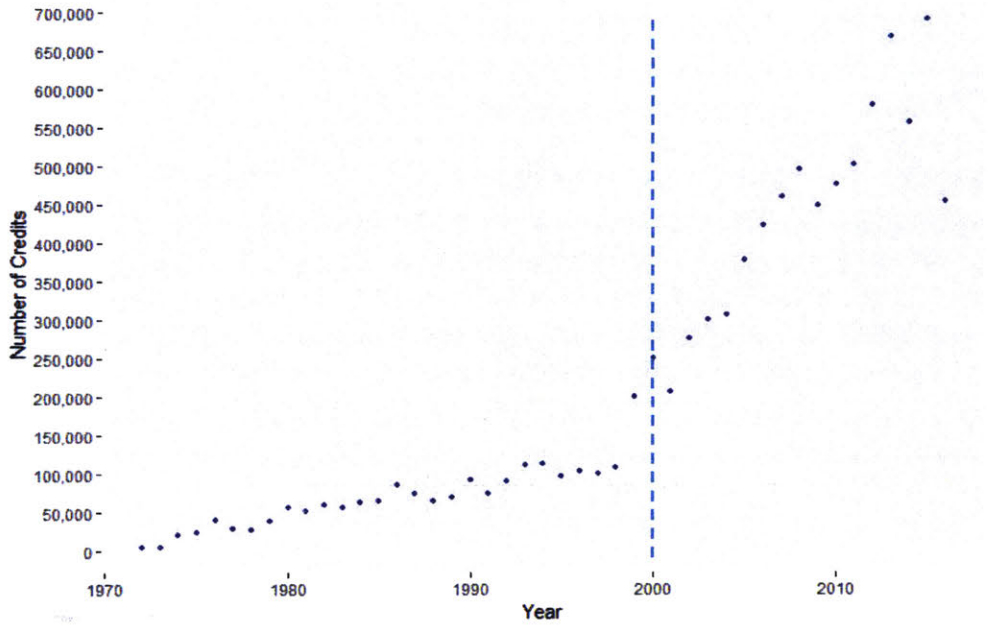
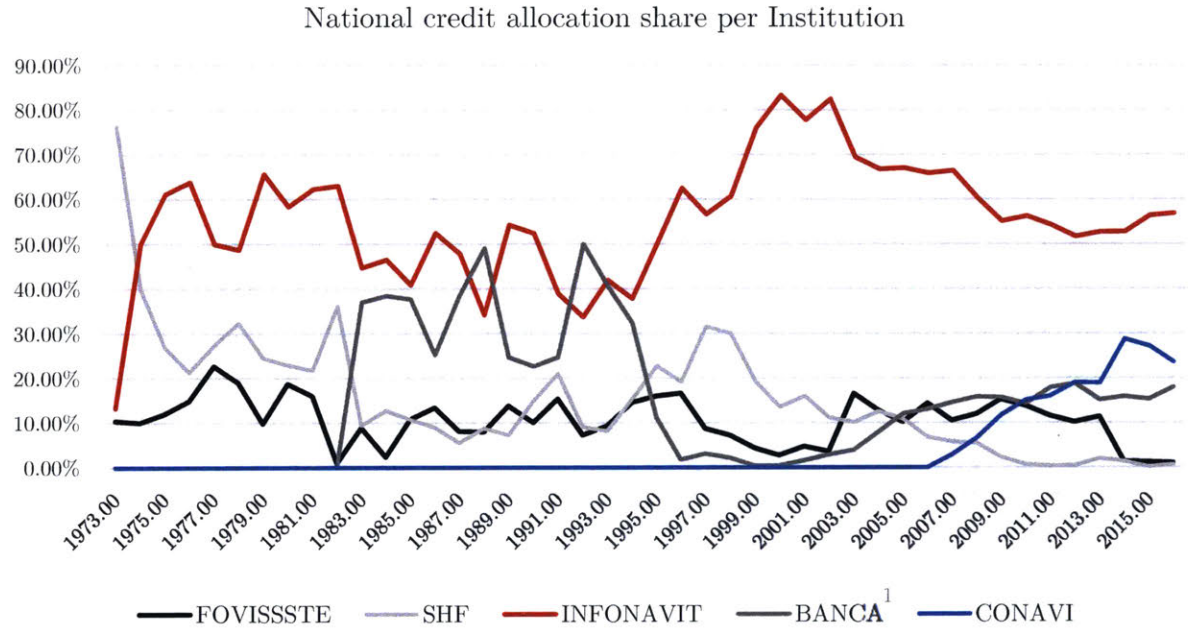


Diagram 1 - Main affordable housing provision system in Mexico
Source: Own elaboration based on data from INFONAVIT (INFONAVIT 2017) and CONAVI (CONAVI 2016)



Graph 1 - Number of credits lent by INFONAVIT per year, since 1972.
Source: Own elaboration based on data from INFONAVIT (INFONAVIT, Indicadores Operativos 2017)

In Mexico, INFONAVIT's leading role comes also from the share of credits it allocates yearly in comparison to other institutions. While there are different options for Mexicans to access loans and credits for housing[2], INFONAVIT has turned itself as well into the largest mortgage lender in Mexico (see Graph 2). In 2016, INFONAVIT alone lent 65% of all credits given for affordable housing purchase to works that were eligible for CONAVI's subsidy[3] (CONAVI, Datos Abiertos - Financiamiento de Vivienda 2016). This positions the Institution in a unique situation, as it is clear it has greatly shaped the affordable housing market in Mexico. For decades, the market has been driven by most of INFONAVIT's policies, and while the Institute has been successful in increasing access to housing to Mexicans, its impact is so large-scale that any flaw in its policies and programs disturbs and threatens the provision system.



Graph 2 – Yearly distribution of the credit's allocation share by different mortgage lender institutions.
Source: Own elaboration based on data from CONAVI (CONAVI, Datos Abiertos - Financiamiento de Vivienda 2016)
1 BANCA refers to all private banks that lend credits for affordable housing

[2] Those who share a significant stake of the affordable housing market in Mexico are INFONAVIT, Private Banks, BANJERCITO (Bank of the Military), CFE (Federal Commission of Electricity), CONAVI, FONHAPO, FOVISSSTE, Habitat Mexico, ISSFAM (Social Security Institute for the Mexican Army), SHF and PEMEX (Mexican Petroleums)
[3] This means that eligible workers could access to both INFONAVIT's credit and CONAVI's land subsidy, which requires them to have an income equal or less to 5 UMA.

Given the importance of INFONAVIT in the housing market, in this thesis, the unit of analysis will be the affordable housing market stock represented by INFONAVIT's accredited housing developments and units. These units represent the epitome of housing allocation and provision in Mexico and reflect the nature of private housing development in Mexico.

2. Affordable Housing Provision and Home Abandonment

What does the structure of this market, driven mainly by INFONAVIT, mean to affordable housing planning in Mexico? Well, there is no doubt that there is a shortage of affordable housing in Mexico, so under this system, the logical conclusion is that credit supply needs to keep growing. As it is, credit allocation to Mexican states has increased exponentially since the beginning of the 2000's. This is not surprising, as INFONAVIT's state delegations[4] are required to meet credit-allocation objectives yearly and these cannot be less than the ones in previous years. So far this strategy has been successful. Additionally, estimated demand [5] has increased since 2006 (INFONAVIT 2017), and while these estimations greatly outnumber the credits allocated per year, the underlying takeaway is that credit supply and demand for housing are constantly increasing.

However, when it comes to planning, it is not only credit supply that matters. This significant number of credits needs to be understood geographically, as each credit represents the opportunity of a worker or a family to buy a house, and this house needs to be somewhere. This is relevant because this credit allocation system that erupted aggressively in the early 2000's (See the change of the slope in the behavior of credit allocation in Graph 1) created an unregulated housing market where affordable housing was developed wherever it was profitable for private developers. Very cheap land was found in the outskirts of Mexican cities and consequently private developers bought extensive amounts of land, expecting to develop them in the future for

[4] INFONAVIT is a centralized institution with a deconcentrated administration. Each Mexican state counts with an INFONAVIT delegation that oversees the loans and mortgages portfolio expedited in that state.

[5] Number of new credit holders expected to be enrolled in a given year

affordable housing. In a decentralized urban planning context like the Mexican one, it was just a matter of time to see not only urban expansion growth (SEDESOL, La expansión de las ciudades 1980-2010 2012), but also extensive landscapes of abandoned houses. Since the late 2000's and just before the Mexican housing crisis broke, INFONAVIT started recording significant amounts of houses abandoned in its housing developments built after 2005.

Through the past nine years, housing abandonment has remained rather constant in Mexico. In 2016 alone, INFONAVI estimated that 70,000 affordable housing units were abandoned[6], and almost 90 million Mexican pesos (4.5M USD) were represented by non-performing loans (INFONAVIT, Indicadores Operativos 2017). On the other side, we have an estimated housing demand that outnumbers the number of credits allocated yearly, and while credit allocation increases yearly for all states, in the past 20 years, states' housing deficit has decreased marginally, in some cases roughly 12%[7]. In a country where there exists a clear demand for affordable housing, there is also an ongoing phenomenon of housing abandonment, which paradoxically, is part of the current state of affordable housing planning in Mexico.

3. How it All Began - The Roots of Housing Abandonment in Mexico

There is significant evidence that there is a systemic condition within the housing credit provision system that perpetuates the housing abandonment problem and that goes beyond any physical condition from the built environment. **This condition finds its roots in the way credit institutions operate, how and where private developers develop new housing and how affordable housing planning is done at the municipal level.** To understand how abandonment sprouts in Mexico, it is not enough to understand the physical conditions that affect the abandoned houses.

[6] This information comes directly from the Portfolio Management department of INFONAVIT Central Offices in Mexico City and was retrieved on March 2017.

[7] This number comes from an analysis made to calculate current housing deficits in the Mexican States. Complete data can be found in Table 4 within Appendix A.

To achieve that understanding, we must go further and analyze the planning decision-making framework under which these houses exist.

Housing abandonment finds its initial roots in the institutional changes INFONAVIT undertook in 1997 and the way affordable housing planning was envisioned by the incoming Mexican federal administration at the beginning of the 2000s. On one side, recently elected President Vicente Fox had enacted the 2001-2006 National Development Plan in which housing deficit was portrayed as a major challenge to be tackled. New strategies to increase housing supply were needed and the reinforcement of the private housing development market was an obvious option (Presidency of Mexico 2001). On the other side, INFOANVIT had changed its strategy of housing provision. Until 1997, INFONAVIT had focused its resources in building and supplying housing with minimal impact on credit allocation. The 1997 reforms on the INFONVAIT Law shifted this strategy, and the Institute would no longer focus on supply and housing construction. Rather, it would be profiled as a financing institution that would focus on credit allocation (Ordoñez Barba and Reyes Santos 2006, Camara de Diputados del H. Congreso de la Unión 1972).

However, there was a major challenge. Both strategies relied on a private market that was rather non-existent. Until this point, the housing developer's market focused on sectors of the population whose income levels were not within the main target of INFONAVIT's credit policy. Therefore, while the Institute was focusing on strengthening its credit schemes, there was no housing market for which those credits would target. To reactivate the market, INFONAVIT conveyed the "Commitment for Housing Agreement[8]" with developers and the Mexican state. This agreement aimed to facilitate the process of credit allocation to workers, facilitate developers' access to land, and provide as much information as possible to developers regarding the number of credits allocated regionally so that they could invest in specific markets according to estimated demand (Méndez, et al. 2006).

[8] Manuel Alejandro González Arreola makes a detailed historical account of this agreement that can be reviewed in Chapter three of "El Proceso de Modernización en el INFONAVIT 2001-2006, Estrategia, Redes y Liderazgo"

This environment laid the groundwork for a massive credit allocation strategy. By 2001, the housing deficit in Mexico had reached a major peak[9] and the transition team of Vicente Fox established housing development and provision as a top priority of his presidency. This change in the political setting also brought additional changes within the administrative organization of INFONVIT. In 2001, Victor Manuel Borrás Setién was elected General Director of INFONAVIT. With a background in accounting and public finance, Borrás brought a strong vision of reinforcing the financing structure of the Institute and increasing the number of housing credits in order to meet the goals of the National Development Plan. This last need was particularly important for the new administration of Borrás. As Mariano Palacios Alcocer, ex Secretary of Labor and Social Welfare mentioned when talking about the need to develop new credit options:

> *"...(it is necessary to develop new options) for all social groups, eradicate discretional (methods) in future projects' terms of references, facilitate (housing) financing options, simplify rules and construction permits and reactivate the creation of land reserves linked to urban development programs" (as cited in (Méndez, et al. 2006)).*

All these political and financial ideas were later incorporated into a policy to enable the allocation of 1.8 million of credits in a span of 6 years that resulted in the credit allocation behavior shown on Graph 1 after 2001. Two additional triggering factors were important in consolidating this new framework of housing supply and credit allocation. The first one was the influence the World Bank had in the national housing policy at the end of the 80's and the beginning of the 90's that provided the foundation for free-market national housing policies. According to Boils, the World Bank, which at that time had a strong influence in the financing of the housing market in Mexico, aligned with the idea that "all housing development policies led by federal entities had to be tailored towards strengthening the market under a free market model. This is why private

[9] 800,000 housing units were needed to be developed in order to breach the housing deficit gap.

developers must be the structural element on which housing construction should rely. The state, in any of its levels, should be limited in creating conditions that facilitate the functioning of private developers" (Boils 2004). The second factor was the Mexican crisis of 1994. Like Martha Schteingart and Beatriz García record, the housing industry experimented with an important increment in housing sales in comparison to other industries that were decaying (Schteingart and García 2006). Because of the fragile environment for investment, private banks recessed from lending more mortgages leaving a fertile ground where INFONAVIT took a predominant role in fulfilling the needs of providing loans to the low-income branch of the Mexican population (Monkkonen 2009, Schteingart and García 2006).

4. Housing Abandonment as a Product of Massive Construction

Once triggered, immense affordable housing construction became the key policy the Mexican government undertook to allocate the large credit production result of the 1997 reforms. A process identified as standardized (Lara García 2016), it was also very successful and legitimate in its beginning. Its legacy can be graphically described in the first eleven pages of the "Current State of Housing in Mexico" yearly publications by CIDOC (CIDOC 2016), and that are shown in Figure 1. Large fields of houses developed under this mass production system painted

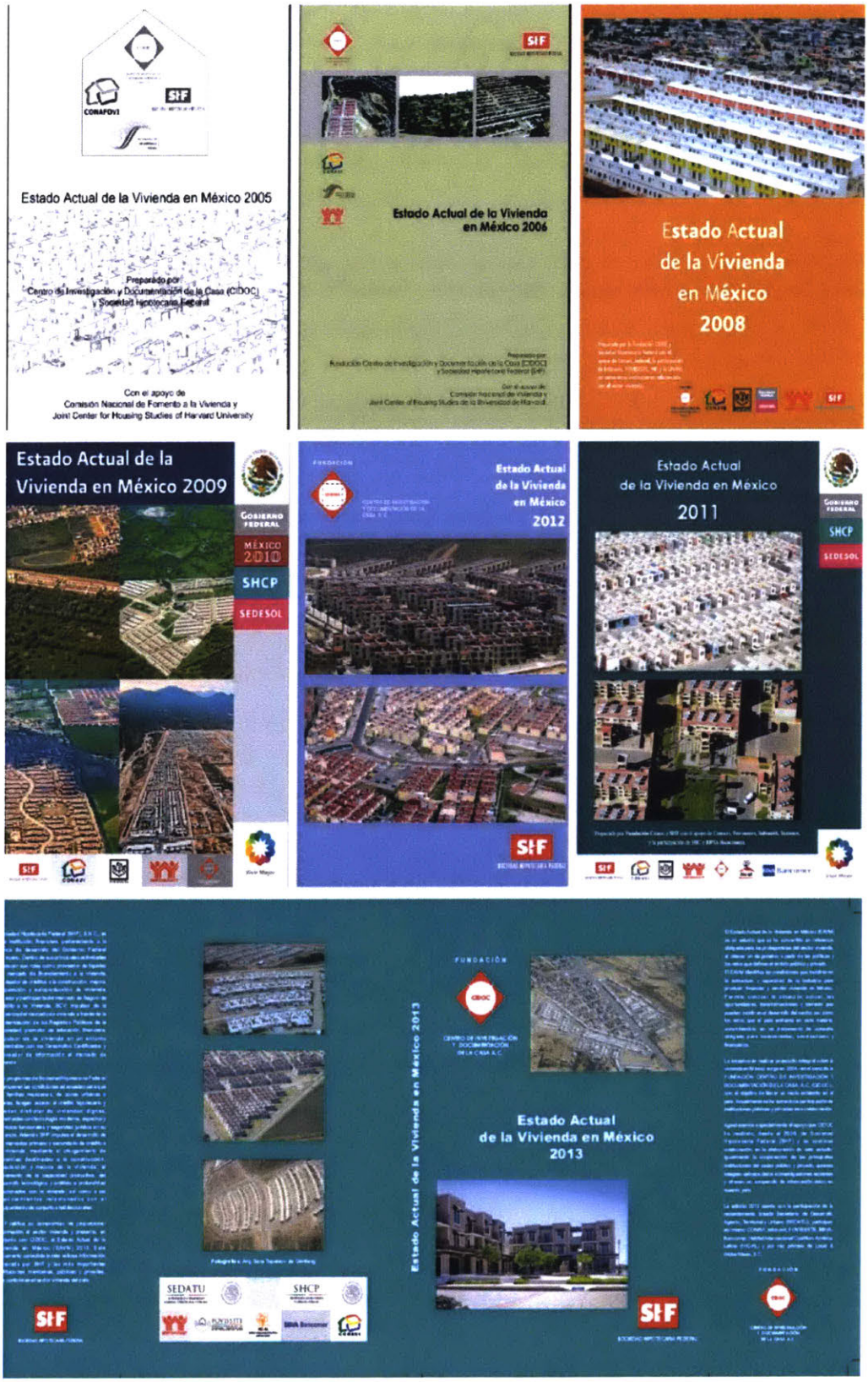


Figure 1 – Front pages of CIDOC's Current State of Housing in Mexico, years 2005-2013
Source: Own elaboration from CIDOC (CIDOC 2016)

the Mexican landscape. Mexican cities' peripheries were stocked with large housing developments.

After INFONAVIT consolidated its credit policy, the housing construction market shifted entirely to private developers. By 2004 CIDOC estimated that 300,000 housing units were developed by private developers, and most of them were built to target INFONAVIT's market (CIDOC 2004). From this point on, the market only increased and the role of developers was considered equally as crucial as that of INFONAVIT in achieving the goal of providing housing to Mexican families. By 2005, the common practice was the free-market led by developers: they would buy large parcels of land, obtain construction permits for their development, develop the public infrastructure within it, build the houses, and finally arrange the credit allocation (CIDOC 2005, Villavicencio Blanco and Durán Contreras 2003). This model worked and works perfectly for them, the national and local governments, and INFONAVIT. By 2007 CIDOC reported that 2,600 private developers existed and that the market was concentrated within only nine of their portfolios[10] (CIDOC 2007).

For governments, INFONAVIT, and developers, land was seen as an important and infinite asset. The ideology of massive housing construction and credit allocation was at its peak and the Mexican government was fostering an environment for it to succeed. CIDOC conveys this sentiment in the following lines: "the urban land is the main asset for city's growth (...). For the government, it is a challenge to align stakeholders around the value of this asset and achieve the objectives of the policy and reach the goal of 6 million houses for the 2007-2012 period" (CIDOC 2007). Little consideration was given to urban expansion and housing abandonment, which were negative externalities of the housing development model. On the contrary, this model was seen as the solution to the housing deficit that the government needed to tackle. As CIDOC reported in 2007, "private developers' land reserves (...) are enough to keep on building for several years at their current pace". By that time, the largest developer, GEO Houses, had estimated land reserves

[10] HOMEX, Hogar, GEO, ARA, URBI, SADASI, CONDAK, PULTE.

that would last for seven more years (CIDOC 2007). Until 2009, CIDOC and SHF were optimistic about the efficiency of the provision system. While they acknowledged the impact the housing crisis had in the Mexican market in 2008, they assumed a recovering market by 2009 (CIDOC 2009). This crisis had little effect as well in the ideology of massive construction. In 2009, the government conveyed the National Pact for Housing, where developers reassured that they would keep building houses to ensure the construction of 800,000 housing units by the end of 2009.

However, reality would eventually overcome this idealized state of planning. After the housing crisis in the early years of the 2010's, INFONAVIT identified an increasing number of non-performing loans. These were people that for some reason were not paying their mortgage anymore. When INFONAVIT tracked these loans and visited people's homes, they found out that these houses were already abandoned. Eventually, the housing abandonment phenomenon was physically evident in major cities across Mexico. At the beginning it was believed the phenomenon escalated due to the rise of migration and crime, as in 2006, President Felipe Calderón initiated the Mexican Drug War. At that time, these reasons were openly confirmed and accepted by different INFONAVIT public officials (EXPANSIÓN 2010, Carrasco Soto 2012, Sandoval Alarcón 2012, J. Reyes 2012). However, years after the Mexican Drug War ended, the problem of abandonment remained. Authors like Gabriel García Moreno identified that, contrary to the mainstream belief, crime and insecurity had little effect in determining abandonment in some regions of the country (García Moreno, El abandono de la vivienda como consecuencia de la delincuencia e inseguridad urbanas 2012). What continued from that reality was an astonishing number of reports by the media about complete housing developments that were either left under construction or were partially or completely abandoned by its inhabitants. These reports spanned from 2013 to present and reported different reasons why people were abandoning their homes: undesirable environmental conditions such as lack of access to transportation and urban services (water, sanitation, drainage, electricity, gas), lack of access to jobs, lack of access to educational and recreational centers, etc (Reyes y Cabrera 2013, Salinas Cesáreo 2015, Arias 2015, Monroy 2016). These developments, built amidst the housing "boom" in Mexico and as a response to a

national policy of credit allocation, deployed in areas where municipal and urban services were either underdeveloped or non-existent. In the rush of allocating credits and supplying new houses, municipal governments issued construction permits to private developers in areas that were not proper for urbanization. Under the promise that these developments would be equipped with urban infrastructure and municipalities would supply public services, uninformed low-income families moved to these developments. Eventually, they found out that these services would never come, and that they had invested in a house that was not suitable for living. Undertaking an extremely tough decision, these families abandoned their homes. They couldn't afford living there anymore.

5. Understanding Abandonment in the City Context

In Mexico, abandonment can be defined as an urban phenomenon in which families or individuals decide to no longer live in a house they own or for which they are paying a mortgage. As explained in the last chapter, abandonment has a multi-dimensional nature that seems to be explained by various factors that span from built environment conditions to family or individual characteristics of inhabitants. Previous efforts to understand what triggers abandonment in cities have tried to explain that nature, and it was not until very recently that the Mexican government and INFONAVIT have developed research on the phenomenon to better understand it.

Within the international context, factors of housing abandonment have been studied under different lenses. Back in 2003, studies in Philadelphia, Chicago, Los Angeles and New York showed that property ownership, years of rent, proximity to other vacant lots and proximity to demolished properties had an effect on determining abandonment (Hillier, et al. 2003). In 2006, the Lincoln Institute of Land Policy developed a working paper to determine housing abandonment in Flint, Michigan. Results showed that it was mainly socio-economic factors that determined housing abandonment, specifically income level, employment status, owner/renter tenancy, race, and educational attainment (Basset, Schweitzer and Panken 2006). On studying different definitions

of "abandonment", V. Morckel (2014) was able to identify that local conditions and understanding of abandonment might be crucial in understanding its factors. In general, population loss, understood as the declining of population on central cities, and property taxes, are two of the most cited reasons for housing abandonment (Morckel 2014, Marcuse 1985, White 1986, Wilson and Margulis 1994), but other tested variables that proved relevant range from the decline of property values (Marcuse 1985), the decline in income and financial capacity of home-owners (Marcuse 1985, Scafidi 1998, Basset, Schweitzer and Panken 2006), the widespread process of suburbanization (White 1986), location, accessibility and proximity to city centers (Wilson and Margulis 1994, Basset, Schweitzer and Panken 2006), crime and safety (Basset, Schweitzer and Panken 2006), the decline of public and commercial services (Tucker 2013) and not surprisingly, proximity to abandoned housing (Scafidi 1998, Hillier, et al. 2003, Han 2013).

As mentioned before, it was not until recently that researchers conducted studies to identify factors of housing abandonment in Mexico. In 2011, Landy Sánchez and Clara Salazar (2011) reported that international migration, housing finance policy and housing oversupply were key determinants of housing abandonment; these were later tested by Paavo Monkkonen (2014) using a statistical approach, confirming their relevance. Later in 2013, Jesus Enriquez and Sarah Bernal (2013) developed a study that identified that economic crisis, income and habitability conditions (housing location, housing quality, security, among others) were factors that produced housing abandonment in Sonora. Similarly, qualitative approaches on the effect of crime and safety in urban areas have been developed. Findings show that in Ciudad Juarez crime and delinquency do not play an important role on determining abandonment (García Moreno 2012) but housing overproduction does determine vacancy in the city (Fuentes and Hernández 2014). Francisco Lara (2016) used census data to identify housing abandonment factors in Tijuana, among which he found that social demographics and educational attainment were significant.

In 2015, CIDOC stated that from among those states with the highest rates of abandonment, a significant amount of abandoned housing was built in places without public services, transit

infrastructure, nor urban amenities (CIDOC 2015). Specifically, CIDOC identified that distance to job centers was the most important reason for housing abandonment. However, the level of aggregation of the data used for the study does not account for the specific urban contexts where housing projects are developed within cities or metropolitan areas. The most recent studies on abandonment in Mexico or Mexican cities are those of Ackermann, et al. (2015) and INFONAVIT (2012). These studies find similar results to those found in prior studies, but since they use INFONAVIT household data in their approaches, they find that financial vulnerabilities of credit-holders might play an important role in determining abandonment.

6. Why Is Abandonment Important and Who Is to Be Held Accountable?

Housing abandonment represents a crisis that goes beyond the political and economic capacities of the Mexican government. This crisis finds its roots in the social dynamic of occupying space and living in it. The phenomenon reveals a behavior that reflects the lifestyle of Mexicans: "if my house does not satisfy my living conditions, then I leave". Housing abandonment is, in the end, an indicator that highlights, among others, deficiencies in housing, financial capacities and the built environment that Mexicans need to satisfy their living conditions.

For the great majority of Mexicans, buying a house represents a life effort. The main sector of the population that INFOANVIT covers has been historically disenfranchised from access to quality housing. These ideas are not fundamentally emotional. Very recently, Francisco Lara found that perceptions on abandonment significantly differed across levels of government and in relationship to the sense of belonging to the house (Lara García 2016). Mexicans live, in fact, in a country of unequal rights and opportunities that deliver different perceptions of the reality. Last year, INFONAVIT published a report that captures this reality:

> *"30% of credit-holders are unsatisfied with the amount of the credit they undertook in relationship with the housing unit they received,*

42% are discontent with how far they live from transportation, retail centers, schools and religious centers,

48% would not buy their house with the same developer if they could chose,

37% invest two hours or more to travel and return from work,

32% reports that the housing development where they live has no maintenance,

***And finally, 45% reports that given the case they could not afford to pay the credit anymore, they would prefer to leave the house**". (CIDS, Vivienda 2016)*

Analyzing these views, different stakeholders have been involved in the process of fostering that environment. While it is easy to target INFONAVIT as the culprit, in reality other actors have had more influence in shaping the housing development model and therefore, their effect on abandonment. **Abandonment, in the end, is not only the result of an unmeasured strategy of credit allocation, but also of an unregulated market of housing construction and weak strategies of affordable housing planning from municipalities.**

If the Mexican government wants to truly improve the quality of life of the majority of Mexicans, then it should start thinking of new innovative strategies to better allocate and build affordable housing. Not only because it is a constitutional right, but because of what it represents to Mexican families.

CHAPTER 2: Spatial Analysis of Housing Abandonment in Guadalajara

The previous chapter has given us an explanation on why the phenomenon of home abandonment perpetuates in Mexican cities. It is clear that it this is due to a combination of weak or null municipal planning capacities and a provision system that looks to allocate as many credits as possible under a massive housing construction system. Moving forward, cities in Mexico are starting to realize the importance of addressing the home abandonment problem. Previous approaches to reduce home abandonment have been weak on delivering the expected results as the credit provision system remains the main strategy to provide affordable housing in Mexico.

In giving a new vision to approach the problem of housing abandonment in cities, the Metropolitan Area of Guadalajara has developed a new metropolitan urban development plan (POTmet) to allocate affordable housing and reduce home abandonment. Like many other cities in the country, Guadalajara has suffered from unregulated urban planning that has dispersed affordable housing all across the city borders. Abandonment itself is a large social issue, for the reasons presented already in the previous chapter. It is a problem that reflects an informal planning reality that leaves indefensible entire areas of cities. The phenomenon also reflects a lack of institutional capacities to provide services and infrastructure.

In this chapter I want to present the magnitude of the home abandonment problem that Guadalajara currently faces and that the POTmet needs to address. The idea behind doing this analysis is to show how the nature of abandonment explained in the previous chapter materializes in the spatial form of the city of Guadalajara, and analyze where Guadalajara's planners should direct their efforts. **If POTmet brings new metropolitan efforts to consolidate better planning in Guadalajara, then they need to remain cognizant of this current reality to properly address it.**

1. The Spatial Form of Abandonment in Guadalajara

The Metropolitan Area of Guadalajara (MAG) is comprised by 9 municipalities and is the second largest metropolitan area in Mexico. By 2010, it had a population of almost 5 million inhabitants (INEGI 2010) and according to estimations from CONAPO, its population growth ratio is constantly increasing (CONAPO 2012).

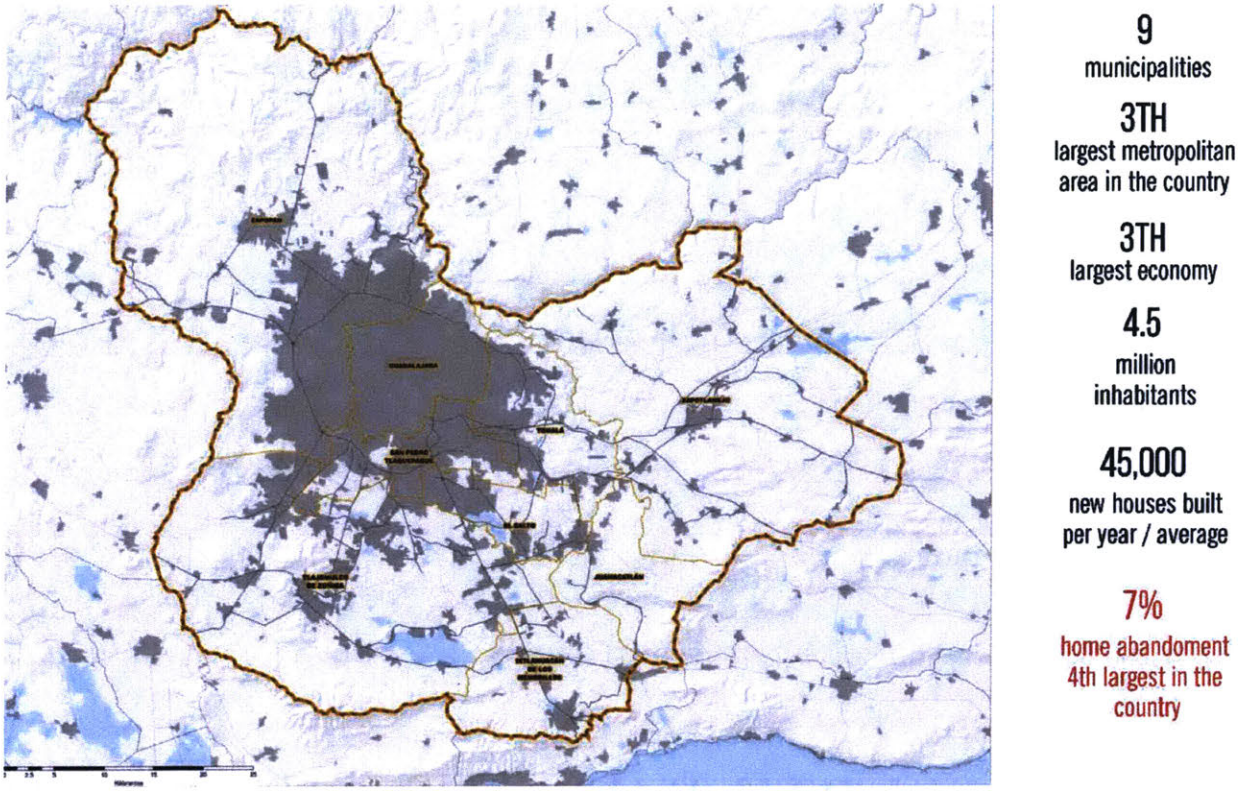


Figure 2 - Metropolitan Area of Guadalajara.
Source: Map extracted from the POTmet and developed by IMEPLAN (IMEPLAN 2016). Data based on INEGI and INVONAVIT.

Also, the MAG has one of the largest percentages of home abandonment in Mexico. In the MAG, almost 7% of the total houses credited by INFONAVIT are abandoned, which sums up to approximately 35,000 units according to INFONAVIT and RUV since 2008 (Portfolio Management Department and Credit Department 2017, Housing Single Registry 2017). Unfortunately, because of the way INFONAVIT records their abandoned homes, this is only a

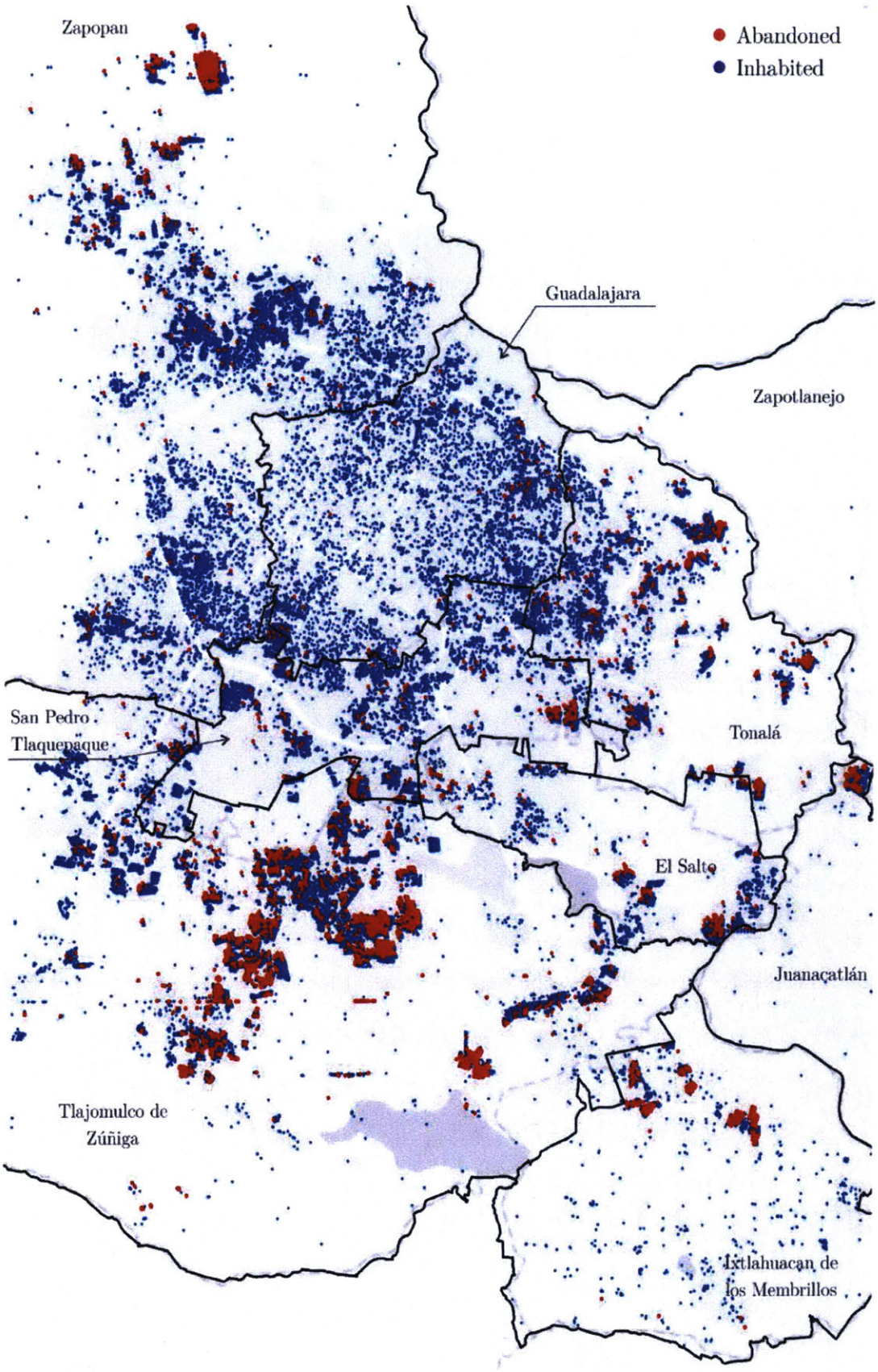
proxy which in reality, is always lower than the true amount of abandoned homes[11]. Tlajomulco, one of the MAG's municipalities, currently holds the record of the largest amount of abandoned homes within a single municipality in Mexico. The distribution of these houses in the MAG is presented in Table 1.

Municipality	Total Population (px)	Home Abandonment (%)
Tlajomulco de Zúñiga	549,442	58.48%
Ixtlahuacán de los membrillos	53,045	19.94%
Zapopan	132,272	9.68%
Tonalá	536,111	4.94%
El Salto	183,437	3.01%
San Pedro Tlaquepaque	664,193	2.77%
Juanacatlán	179,55	0.84%
Guadalajara	1,460,148	0.29%
Zapotlanejo	63,634	0.04%
	4,860,237	

Table 1 - Percentage of Home Abandonment for all INFONAVIT developments per municipality
Source: Own elaboration based on data from INFONAVIT (I. Portfolio Management Department 2017) and INEGI (INEGI 2010).

However, this table tells us about how the phenomenon of abandonment is present in the spatial form of the city. In the first chapter I described how certain policies regarding credit allocation and massive housing provision have triggered the phenomenon. This provision scheme has given the city of Guadalajara a particular abandonment landscape best described in Map 1. As we can see in the map, abandoned houses are mainly clustered in the periphery of the metropolitan area. Zapopan, Tlajomulco de Zúñiga and Ixtlahuacán de los Membrillos collect the largest stock of abandoned houses.

[11] INFONAVIT only records that a house is abandoned after the credit-holder stops paying his credit, after several months. However, some credit-holders that don't live in their homes, keep paying the credit. While this is not the definition of abandonment this thesis studies, it is important to recognize the effect it an unoccupied unit has in influencing abandonment in other close to it.



Map 1 - Spatial distribution of abandoned homes in Guadalajara
Source: Own elaboration based on data from INFONAVIT, RUV, CIDS and ESRI

2. Current Efforts to Reduce Abandonment: The Land Reserve's Consolidation Program in Guadalajara

To reduce home abandonment, different national and state housing and urban development policies have been implemented in Guadalajara. Before 2013, all of them focused primarily on housing provision while balancing aspects of urban development such as urban sprawl. Some examples of these are the National Housing Policy, the National Housing Program, and the National Program for Access to Subsidy for Housing Solutions.

It was not until 2013 that the first program that sought to regulate affordable housing construction while reducing the large rates of abandonment in Mexico was implemented. The program is called the Land Reserve's Consolidation Program and is sponsored and developed by the National Housing Commission. (SEGOB 2014). This is the first planning tool developed at any government level that looks to regulate where affordable housing is built in cities. The program has three objectives summarized as follows: densify urban land through vertical affordable housing construction in urban cores; foster a financial environment in which low-income individuals (2.6 or less SMGVM[12]) can access intra-urban vertical affordable housing; and reduce greenhouse gases emissions from affordable housing units. This program was formulated to counter the consequences of the massive production scheme that took place in the early 2000's. The physical effects of that policy are visible in the accelerated urban expansion of Mexican cities and the large landscapes of housing abandonment that took place in those housing developments.

How does this program work? As Diagram 1 shows, right-holders can buy a house with the help of INFONAVIT and a federal land subsidy, expedited by CONAVI. The program restricts access to that federal land subsidy (that previously was not regulated, hence eligible subjects could apply and obtain it) based on a land-development restriction policy, where intra-urban and peri-

[12] In Spanish, Salario Mínimo General Vigente Mensual, which stands for Minimum Current Monthly Salary. This is an average monthly rate used by federal policies to measure ranges of subsidies according to people's income.

urban areas around and within cities are identified as eligible or not for the land subsidy. Therefore, only credit-holders who buy houses built within those areas are eligible for that land-subsidy.

The areas into which the program divides the city are commonly called Urban Contention Polygons (PCU). Each is defined using geo-spatial methodologies considering the following aspects: PCU1, or the inter-urban areas, are defined by those AGEB's[13] that contain sources of employment and where each AGEB can at least host 250 jobs; PCU2 is defined by those AGEB' in which at least 75% of the housing units have access to water and sewage; PCU3, also called "growth areas next to the consolidated city", are defined by buffer zones outside each PCU2 in spans between 100 and 900 meters. The number of buffers around each PCU2 that are PCU3 is defined by the total city population. For example, a city that has a population of 50,000 inhabitants is only eligible to have 500 meters of buffers (5 buffers), whereas cities with more than one million of inhabitants can utilize buffers of up to 900 meters (9 buffers) (CONAVI 2015).

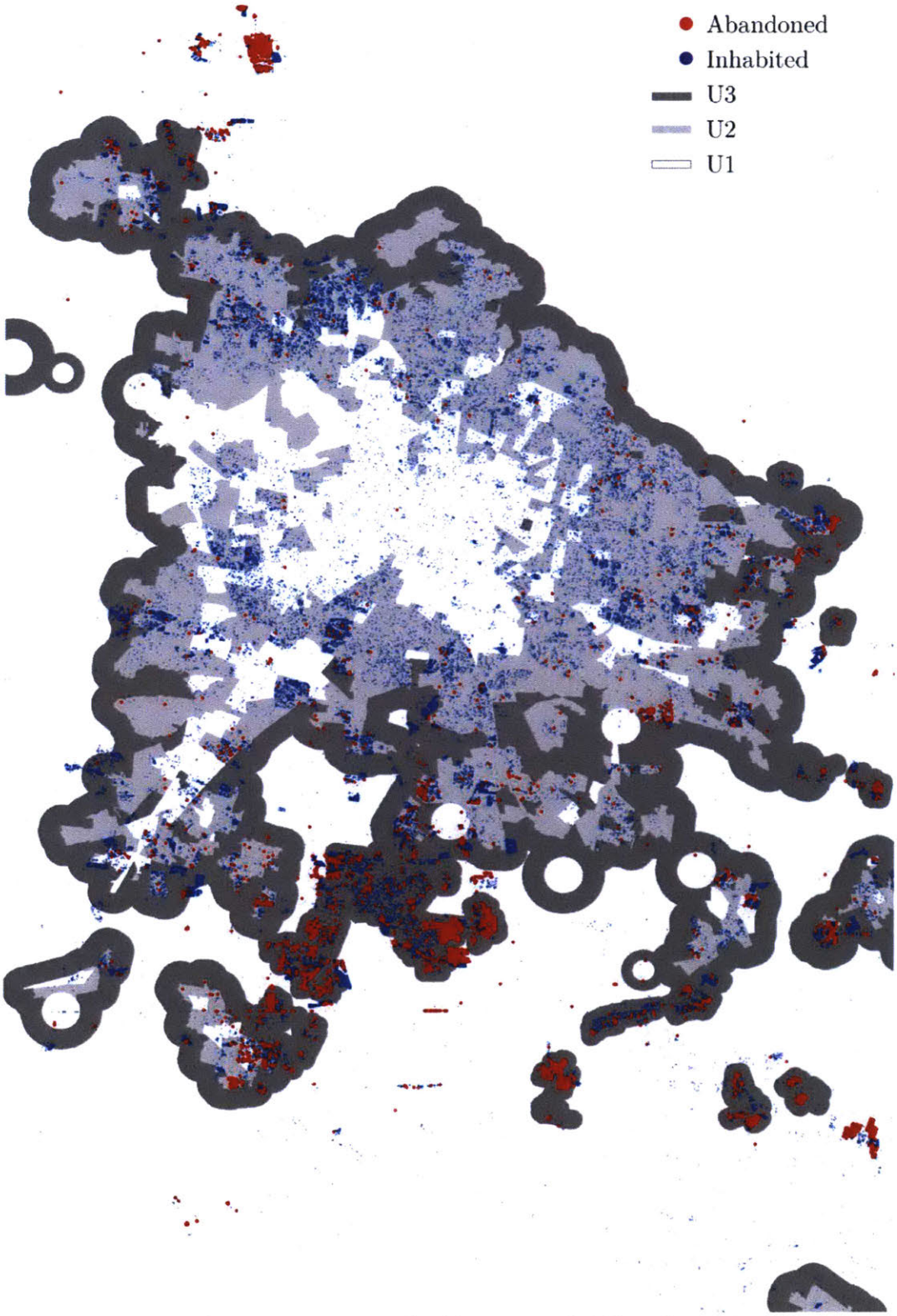
Each house built within any of the polygons is given a score based on the polygon in which it was developed and based on other built environment conditions (such as house dimensions, access to urban services, schools, hospitals and transportation) (SEDATU 2016). The higher the score the house receives, the larger the subsidy the credit-holder gets to buy that house. Sometimes, credit-holders would be eligible for a federal subsidy that goes up to 70,000 Mexican pesos (3,500 USD), which in some cases accounts for 25% of the total value of the house. If we consider that any given individual would have its own personal savings and the savings from the INFONAVIT fund, the amount of credit he or she would need would be significantly less with the additional federal land subsidy.

Since this is a policy that directly targets the amount of subsidy a credit-holder can get from the federal government when buying a house, it indirectly regulated where private

[13] In Spanish, Área Geoestadística Básica Espacial, equivalent to Census Tract in America.

developers built in the city. The logic behind this program is that developers would try to build in PCU1 or PCU2, and closer to the city center (where jobs are concentrated). That way, credit-holders would be eligible for more subsidy and it would be easier to sell those houses.

In Guadalajara, PCU's also give form to the city, and as Map 2 shows, they seem to be spatially correlated to clusters of abandoned housing. In fact, in Guadalajara, 62% of all housing financed by INFONAVIT is located in PCU3 and only 5% is located in PCU1. From the total universe of abandoned homes, proportionally 67% is located in PCU3 and only 4% in PCU1. This shows the limitations this program has had in fostering construction in the city center. Later in this thesis, there are other circumstances that define affordable housing planning in Guadalajara that the Land Reserve's Consolidation Program fails to capture. Perhaps, for future research on abandonment and affordable planning policy in Guadalajara and Mexico, it would be interesting to rethink this program to capture those circumstances that were previously unconsidered.



Map 2 - Distribution of abandoned homes in Guadalajara over the Urban Contention Polygons
Source: Own elaboration based on information from INFONAVIT, RUV, CIDS and ESRI

3. Determinants of Housing Abandonment in Guadalajara

If the objective of the POTmet is to reduce housing abandonment in Guadalajara, then what factors of abandonment should the plan consider? As explained in the previous chapter, most of the identified determinants of abandonment in Mexican cities are related to conditions of the built environment, and INFONAVIT and the Mexican government have relied on these findings to develop their policies. For example, the Land Reserve's Consolidation Program aims to reduce construction in the periphery as a way to increase access to urban services. INFONAVIT's programs of House Improvement and House Expansion look to enhance the physical characteristics of houses to increase the quality of life of its inhabitants and reduce home abandonment. However, Guadalajara and Mexican cities need to have certainty that these are the issues policy efforts should be targeting. Most importantly, if the POTmet wants to effectively address abandonment, they need to have a good understanding about the local conditions that trigger abandonment.

An example of how this better understanding of determinants could be achieved is presented in Appendix B. In Appendix B, I present an initial statistical approximation to explain the decision of an individual to abandon its home. The model is not limited to data from the built environment, but also uses data from INFONAVIT and the financial status of credit-holders (See Figure 3, Table 5 and Table 6). This model, however, is only a reference of how further research on this line could be done, and for the purposes of this thesis, I won't use it to draw conclusions.

As a proxy to understand the determinants of home abandonment if Guadalajara, I will use two research documents elaborated for INFONAVIT that look to explain what accounts for abandonment in Mexican cities (national level). The first document was developed by C230 Group, and it shows that the three top predictors of abandonment in Mexico are the location of the house, loss of job and the size of the house (C230 Consultores 2012). The second document was developed by Ackerman et. al., and they divide predictors in two groups, those related to the built

environment and those related to the financial vulnerabilities of credit-holders (Ackermann, et al. 2015). The three tops predictors regarding the built environment are the ECUVE Index, the number of restaurant employees within 5km and the number of employees within 5km. On the financial vulnerabilities group, they found that INFONAVIT's Risk Index was the top predictor, followed by the years since the loan was granted and income. Diagram 2 shows the list of top predictors extracted from these two studies.

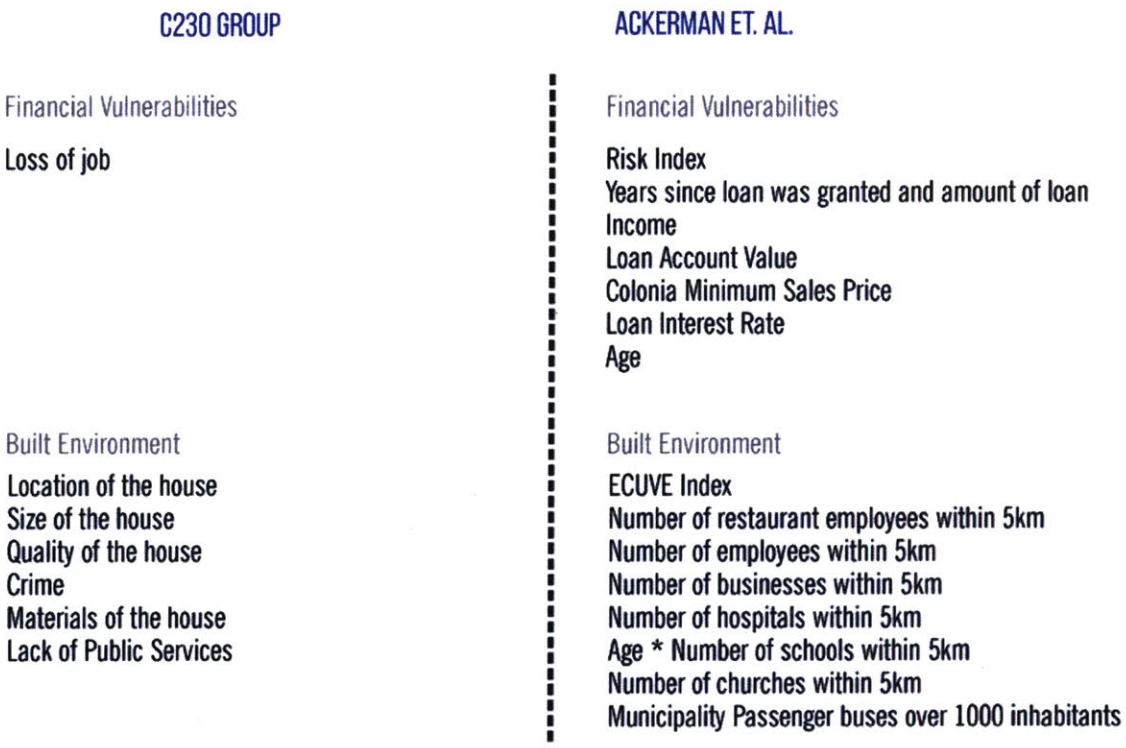


Diagram 2 - Top Predictors of Abandonment in Mexican Cities
Source: C230 Group and Ackerman et. al. (Ackermann, et al. 2015, C230 Consultores 2012)

Important to note is how these studies, made at the same level of analysis, show different top predictors. It sheds light on the importance of doing analysis of abandonment determinants at disaggregated levels (metropolitan area, municipality, housing development). Even with these differences between those two studies, we can confirm the multi-dimensional nature of abandonment and previous knowledge on what determines abandonment (See Chapter 1, section 5). The following section of this chapter will discuss how data on abandonment from the

Metropolitan Area of Guadalajara aligns to these determinants, in order to find evidence of the variety of determinants in the city, and how this should be reflected in different areas policy-makers and IMEPLAN should focus when trying to target abandonment.

4. Discussion of the Phenomenon of Housing Abandonment in Guadalajara

When looking at the growth pattern of abandonment in the MAG shown in Figure 7, it is clear that Guadalajara's problem of abandonment is not too different from other Mexican cities or from that portrayed in Chapter 1. Abandoned homes have been clustering in the periphery since the phenomenon started being recorded, and on average, the rate of abandonment in the MAG has not decreased from 8.5%. Clearly there are some systemic conditions that help perpetuate this spatial pattern.

Top predictors of home abandonment, described in the last section, are the key to understand why this pattern happens. The first one is the geographic allocation of housing units. Since 2010, at least 40% of all affordable housing built in the State of Jalisco has been clustered in Tlajomulco de Zúñga, followed by Zapopan and Tonalá (See Table 2). Tlajomulco de Zúñiga and Zapopan are also the municipalities with the highest rate of abandonment in the MAG. Massive construction here seems to be creating an environment where, in underserved areas like these two municipalities, abandonment rates increase. This can also be explained by the argument that once abandonment begins, there is a spillover effect in neighboring developments. In Figure 6 we can see these spatial effects in a housing development located in Tlajomulco de Zuñiga. Here, in time 0, near December 2013, the rate of abandonment was 10%. 3 years later in 2016, the rate escalated to 30%, having its peak in January 2015.

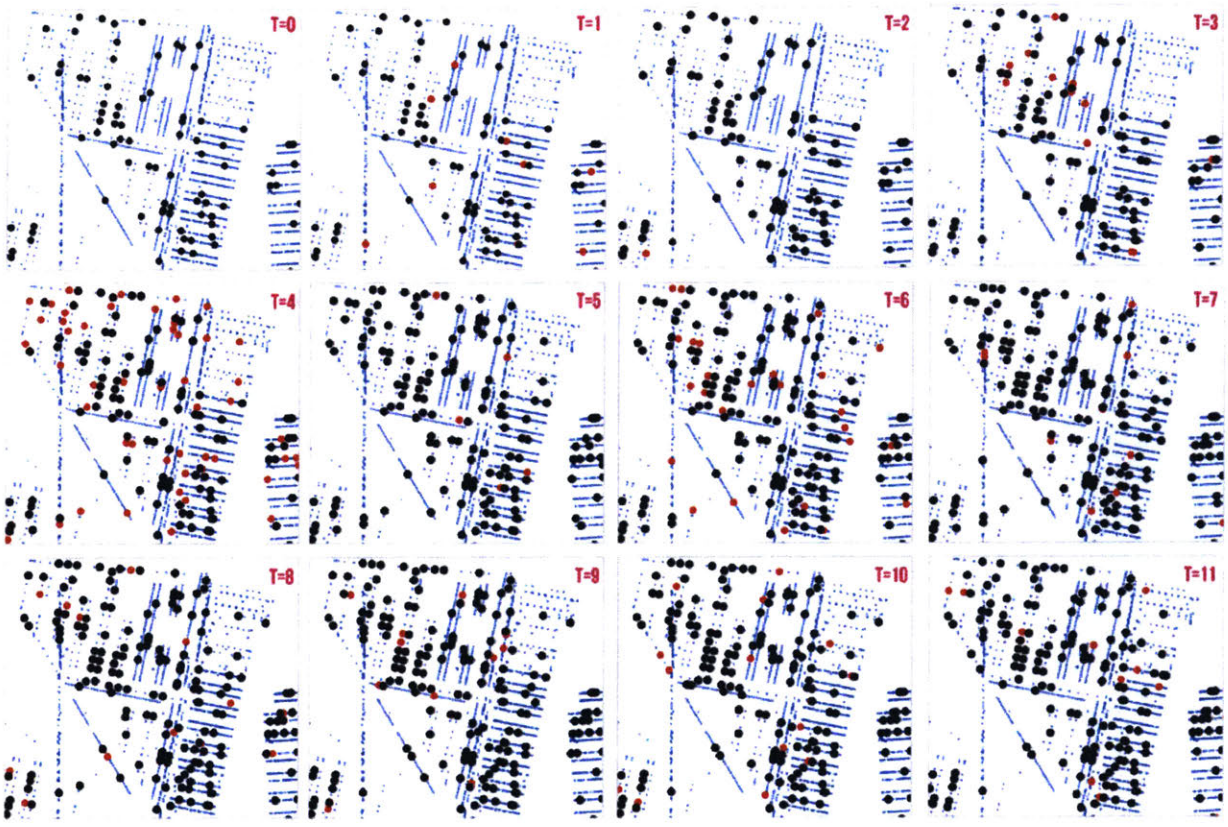


Figure 3 - Spillover effect of abandonment.
A graphical representation of abandonment events in a time series, where each frame represents a month and the distance between each T is 3 months. In T=0, black dots represent the abandoned homes in that month. In T=1, red dots represent the new homes that were abandoned that month, and black dots represent the cumulative of all abandoned homes from previous months.
Source: Created by the author based on data from INFOANVIT, RUV, CIDS, INEGI and ESRI

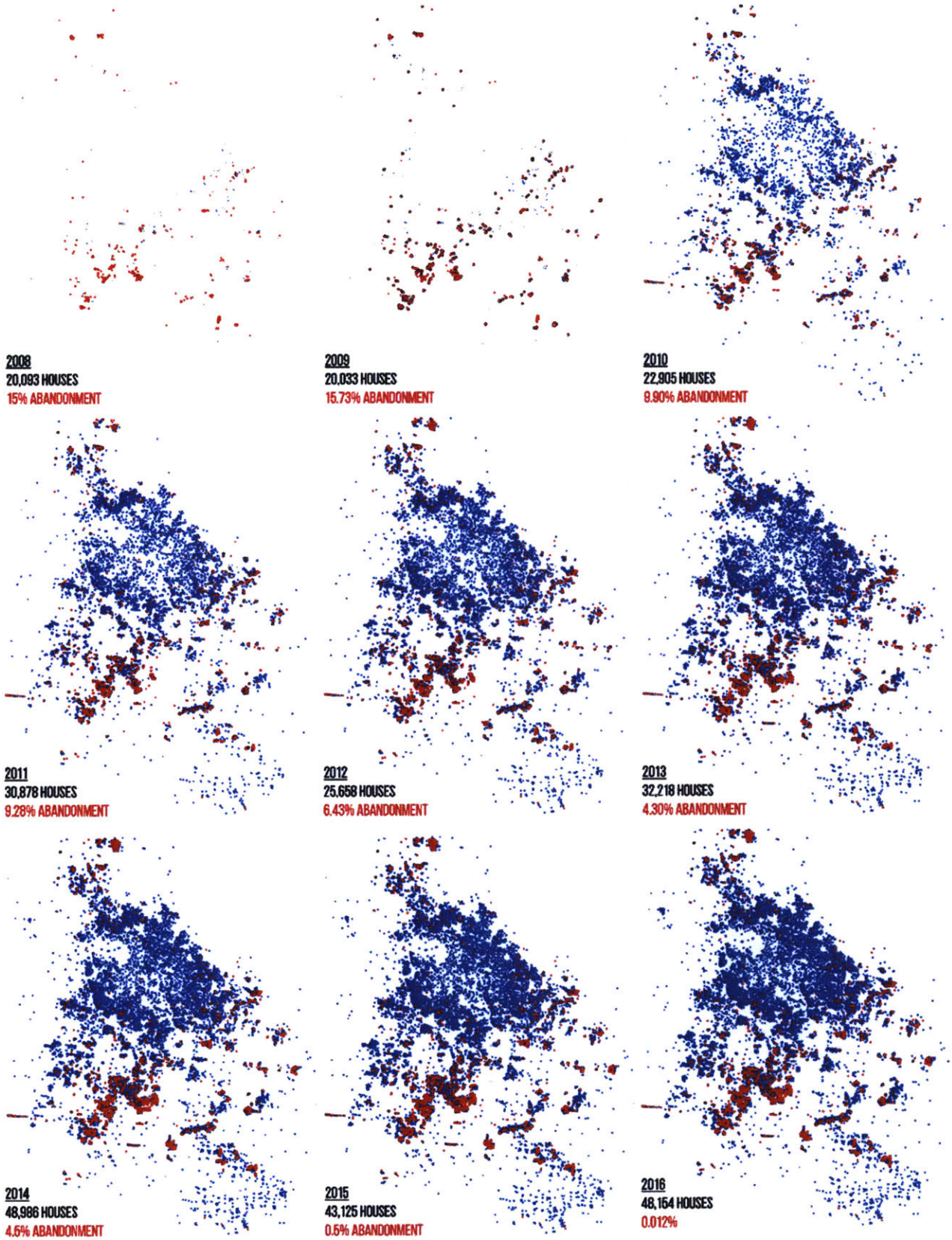


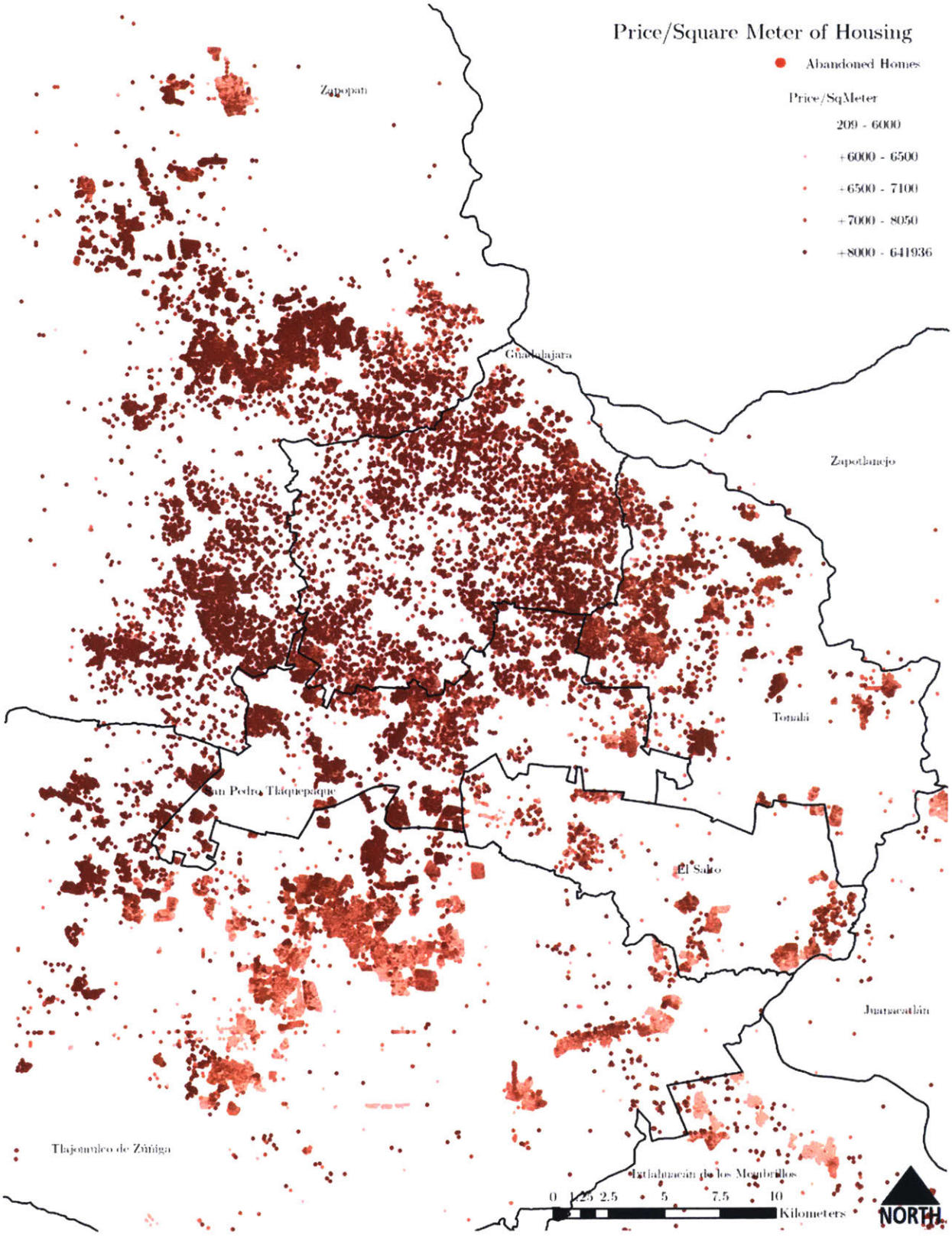
Figure 4 - Historic evolution of the housing market and housing abandonment in Guadalajara
The map shows inhabited (blue) and abandoned houses per year.
Source: Created by the author based on data from INFONAVIT, RUV and CIDS

While some affordable housing has been developed in the center of Guadalajara, in the past 9 years, most of it has been developed in the periphery. This number goes up to almost 85% of the total affordable housing stock in Guadalajara according to RUV and CIDS (RUV 2017, CIDS 2017). The Housing Typology[14] variable, represented by the predictor Size of the house, behaves similarly. In the past 7 years, only 15% of the total housing stock has been developed as vertical housing, and during 2016, only 12% was developed as vertical housing. Currently, 92% of the horizontal housing stock in the MAG is concentrated in the periphery of the city. Therefore, in these areas where the patterns of abandonment are visible, housing is built massively and horizontally.

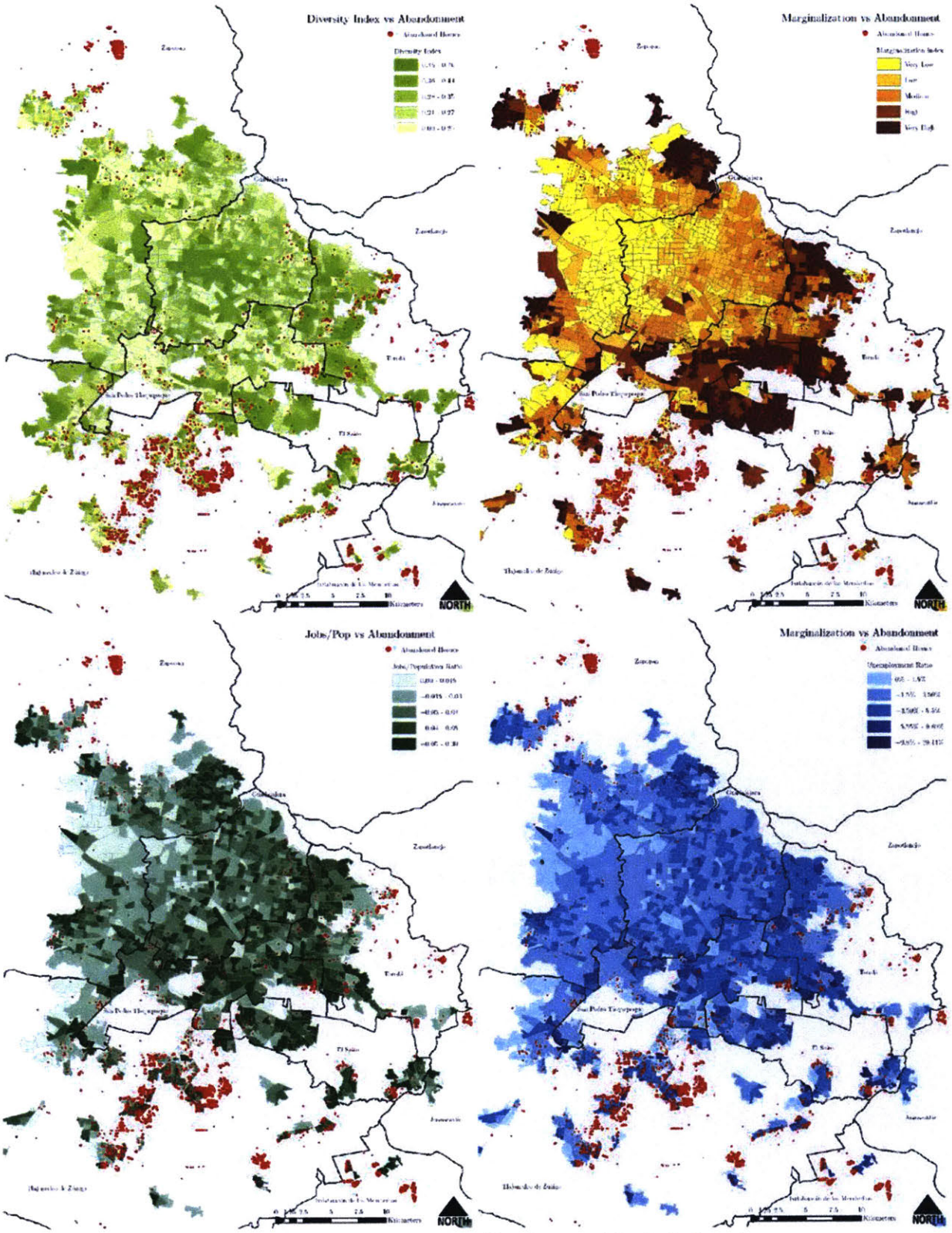
Both C230 and Ackerman et. al. introduce the relevance financial vulnerabilities have in determining home abandonment. Both state that unemployment or access to jobs and income have an influence in the decision of abandoning a home, and as data shows, 83% of all credits lent by INFONAVIT in Guadalajara since 2010, were issued to very low-income or low-income individuals (Portfolio Management Department and Credit Department 2017, CIDS 2017) among which 92% had very low Risk Indexes[15], which means that they were very likely to lose their jobs. There seems to be a correlation in between being economically vulnerable and accessibility to jobs. However, more relevant to the discussion of spatial location of abandonment is the fact that the homes were these individuals live are cheap (97% of those with low Risk index and Low Income live in social housing[16]) and are located in the periphery of the city, between PCU3 and outside PCU3. As Table 3 shows, the municipalities with the highest concentration of affordable housing in the State are also those that collect the cheapest housing. On average, the price of housing in the periphery is 195,000 Mexican Pesos (9,750 USD), just above the threshold of economic units (those that are provided to very-low income families/individuals). This predictor is better represented in Map 3, where it is clearly shown that there is a spatial correlation between location

[14] To see a complete definition of this variable and, please see Table 5 and Table 6
[15] To see a complete definition of this variable and, please see Table 5 and Table 6
[16] To see a complete definition of this variable and, please see Table 5 and Table 6

in the periphery and low-cost houses. Other top predictors of abandonment also show spatial correlation with abandonment. For example, houses located in areas where marginalization and unemployment rates are high (related to the financial vulnerabilities of credit-holders), where the built environment is mostly driven by single uses (residential), and where availability of jobs is scarce, were within or surrounded clusters of abandonment. Additionally, the majority of jobs in Guadalajara are concentrated in the center of the city, making these houses built in the periphery complete islands inaccessible to jobs. Some of these important relationships are shown in Map 4, Map 5, Map 6 and Map 7.



Map 3 - Price/SquareMeter of Housing
Source: Created by the aurthor using data from INFONAVIT, CIDS and ESRI



Map 7 - Spatial relationship between Marginalization and Abandonment (Top Left Corner)

Map 6 - Spatial relationship between Diversity Index and Abandonment (Right Top Corner)

Map 5 - Spatial relationship between Job/Population ratio and Abandonment (Bottom Right Corner)

Map 4 - Spatial relationship between Unemployment and Abandonment (Bottom Right Corner)

CHAPTER 3: Guadalajara's Strategy to Address Housing Abandonment – The POTmet

Given the current abandonment conditions presented in the last chapter, how is Guadalajara addressing the abandonment problem?

In 2016, the Metropolitan Area of Guadalajara, looking to reduce home abandonment and regulate urban and housing development, implemented a metropolitan urban development plan that captures the new vision of the city's urban development: the POTmet. For the housing abandonment problem, good metropolitan coordination is important since affordable housing planning relies on municipalities. Metropolitan coordination means the overlap of different municipal autonomies for a greater good. Here, understanding and resolving the housing abandonment phenomenon becomes much more complex, because it depends on the collaboration of different entities with different goals for the housing market. In this sense, the creation of an urban development plan that considers housing as a fundamental cornerstone of development and additionally does it at a metropolitan level leads the way to develop solutions for the housing abandonment problem. In an urban national system that grows with such speed in number of metropolitan areas, Guadalajara represents a unique governance model in the country. Its urban development proposal, particularly on abandonment, can act as an example for emerging metropolitan areas and even trigger conversations to develop federal housing policies.

In this third chapter I examine POTmet's strategy for affordable housing planning, how it works and how it plans to regulate housing development. To provide a strong understanding on how the plan was developed, which will be further studied in the next chapter, I include a roadmap through the history of the metropolitan governance in Guadalajara, and how different policy changes led to the creation of both IMEPLAN and POTmet.

1. Metropolitan Governance in Guadalajara

A historic pioneer in Metropolitan coordination in Mexico, Guadalajara's metropolitan government model is extremely simple. It consists of three legal bodies created in 2008 through modifications made in Jalisco's Urban Code: the Metropolitan Coordination Board (MCB), the Metropolitan Institute of Planning (IMEPLAN) and the Metropolitan Citizen Council (MCC) (Congreso del Estado de Jalisco 2008). Diagram 3 summarizes the roles of these institutional entities (Congreso del Estado de Jalisco 2008).

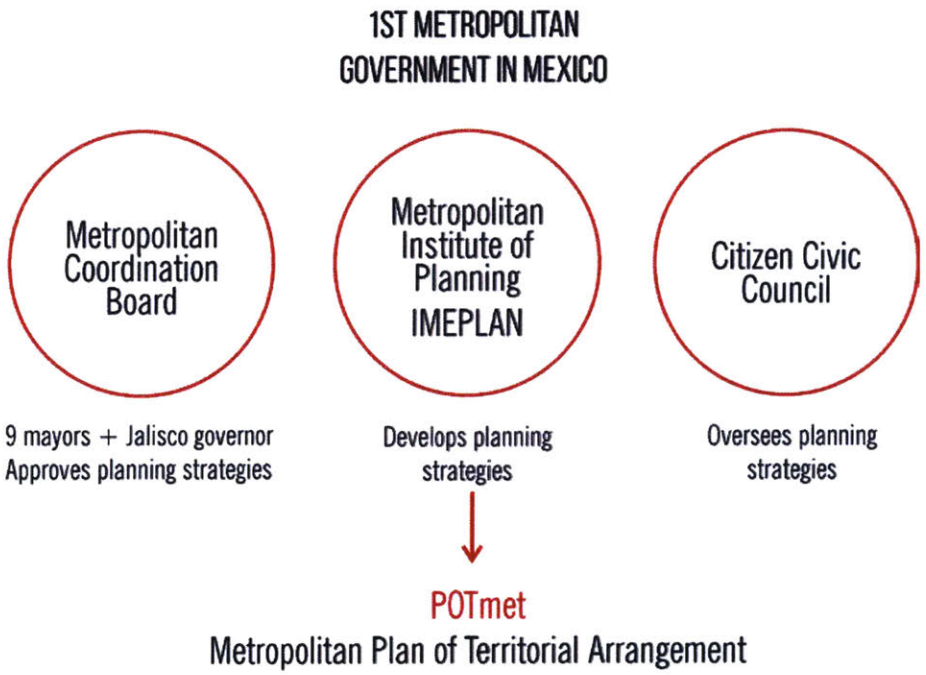


Diagram 3 - Metropolitan Government Structure in Guadalajara

Between the Institutes, they share the activities of proposing, reviewing and implementing development plans and programs at the metropolitan level. The model is clear: the MCB is a political entity that generates an agenda of metropolitan objectives. It is led by Jalisco's governor and the 9 mayors of the municipalities that conform the MAG. The IMEPLAN is in charge of developing and implementing strategies to reach those metropolitan objectives. One example of these strategies is the POTmet. The MCC reviews and oversees that plans developed by

IMEPLAN cover the metropolitan agenda, and it's formed by members of civil society and academia.

While Jalisco's Urban Code of 2008 had already given definition to these bodies, it was not until 2011 that the legal means to support them was created: Jalisco's Metropolitan Coordination Law. This law was first introduced between 2008 and 2009 by the Metropolitan Affairs Commission in the Congress led by Enrique Alfaro, current governor of Guadalajara and, at that time, Local Deputy of the LVIII Legislature Congress of Jalisco. The Law was initially rejected by Governor Emilio González[17] and after that, during a two-year period, the law was reviewed to be submitted again. In 2011, Enrique Alfaro, the governor of Tlajomulco de Zuñiga at that time, pitched the Law's approval, motivated in part by the needs of the metropolitan area, and particularly the MAG, regarding issues of water provision, crime and transportation[18]. These would become the first needs discussed in the broader metropolitan agenda.

2. Urban Policy Changes in Guadalajara: An Urban Metropolitan Agenda

It is no surprise that Guadalajara was the first metropolitan area in Mexico to move towards the consolidation of efforts in metropolitan governance. Previous to 2011, Guadalajara had already experimented with other metropolitan governments, particularly those regarding water distribution with SIAPA[19] and the Metropolitan Council of Guadalajara (Arellano Ríos 2014). Boosting a Law that could formalize metropolitan coordination among municipalities continued with that legacy of metropolitan vision. It was this metropolitan urban planning legacy that

[17] Even though the rejection of the Law was funded with legal bounds in 2008 (EL INFORMADOR 2010), it is difficult not to wonder if the dismissal was driven by political interests. In that time, the Law was promoted by the Revolutionary Institutional Party (PRI) who governed five of the nine municipalities of the MAG (Guadalajara, El Salto, Tlaquepaque, Tonalá and Zapopan).

[18] This event helped him consolidate a strong group of constituents in Tlajomulco. It also allowed a change in the political panorama of the MAG in the following years.

[19] Inter-municipal system of Water Provision and Sewage, in Spanish, Sistema Intermunicipal de los Servicios de Agua Potable y Alcantarillado

Guadalajara had experimented with[20] that settled the initial vision of IMEPLAN as a body that would focus on addressing urban issues. As Ramiro Hernández García[21] mentioned in 2012 about the future of the metropolitan efforts and IMEPLAN,

> *"The Metropolitan Area of Guadalajara entered a period of (urban) decomposition. Not always does autonomy warrant efficiency, and I believe that this time (municipal) autonomy has resulted in dispersion and disorder. Today we live in a dispersed metropolitan area (...) and I believe that this will be a great opportunity to build a consolidation process, of reintegration and reorganization of the city (of Guadalajra)" (El Informador 2012).*

Since 2008, there was an intention to solve the urban mobility, water supply, solid waste, public security and urban sprawl problems at a metropolitan level. These were the broader issues that municipalities were calling to attention, and that Alfaro, joined by the Metropolitan Commission and later by its Tlajomulco constituency, brought to attention in the Congress that later approved the metropolitan Law. However, after the Law was approved and the metropolitan bodies were legally implemented in 2011, the first actions for their metropolitan agenda were still unclear. Initial conversations in the 2011 Congress focused attention on the larger issues of water supply and security (Comisión de Asuntos Metropolitanos LX Legislatura 2012). Later on, these conversations were undertaken by the Metropolitan Coordination Board, eventually leading in the creation of the final Metropolitan Agenda in 2012 that stated six priority urban areas: public security, sustainable mobility, water supply, public spaces and green areas, pollution and air quality, and the right and access to the city. Additionally, there was a seventh task, which was

[20] This can be seen in the numerous attempts to bring metropolitan coordination to the area, shown in previous development plans and bodies like the 1947 Urban Improvement Law for Guadalajara, Zapopan, Tlaquepaque and Chapala, the 1967 Urban Coordination Commission of the Atemajac Valley, the 1978 Regional Urban Development Commission of Guadalajara, SIAPA in 1978, the Regional Urban Plan of Guadalaja and the Arrangement Plan of the Metropolitan Area of Guadalajara in the early 80's (Arellano Ríos 2014).

[21] Mayor of Guadalajara in 2012

to finish develop the body in charge of strategically thinking of how to approach those urban issues: IMEPLAN (Gobierno del Estado y Municipios 2014).

However, the discussions around these urban issues and the future of IMEPLAN remained on pause until 2014 when IMEPLAN was officially created[22]. And even then, they faced serious delays as the first director of IMEPLAN, Alberto Orozco, was not able to prove that his appointment was driven by political interests[23], resulting in his unexpected resignation. It wasn't until 2015, when the political scenario in the MAG had changed already, that the discussions around the metropolitan agenda took place again. And by then, the final definition of the metropolitan agenda was also influenced by the political scenario[24]. Enrique Alfaro, as the leader of the Metropolitan Board Coordination and mayor of Guadalajara, was able to appoint the new and current director of IMEPLAN, Ricardo Gutiérrez Padilla. As the journal La Crónica Jalisco recorded, Padilla set IMEPLAN's priorities around territorial arrangement and urban development of the Metropolitan Area of Guadalajara (Gómez 2015).

[22] Even after the approval of the 2011 Metropolitan Coordination Law, the process of the creation of the IMEPLAN extended for three more years. Essentially the delay was due to Municipal elections in the MAG in 2012, the lack of economic resources from municipalities to contribute to the initial fund of IMEPLAN and the formal geographic definition of the MAG that would include a new municipality, Zapotlanejo (for its acronym in Spanish, Guadalajara's Metropolitan Area) (Arellano Ríos 2014). During the commotion of the 2012 governmental elections, PRI's primordial focus was obtaining control of Jalisco's government in 2012, achieving this objective on July 1st of that same year. This political transition positioned 5 municipalities under PRI's control.

[23] The assignment of IMEPLAN's first director, Alberto Orozco, created a scene of political tension as it was viewed as a "top-down" decision. On one side, civil society, demanded legitimacy in the election process, as it was promised in 2012 bye the Metropolitan Coordination Board (Arellano Ríos 2014). This sector worried that the imposition of Alberto Orozco was driven by political interests. They also stated that the nomination was not open to civil society or academia members (Cárdenas Mendoza 2014).

[24] By 2015, both PRI and PAN had lost most of the municipalities comprising the MAG, and Movimiento Ciudadano, led by Alfaro, took control of 5 municipalities.

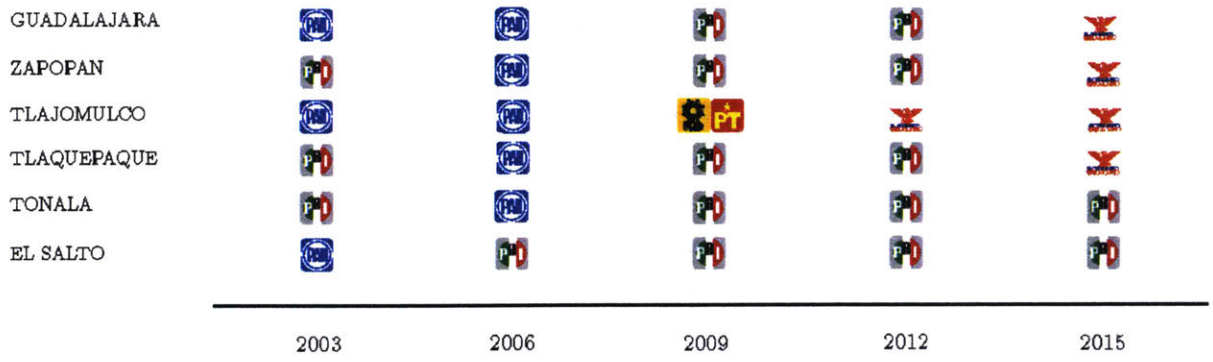


Figure 5 - Political Transition in the MAG
Source: Own elaboration

With this new vision, IMEPLAN evolved into an Institution that would focus on developing strategies regarding urban development. Not to say that initially it was not envisioned that way, but the shift in the political scene settled the final definition of the proposed actions of IMEPLAN. In words of Aristóteles Sandoval when talking about the future of IMEPLAN, the other artifice alongside Alfaro in consolidating metropolitan coordination (Arellano Ríos 2014),

> *"This period has to be of consolidation of the big projects and urban planning, has to focus in smart growth and a new vision of territorial management, that generates conditions of development, competition, but also social welfare, equity. Bad planning or lack of planning has its (consequences) that today have generated more poverty,* ***abandonment*** *and this, as a consequence, carries out insecurity and poor economic development".*

Finally, with Ricardo Padilla, IMEPLAN established the current Metropolitan Agenda, which is basically an Urban Metropolitan Agenda, that covers 8 urban issues that go beyond the initial water and security issues: urban security, public spaces, urban mobility, a new model of housing provision, environmental management, strategic planning for development, metropolitan management and risk management. The next sections and chapter will focus on explaining the housing provision strategy and how it was envisioned.

3. Building Planning Capacities in the MAG: The IMEPLAN and Affordable Housing Framework

The affordable housing planning framework in the MAG is not too different from that of other Mexican cities. In the Area, each municipality has to develop their own housing plan based on the National Housing Program. Some municipalities have their own Housing Agencies that oversee the elaboration of these plans and their implementation, and these agencies also help provide affordable housing to very low-income individuals and families. Also, these agencies/municipalities get financial and planning support from the Housing Institute of Jalisco, which is the housing agency that oversees affordable housing provision for very low income individuals and families in the State of Jalisco. Parallel to the municipal and state systems, the planning framework includes the INFONAVIT delegation in Jalisco, which oversees all credits issued in the State of Jalisco, and CANADEVI Jalisco, which is the private developers' union.

After the Metropolitan Coordination Law was introduced and IMEPLAN was created, the need for a strategic plan to allocate housing, and urban development in general, was brought as a priority. In this sense, Jalisco's Urban Code, and later the Organic Statute of the Metropolitan Coordination Instances of the Metropolitan Area of Guadalajara, indicated the means under which these priorities were to be developed. These means were three documents to be developed by IMEPLAN: the POTmet, the Metropolitan Risk Map and the PDM (for its acronym in Spanish, Metropolitan Development Program) (Gobierno del Estado de Jalisco 2014).

After 2015 with Padilla in charge, the first task of the IMEPLAN was to develop the POTmet, plan that "supports and gives legal enforcement to the decisions of territorial planning promoted by the IMEPLAN" (IMEPLAN 2016). After many years of unstructured urban planning, the inter-municipal coordination launched this plan that aims to provide structure to city growth and contain urban sprawl. This document states the basic elements of urban development in the

territory and its limitations and restrictions on the construction of new development areas. Verbatim, the POTmet is described as:

> *"...a metropolitan planning instrument for the territory arrangement that prescribes limiting elements of classification and spatial indication. It is an immediate reference for the urban development instruments of territorial arrangement from the nine municipalities that conform Guadalajara's Metropolitan Area (IMEPLAN, Plan de Ordenamiento Territorial Metropolitano 2016)."*

Additionally, the POTmet respects the municipalities' autonomy while being a mandatory document. Since Article 115 is still active, the POTmet doesn't substitute municipal development plans or violate the capacity of municipalities to develop them. Rather, the POTmet is a legal document on which the nine municipalities that make Guadalajara's metropolitan area should base their municipal development plans. The compulsory element of the document is backed up by Jalisco's Urban Code, which at the same time is the legal basis of POTmet's functioning.

The relevance of the POTmet in the problem of housing abandonment is that it recognizes and enforces recognition of affordable housing planning as a central axis of urban development. This is because, to develop the POTmet, different parameters were considered, and housing was one of them. Specifically in the development of new housing, POTmet determines the new areas that can be urbanized in the MAG and it restricts construction outside those areas. Chapter 5 of the POTmet describes that,

> *"The proposed territorial arrangement will set the bases for the city's urban sprawl, avoiding the replication of the anarchic and uncoordinated model that promotes the partial planning of municipal order (IMEPLAN 2016)."*

On June 27, 2016 POTmet was officially approved by the nine municipalities of the MAG and Jalisco's governor. Since that moment, and for the first time in Mexican history, a metropolitan planning instrument was of mandatory observation. As Enrique Alfaro stated about the history of Guadalajara's metropolitan planning:

> *"Other instruments were created, but they were never instated, they never had legal value nor they were an instrument that dictated, formally and legally, the decision-making process by the councils, and the existence of these documents is what explains the urban chaos in which Guadalajara ended up in (Villaseñor 2016)."*

The process of consolidating the metropolitan government in Guadalajara took some years after 2008 and it was not until 2015 that IMEPLAN formally consolidated. The importance of the IMEPLAN in the context of this thesis is that it shifts back planning capacities to municipalities and concentrates them at the metropolitan scale. Further, it is the IMEPLAN that proposes the POTmet, and its team currently implements the affordable housing planning strategy to reduce home abandonment.

4. The POTmet: Guadalajara's Policy to Regulate Housing Provision and Reduce Abandonment

This chapter's last section aims to explain the urban development policy established in the POTmet, it's more important elements and its implications regarding housing construction and abandonment.

POTmet's main urban development strategy is based on the restriction of new construction (urban and housing) within defined areas of previously identified urban developable land. In synthesis, the plan develops a methodology based on different geo-spatial analyses that results in

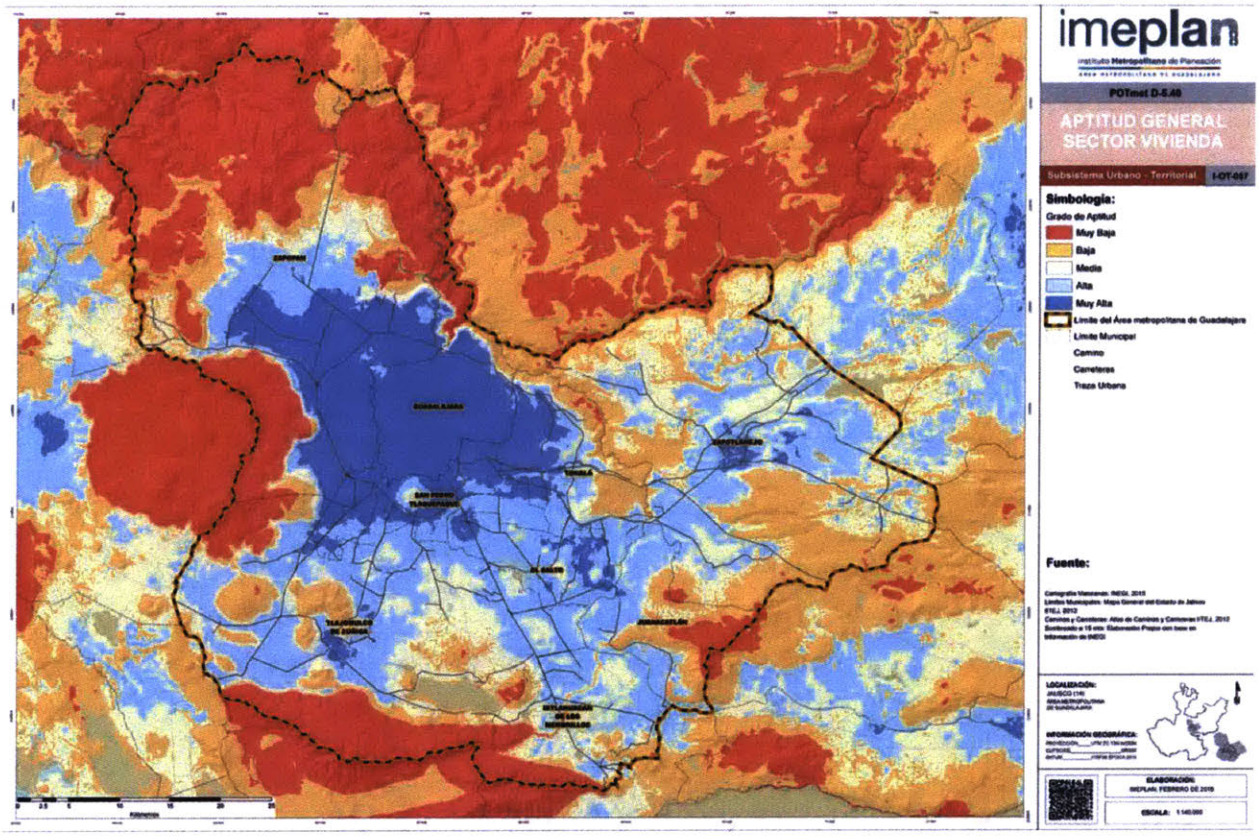
a suitability map for urban construction. Within the land that is suitable to urbanized, the POTmet localizes 71 point-centralities (urban centers) divided in four categories: metropolitan (3), peripheral (9), satellite (7) and emergent centralities. The POTmet assigns four growth polygons to the first three centralities and two growth polygons to the emergent centralities. All polygons are concentric for each centrality, and each one is bigger than the previous one. These polygons delimit areas where housing construction can take place. Construction on any other subsequent polygon is restricted to the 75% of the urban consolidation of the previous one.

The following diagram synthetizes the process explained in the previous paragraph. These elements define the strategy of construction and location of housing in the MAG since 2016. Each of the mentioned components in the diagram are explained in the following sections.

Suitable areas for housing construction.

With regards to housing, the first analysis presented within the POTmet has to do with the capacity of land to be developed for housing and affordable housing. Here, the document introduces the concept of urbanization in terms of housing development, describing it as the process of establishing housing in areas where appropriate living conditions exist, and where investment to acquire and maintain a house are in equilibrium with the benefits offered by the city (IMEPLAN, Plan de Ordenamiento Territorial Metropolitano 2016).

The analysis results in a suitability map (See Map 8) of areas where housing and affordable housing developments are likely to succeed or not. While the methodology itself is interesting, the results shown are the major take away.

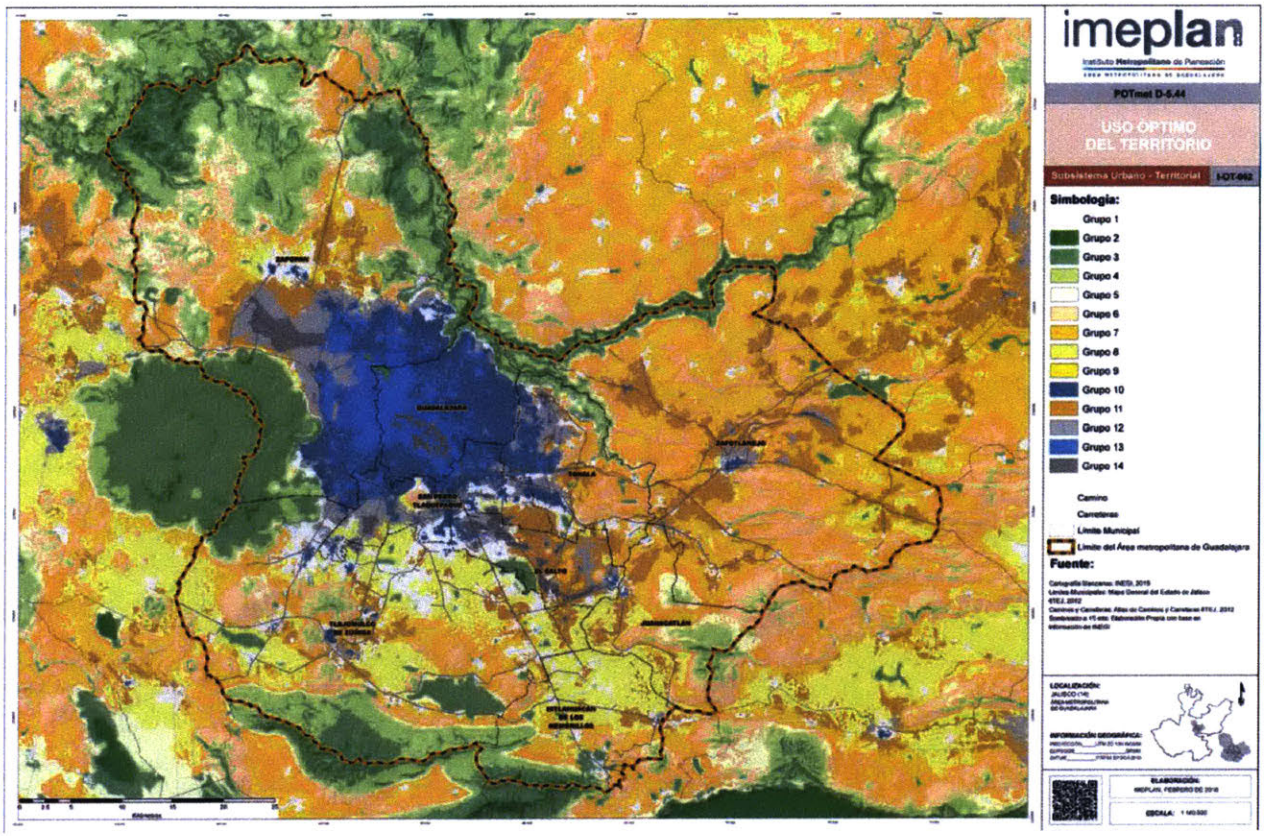


Map 8 - General Suitability for the Housing Sector
The map shows housing development suitability. Red colors show less suitability for development. Blue colors show more suitability for development.
Source: (IMEPLAN 2016).

Map 8 shows housing development suitability within the region. Red colors show less suitability for development. Blue colors show more suitability for development. Source: (IMEPLAN 2016).

As described in the diagram, this component (housing) was weighted with three other components to result in a final suitability map. This final map (MAP 2) shows 14 groups of potential uses, with construction of housing developments being represented by groups 10 and 13.

The map shows a relatively shrunk area in respect to the previous map, that concentrates housing development in the center of the MAG.



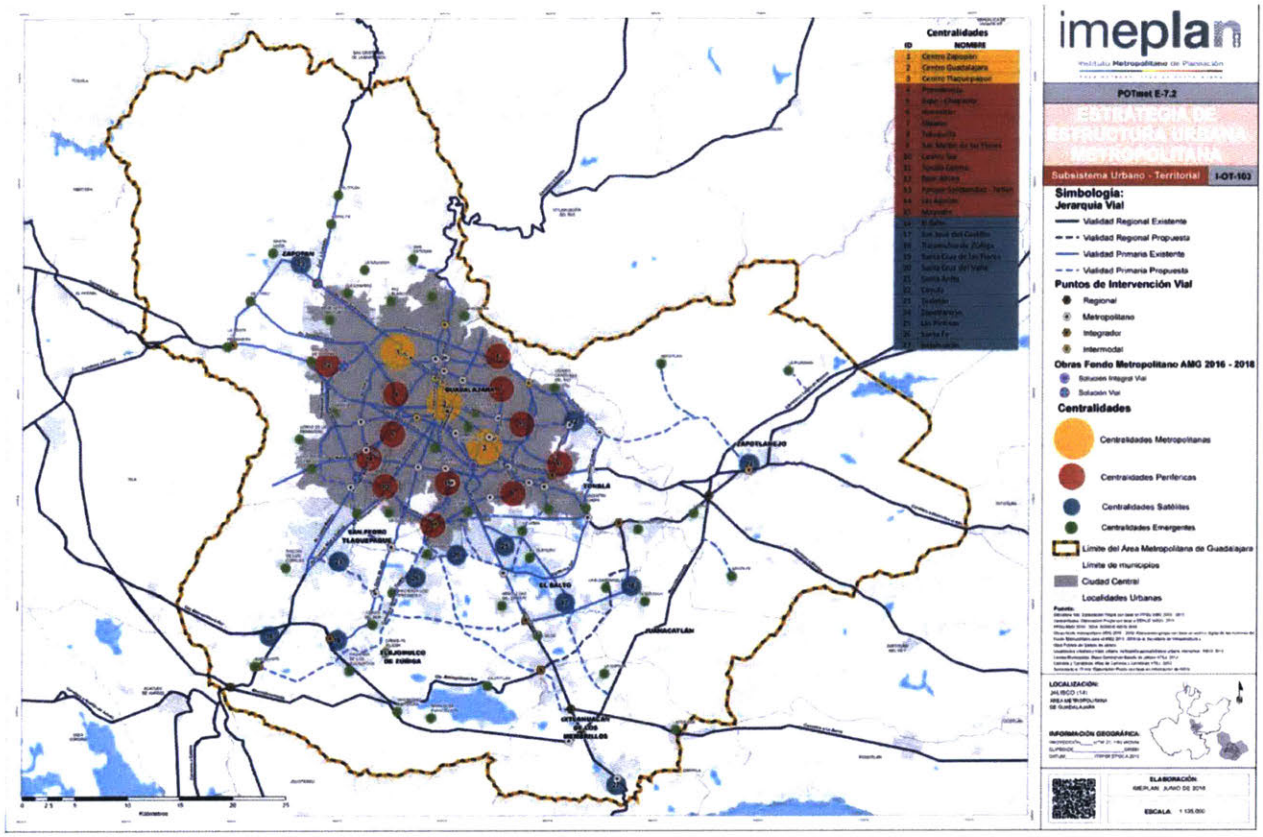
Map 9 – Optimal Use of the Territory.
The map shows the intersection of the 5 components evaluated: urban sector, housing, industry, agriculture and environmental conservation. We can see how the suitable area for housing construction shrinks. In the map, this area is represented mainly in groups 10 and 13. Source: (IMEPLAN 2016).

Metropolitan Structure based on centralities

The core element of POTmet's urban development strategy is the "centralities". These are defined as "urban units linked by road infrastructure (...) that cluster employment, population, transportation infrastructure and basic services". Additionally, these areas are "characterized by a high potential to develop social identity among their inhabitants" (IMEPLAN 2016). These urban units are categorized in four groups: metropolitan, peripheral, satellite and emergent centralities. As a whole, they define the metropolitan structure of the area. While the first three units are defined in terms of their connectivity to mass-transportation, access to public services

and distance to the center of the MAG, the emergent centralities are defined in terms of their marginalization indexes, their existing road infrastructure and the load capacity of transportation. These emergent centralities are the ones that suffered the largest modifications before the plan was published. The centralities are presented in the following map (MAP 3).

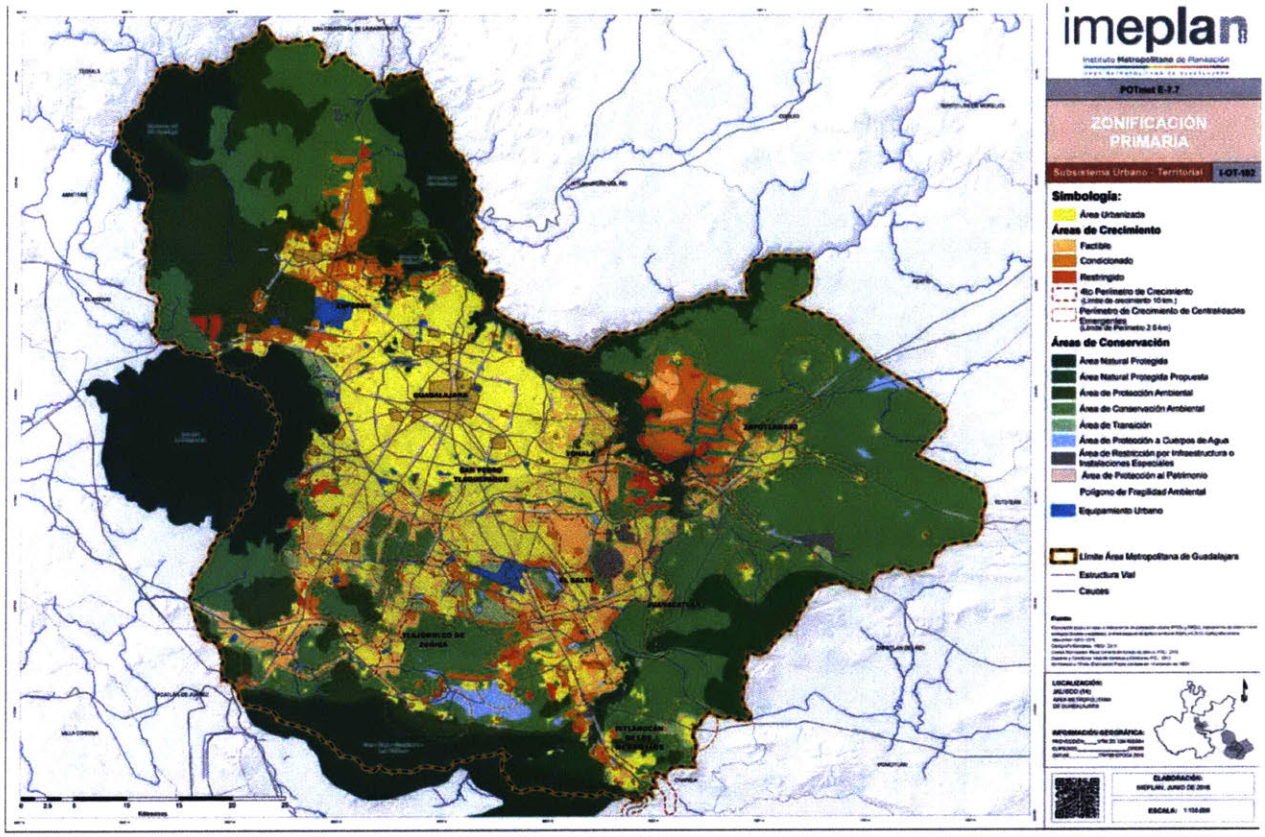
Urban land reserves



Map 10 – Metropolitan Structure of the MAG based on centralities.
Source: (IMEPLAN 2016).

Once the basic units of the metropolitan structure are defined, the POTmet defines "urbanized area". Based on the current municipal development plans, there are 44,048 Ha remaining for developable urban land. The plan estimates that by 2045, the maximum amount of land consumed will be 26,166 Ha. The plan categorizes four different types of areas: Available,

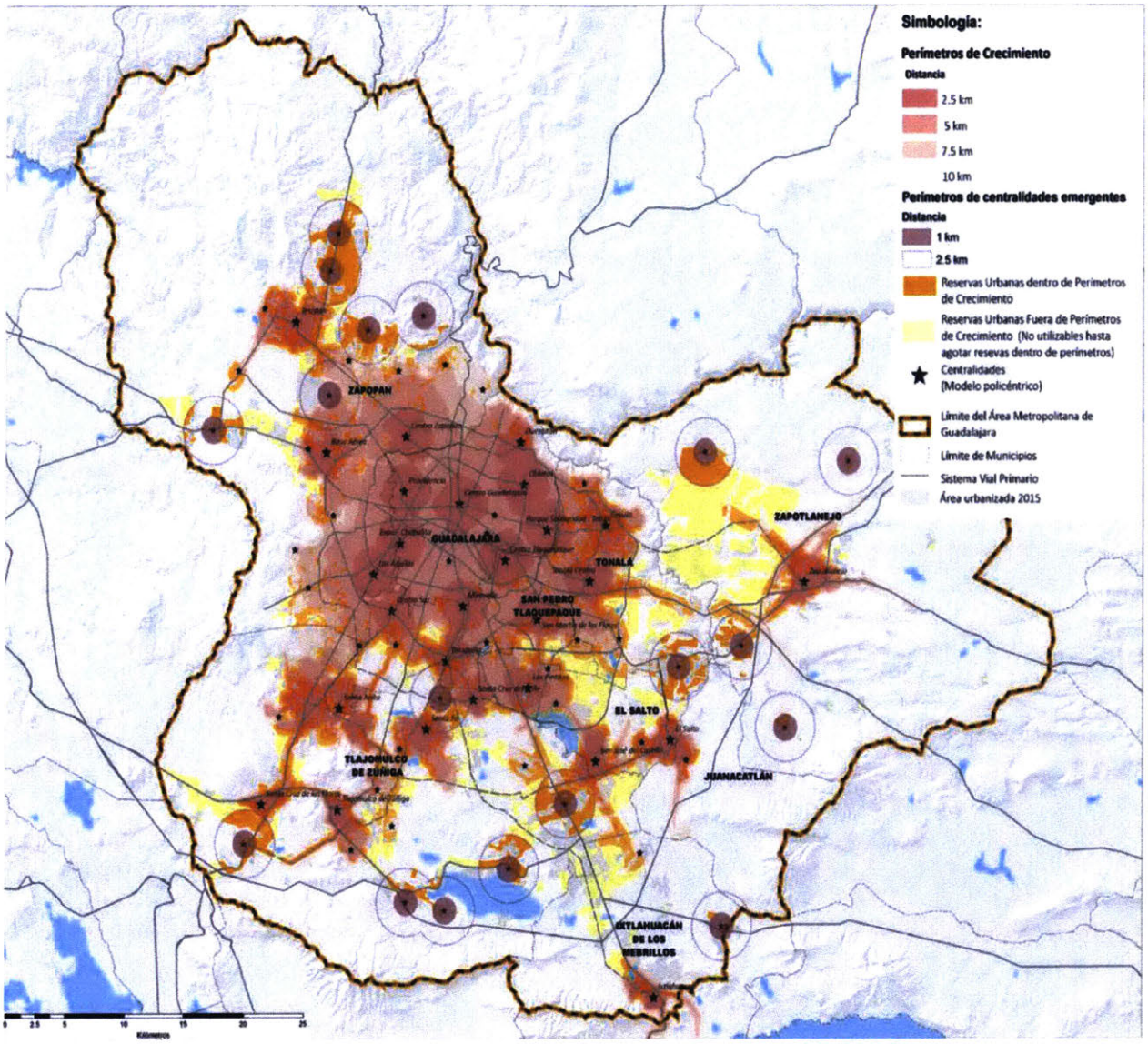
Conditioned, Restricted and Non-available land. For housing construction, only the two first categories are considered. MAP 4 shows those areas.



Map 11 – Available land for construction.
This map shows areas that are available for future construction and that are considered for a development scenario for the year 2045. The areas available for construction are colored in pale pink and orange. Urbanized area is colored in yellow. Source: (IMEPLAN 2016).

Final suitability map

Once all the previous variables were laid out, IMEPLAN developed a suitability map based on three simple conditions: proximity, compactability and density. The basic principle underlying this planning tool is that only certain areas within the Available and Conditioned land reserves will be urbanized. These areas are defined with the proximity condition. This condition creates 4 concentric polygons around the metropolitan peripheral and satellite centralities, and 2 polygons around the emergent centralities. Each of the polygons have dimensions of 2.5km, 5km, 7.5km



Map 12 - POTmet's proposed model of urban growth
Source: (IMEPLAN 2016)

and 10km for the first three centralities, and 1km and 2.5km for the emergent centralities, respectively. The proximity condition established that **only Available and Conditioned land within each of the polygons can be urbanized,** and the compactability condition **restricts construction in any polygon until the previous one available or conditioned land is 75% consolidated.** No available or conditioned land outside any of the polygons will be used until all polygons for all centralities are fulfilled. MAP 5 shows the final decision layers.

POTmet's final spatial proposal suggests a new urban growth concept for Mexican cities, which is the polycentric model. As shown in Map 12, future urban development is restricted in areas highlighted in pink. The POTmet proposes that Guadalajara's city center needs to be consolidated, restricting construction in the periphery of the city. The restriction is also tighter than previous attempts to restrict construction in the periphery, like that of the Land Reserve's Consolidation Program proposal.

5. Final Spatial Form of the POTmet – the Role of Emergent Centralities

POTmet's proposal of urban growth is based on land restriction. The new polygons that it defines (which are tighter than those of the Land Reserve's Consolidation Program), seek to restrict construction in peripheral areas and allow construction in areas closer to the city center. This principle of restriction is what drives their main strategy to reduce home abandonment. The plan is based on the assumption that forcing private developers to build in selected areas, most of them being close to the city center and all of them to an urban center, will reduce the rates of abandonment. This is because, according to the plan, these new areas have been identified as both suitable for development and also well-prepared in terms of urban services and amenities. This area's definition applies to the first three centralities introduced in the last section: metropolitan, peripheral and satellite. Again, these are areas that are already in the city center or in its proximity and that have some degree of consolidation and services[25].

However, key for the affordable housing strategy of the POTmet are the fourth group of centralities called "emergent centralities". These give the plan its final spatial form and differentiates it from previous planning efforts like the LRCP. These centralities create a system of nodes scattered around the region that presumably will foster regional development. The

[25] There is a complete methodology behind the selection of these points based in different variables. To explore this methodology I suggest reviewing the complete POTmet document (IMEPLAN, Plan de Ordenamiento Territorial Metropolitano 2016).

rationale behind proposing those centralities is that growth is expected in those areas, and while those areas are currently underdeveloped, with high rates of marginalization and severe lack of services (IMEPLAN 2016), efforts of future development should rely as well in these centralities, according to the POTmet.

A comparison between the spatial form given by the Land Reserve's Consolidation Program and the POTmet gives us an idea of the degree of building restriction the POTmet has, and the way these emergent centralities are located. Figure 8 shows this comparison. The scale-of-grey mesh represents the Land Reserve's Consolidation Program contour and the pink mesh covers the areas eligible for construction by the POTmet. When overlapping both maps, we can see how the POTmet is not too different from the LRCP contour. Tighter, yes, but based on the same restriction principle. There are some important areas that the LRCP does not consider that the POTmer does, like the urban areas of Zapotlanejo and Ixtlahuacán de los Membrillos, in the south of the map, out of its extent.

However, what appears to be the most relevant difference between both maps is the presence of the emergent centralities, represented by a small star and a 2.5 km circular buffer. There are 13 emergent centralities that the LRCP does not cover, and that are new areas of development proposed by the POTmet (these are signaled with blue arrows in the third map). To be clear, only the land colored in pink within the 2.5 km buffer is suitable for construction (IMEPLAN 2016). Nonetheless, the plan establishes that once that land is developed, surrounding land within that buffer can be used for development.

The next chapter of this thesis will examine the development process of this plan and what factors drove the decision to include these emergent centralities in the final proposal. As we will see, the selection of these centralities was not random, neither was the result of spatial analyses.

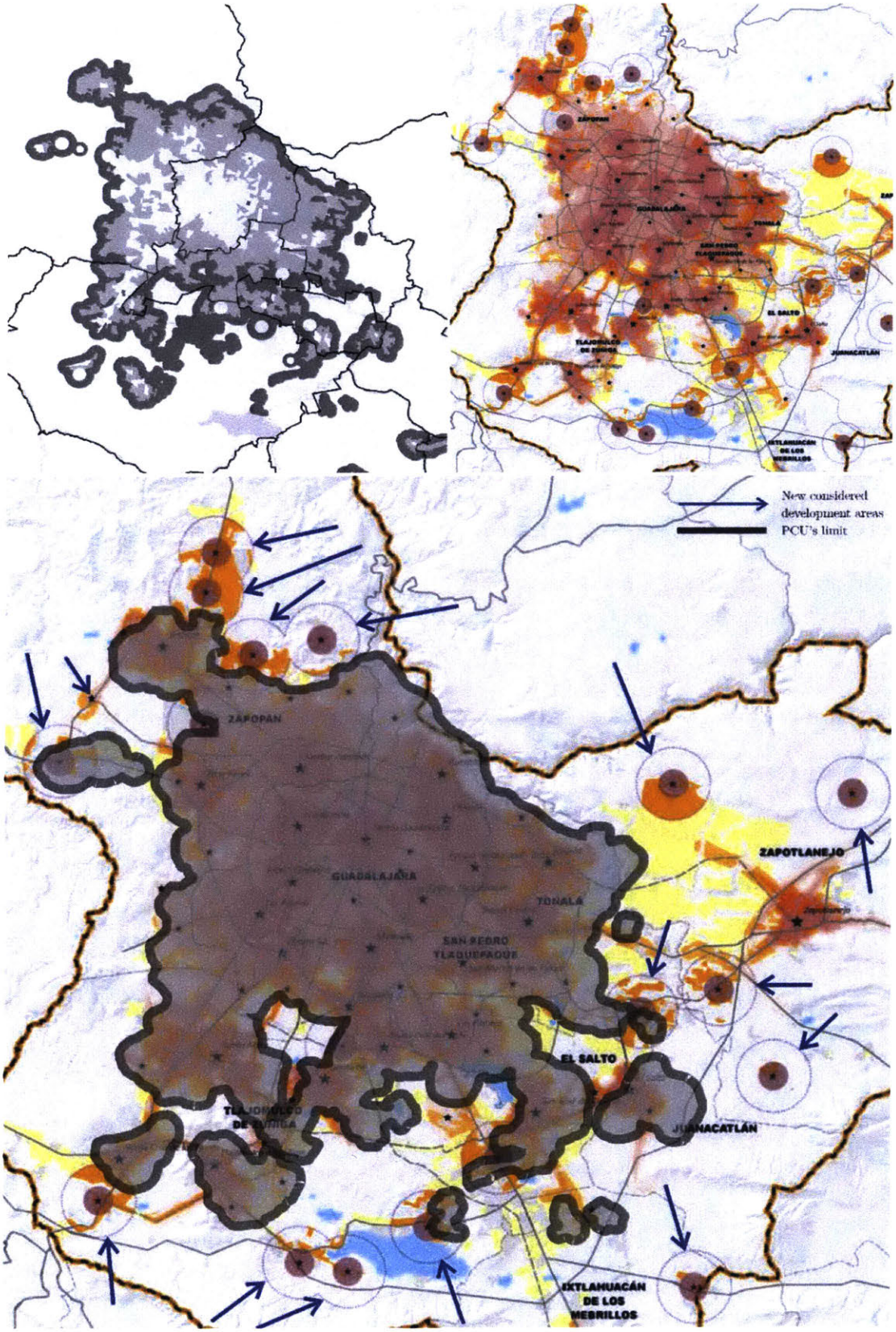


Figure 6 - POTmet vs Land Reserve's Consolidation Program.
On the upper-left corner we can see the PCU's limit. In the upper-right corner, there is the final spatial form proposed by POTmet. The bottom image highlights the new development areas for housing considered by the POTmet.

CHAPTER 4: What's Behind the POTmet? Examining its Potential for Success

Considering the problem of home abandonment in Guadalajara and the planning strategy to reduce it (POTmet), this last chapter discusses the main findings of this thesis. Here, I analyze POTmet's strategy to reduce housing abandonment, its potential for success or failure, and its limitations, through the interpretation of qualitative data from interviews with key stakeholders involved in the process of its creation. Later, I contrast these findings with data on what we already know form the abandonment problem, what determines abandonment in Guadalajara, and how the plan was initially envisioned to reduce home abandonment.

1. How the POTmet Understands Abandonment – Analytical Framework

To understand if the POTmet is a better strategy in reducing home abandonment in Guadalajara, I explored and analyzed narratives of the current state of abandonment in Guadalajara from various stakeholders involved in the matter. I conducted 32 interviews with private developers, INFONAVIT Mexico and Guadalajara, representatives from municipalities and representatives from civil society organizations and academia. The distribution of the interviews was: 15 with affordable housing private developers, 7 with directors of both INFONAVIT Mexico and Guadalajara involved in the housing abandonment issue, 5 with public officials in the government of Guadalajara, and 5 with civil society organizations or academics.

While analyzing these interviews, I identified different patterns that helped explain how the POTmet was tailored to target the housing abandonment problem. I found that t**he plan was mainly crafted based on the perceived limitations from different stakeholders in providing affordable housing in the City of Guadalajara.** In the development of the plan, there was constant contention across stakeholders between what should be done and what could be done. Stakeholders talked about what was needed to reduce housing abandonment, but also brought arguments about how taking those roads to reduce abandonment would limit the capacities of the city to provide

affordable housing. **The arguments found in the conversations helped me build an analytical framework that captures the "realities of home abandonment". I define these "realities" as conditions that currently exist when planning for affordable housing that consequently trigger abandonment. These conditions are known by stakeholders, but they assume their existence is necessary to provide affordable housing in the City. The fact that these "realities" are recognized in the plan, implies that interests from stakeholders are also recognized. These interests were later translated in the final proposal of the POTmet.**

The realities are grouped in three sets: those that understand abandonment as a physical planning issue, those that see it as a finance/subsidy issue and those that frame it as a problem of scale and provision. The textual translation of these realities is explained in Diagram 3.

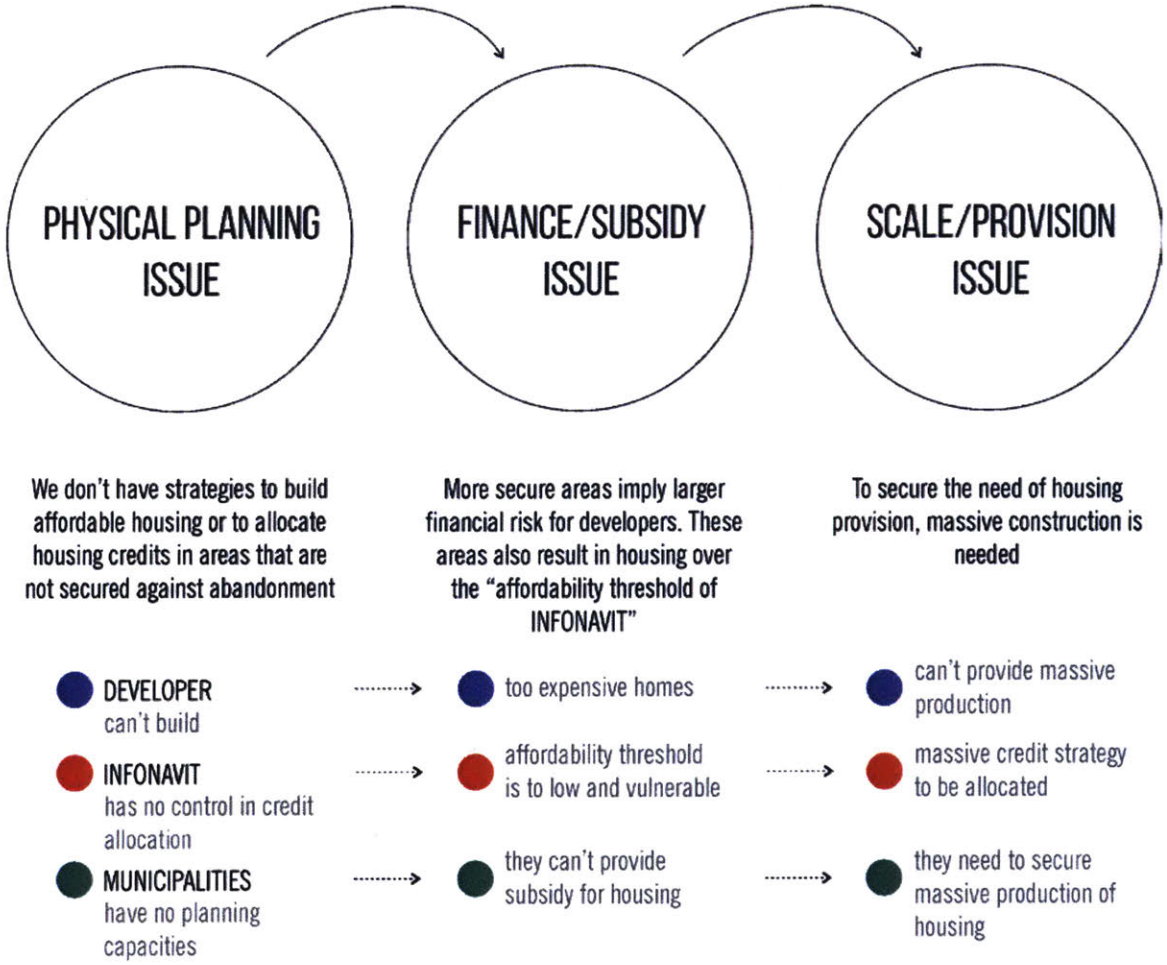


Diagram 4 - Realities of Abandonment
Source: Developed by author

Overall, the analysis found that stakeholders "jump" from one reality to another, recognizing that any of these impact their interest directly. However, there were some clear patterns across interviews.

The first pattern was that, in general, developers recognized that abandonment happens because houses are built "too far from everything". They also recognized that this is a direct consequence of them not being able to invest in more suitable areas in the city that can provide services to their housing developments. The reason is that building in better areas represents a financial burden that they can't afford to undertake. For them, developing affordable housing is already a financial risk (utility margins are too low compared to other types of developments), and to develop affordable housing that can be subsidized by CONAVI and that can be eligible for INFONAVIT credits, they need to build in areas where land is cheap. This is mostly in the periphery of the city. A small group of private developers had already experimented with developing affordable housing in the city center, not too far from the historic center of Guadalajara. For them, the financial factor was not dominant when understanding abandonment. What they expressed is that building in the city center does not allow for enough housing to make houses cheaper. So, parallel to their "experiments" in the city center, these developers would look to build in larger numbers outside the periphery.

A second pattern was brought by officials from INFONAVIT Mexico and INFONAVIT Guadalajara. For them, the issue of scale and provision was more important, as INFONAVIT Guadalajara needs to allocate massive amounts of credits that increase yearly. To assign credits to a housing development, not much is needed beyond the construction permit issued by municipalities. INFONAVIT indirectly incentivizes developers to build in the periphery. This implies a significant increment in the amount of housing units a developer can build compared to the city center, which is translated in a larger allocation of credits by INFONAVIT. Also indirectly, INFONAVIT disincentives construction of affordable housing in the city center. This is because

INFONAVIT credits are allocated based on a combination of the price of the house and the income of the credit-holder. In the case of affordable housing, if the house is too expensive or above the threshold of affordability [26] of INFONAVIT (which regularly happens with developments in the city center), low-income individuals (target of the affordable housing market of INFONAVIT) can't access the INFONAVIT credit because their income is too low[27]. Therefore, developers prefer to develop in the periphery, where houses will receive INFONAVIT credit, presenting better business for them.

Lastly, municipalities with planning capacities in the area recognized that they need the constant provision of credits from INFOANVIT and construction for developers, since this represents a good source of revenue for them. Their planning capacities are subdued by this mechanism of provision, and the urban outcomes are the landscapes of abandonment present in municipalities like Zapopan and Tlajomulco.

2. Realities of Home Abandonment

In this section, I present the stakeholder interviews, creating a narrative around each of the three realities introduced in the previous chapter. How these narratives defined the POTmet will be discussed in Chapter 5.

2.1 Housing abandonment as a physical planning issue

Affordable housing development is a challenge that needs to be understood through the physical planning perspective. Legally, this is a capacity delegated to municipalities, so all other stakeholders limit their recognition of abandonment, and argue that they're not directly

[26] Houses between 150,000 and 250,000 Mexican Pesos (7,500 to 12,500 USD)

[27] This is nonsense, as this perpetuates an environment where low-income individuals can't access better housing that potentially implies higher costs.

responsible for its existence. This reality highlights the physical and spatial character of abandonment, and recognizes that the phenomenon relates to the physical context of cities.

When interviewing INFONAVIT officials in Mexico City, talking about abandonment they would recognize that in fact, INFONAVIT has a serious problem of non-performing loans. However, they would delegate all responsibility of the problem to municipalities arguing that:

> *"... In reality we don't decide where credits are allocated. Credit-holders have the right to decide where to buy the house and who to buy it from. INFONAVIT's responsibility is to provide financially to credit-holders but we have no influence beyond that. That's why Article 115 is so important in the housing abandonment problem, because those who are entitled to plan housing are the only ones who can make a change by reducing the amount of permits in areas where housing should not be developed."*

And on the more local side, officials from INFONAVIT Guadalajara and from the Housing Institute of Jalisco, would agree that the problem of abandonment comes basically from the planning capacities of municipalities. They argue that, in Guadalajara, some municipalities don't have strong institutional capacities to plan affordable housing. Most of them focus on issuing construction permits to developers because that's where their revenue comes from[28]. One public official from IJALVI would say that:

> *"... You see in places like Tlajomulco or Ixtlahuacán, that are very small municipalities, they're still getting familiar with planning affordable housing. Here permits are issued like "hot cakes", they just look for their profit, and don't envision the harm they're doing to the city"*

[28] As a reminder, one of the tax collection capacities that municipalities have comes from property tax.

One official from INFONAVIT Guadalajara expressed that most of the abandoned homes in the municipality of Tlajomulco come from unregulated planning. For him, this means that the municipality **issued too many construction permits** in areas that had no basic services, expecting developers to provide them. This public official also argued that municipalities know very well the abandonment phenomenon and still, keep issuing construction permits where they "shouldn't":

> *"... Before the housing crisis in 2008, the big (developers) like GEO started participating in the BMV. Because of the way the BMV Works, the main objective of these developers was to sell "X" amount of housing units per year, and each year they would increase their stock. In that time, the number of construction permits increased largely and there was very little screening on where these developments were to be located. Even after the crisis and once the abandonment phenomenon was evident, municipalities continued issuing permits. It was a huge business"*

Public officials from the municipality of Tlajomulco, however, explained why construction permits are issued to private developers at the scale it is currently done, and the importance this represents to the economy of cities:

> *"... It is true that in recent years Tlajomulco has experienced firsthand the housing abandonment phenomenon. However, our development plans focus on providing affordable housing, because this is a need not only for us but for the whole Metropolitan Area. If it is not here, where else are they going to build (referring to private developers). There's no available land in Guadalajara. We all agree that we need to implement new strategies (like Transit Oriented Development) and we need to re-densify the city center, bring people closer to the city center. This is not possible, land is too expensive. Here in Tlajomulco we offer an opportunity to develop affordable housing."*

Other representatives from municipalities, like those from Guadalajara, gave a broader vision about the responsibilities other stakeholders, like INFONAVIT, have in planning affordable housing. While not mentioning specifically the credit allocation system, they did mention that **INFONAVIT's capacity to review and approve housing developments** (and eventually allocate credits on them) **has influence in the abandonment phenomenon**:

> *"... We also need to review to what extent INFONAVIT has allowed, through its technical area, authorized housing developments that do not meet the minimum necessary conditions to warrant, at least, livelihood, such as public services and transportation. There are cases where developers hire temporary transportation companies so that, when people with an authorized credit from INFONAVIT visit the developments, they think that these developments are well serviced with transportation. Ultimately, these houses end up being abandoned".*

In general, visions on abandonment classified in this group tend to agree that the problem of abandonment is the result of bad decisions taken by municipalities, specifically the amount of construction permits and their final physical location in the city. In the case of INFONAVIT, it is relevant to see how they delegate total responsibility to municipalities and do not acknowledge that the process of credit allocation depends entirely on them. In the very end, providing construction permits and issuing credits to people are translated into physical planning.

2.2 Housing abandonment as a financing issue

The second reality is that abandonment is the product of financial constraints. Affordable housing planning is done based on market feasibility. This usually results in problems of abandonment, because of the low-quality housing but also because of poor location of housing developments. Here, 92% of all interviewees that were private developers acknowledged the

problem of abandonment[29] and each of them gave a financing-based explanation to the problem. In summary, developers mentioned that the problem was due to lack of incentives to build in other areas except for the city's periphery.

Because of the relationship between the built environment and housing abandonment, one of the logical approaches to reduce abandonment is to plan and build affordable housing in areas that are well served with urban infrastructure and services. Consolidated areas in the urban core of Guadalajara or its surroundings can provide better functioning services than areas in the periphery, where affordable housing is currently built. It is, in fact, a desirable approach that secures both INFONAVIT's and credit-holders investments. It is also a strategy that has been studied and implemented in Guadalajara, as one of the few developers that has successfully implemented it recalls:

> *"...a couple of years ago representatives from the Municipal Housing Institute of Guadalajara convened a meeting with housing developers here in the city to create a partnership to re-densify the city center through vertical affordable housing projects. (...) The first step was to locate available land for construction. Then we started developing the projects in office, getting construction permits and obtaining loans to start building. The government of Guadalajara was very supportive of the strategy and we were working together to make it happen"*

However, this same developer recognizes the challenges of undertaking the task:

> *"...While the cost of the land was not cheap, it was under the market value because of the current state of abandonment in the city center. We achieved the threshold of the pro-forma largely because of the new regulations of no-minimum*

[29] Only some developers denied the existence of abandonment, claiming that this is not an issue that they have had in their own developments.

parking in the area that allowed us to invest in more housing units, but also because these units were sold with a starting price of $500,000 Mexican pesos. However, it's been two years and while most of the housing units are already sold, there are still some that are vacant."

A similar situation was from another developer that was actively looking to develop in the city center:

"... We are interested in working in (the center of) Guadalajara, but we have experienced how hard it is to get land there. It is also more difficult to get permits for affordable housing construction, mainly because it is not in all areas of the city that they allow 5-story buildings (which is the minimum we require to make the pro-forma work) without an elevator. In fact, local authorities, they are the ones who are looking to work with us and develop affordable housing (in the center of the city), but when it comes to getting construction permits, they won't allow it. For example, we have been pushing to get permits for a development near the city center for almost a year and a half. It's been such a long time that it is not profitable anymore for us to continue with it as an affordable housing project."

And another developer that was successful in building near the city center a couple of years ago mentioned the challenges they currently face in developing the same scheme again:

"... In our first attempt we barely made it through the pro-forma. Now, accessing land and urban services is getting more complicated, because there is more land speculation and the price of the land is getting too expensive. The only work-around to it is to increase the value of each housing unit, but then our market would no longer be affordable housing"

These three previous developers are small developers, which has allowed them to undertake projects where profits are smaller, but they can also be more creative. On the other hand, overall, larger developers stated that developing the city center is financially unrealistic. A representative from the second largest developer in Guadalajara mentioned the following when talking about investing in the city center:

> *"... Personally I find it difficult to invest in the city center. We haven't tried to do it yet, but it is not only the price of the land that limits us, but also the investment you need in developing vertical housing. The only way to think about profits is by developing vertical housing, but after 4 or 5 stories, the building's structure gets very expensive. Also, you need parking and elevators that increase the price of the development. Eventually, you get beyond the threshold of 300,000 Mexican pesos, which is around the number of INFONAVIT's market. That's why you need a land subsidy to build in the city center."*

Others think that land is not the only financial limitation. In the words of a representative from one of the largest developers:

> *"... What we're doing in Guadalajara is U1 (in reference to the Land Reserve's Presentation Program Polygons), but when practically developing housing, U1 doesn't matter because you are no longer expecting to receive benefits from CONAVI, SEDATU or INFONAVIT. This is because the final price of housing goes beyond their market. With the new terms of reference from these Institutions, developing affordable housing in U1 is impossible"*

However, most developers agreed that they don't even find it appealing, because it is basically financially unfeasible, and investors don't want to take the risk. A medium-sized developer that has focused on building affordable housing in Ixtlahuacán de los Membrillos mentioned that:

"... I don't think building in the city center is feasible. I already can tell you what the investor's first question will be: what's the price of the land? How many houses are you going to build? We have developed housing in the center of Guadalajara, but that's housing that goes up to 3 million Mexican pesos. In the end, this is a business (referring to affordable housing construction), and like any other business, there needs to be some utility or benefit."

All these interviews reflect the different challenges developers face when trying to build in the center of the city. These challenges represent the reality of affordable housing provision in Guadalajara, and further explain the rationale behind construction in the periphery. While some people would argue that affordable housing construction in the urban core is not too complicated, in reality there needs to exist mechanisms for land acquisition that ensure revenue to developers. If these mechanisms are not ensured, housing units are likely to go beyond the threshold of affordability that INFONAVIT supports.

In fact, some developers still believe that current strategies like the POTmet won't bridge the gap of affordable housing provision. These are developers that believe that the plan needs to provide more fiscal incentives for housing construction. Perhaps, that will come later. As another mid-sized developer mentioned when talking about the new emergent centralities the POTmet proposes,

"... People that developed the POTmet have a very romantic idea on how to develop the city. A week ago there was a panel with INFONAVIT to discuss the "right to the city", a law initiative that will substitute the Urban Code of Jalisco, and that tells you how to build and where to build, among other things. People in the Congress of Jalisco are asking for more dignified and bigger housing for low-income families and individuals, however, these will never be achieved if there is no fiscal incentives for developers to invest in better housing. In the

end, the housing business is all about numbers. If we want better social housing, we need to start by improving the way permits are issued and how we can subsidize the price of land. People (from the POTmet) are too idealistic, good ideas but they won't tell you how to ground them and implement them."

And along this line, another mid-sized developer explained that there is not enough urban infrastructure to serve the model of housing in the city center,

"... I don't think that it will work. In reality, we developers don't consider those plans at all, we work directly with the municipalities. People that develop those plans (in reference to the POTmet) think that we live in United States or Europe, where there is a metro station every 10 meters. It makes no sense, there is a reason why all developers build in U3."

Of course, initial conversations with public officials at IMEPLAN reflected a mindset that defended the idea of building affordable housing in the city center. One top official from IMEPLAN directly involved in the development of POTmet mentioned construction in the outskirts;

"... When you interview private developers, they will tell you that there is a crisis with the POTmet, because there is no cheap land in the center of Guadalajara that it is not feasible for affordable housing (...). However, we already had conversations with INFONAVIT and they accept our planning model. We need to build where development can intersect with sustainable transportation, not necessarily where land is cheaper. We need to build where the equation housing + access to transportation bridges the income gap."

The previous comments reflect the limitations of building affordable housing in the city center and the logic that has driven construction into the periphery. In general, visions on

abandonment in this group tend to agree that while needed, developing in areas with less likelihood of abandonment is financially unfeasible under the current fiscal incentives.

2.3 Housing abandonment as a problem of scale and production

Currently, Guadalajara holds the second largest market of credit allocation in Mexico. In 2016, 9% of the total credits in Mexico had been distributed in Guadalajara, and 7.2% of the total amount of credits that INFONAVIT has lent in its history have been allocated in the MAG (INFONAVIT 2017). Being the second largest metropolitan area in Mexico, its economic and social dynamics will push it to increase its population and housing stock in the near future.

From the federal to the state and local government, all housing policies and programs look to reduce abandonment while providing good quality housing. The most recent ones, like the Land Reserve's Consolidation Program, look to re-densify the city center, providing some economic incentives to developers for doing so. These programs look to exchange two different dynamics of housing provision: massive construction in the outskirts that allow for profits for developers while retaining the affordability of houses, in exchange for construction in the city center, which is more expensive but also of better quality and better located.

However, there is a problem with this trade-off. First, the availability of land in the center of Guadalajara is scarce, and if existent, there is not enough to match the rate and scale of demand for affordable housing. Previous efforts have been successful, but all of them took more than 2 years to be completed. Additionally, as mentioned in the previous section, these housing units are above the affordability threshold of INFONAVIT, because there are no current incentives to reduce construction costs and land expenses for developers.

If the scale of the demand already outnumbers the scale of the provision, it is unrealistic to think that shifting efforts and focusing on re-densifying the center of Guadalajara under the

current economic incentives will bring a fair affordable housing provision. However, it is true that this provision scheme is the one that has triggered the phenomenon of home abandonment in Guadalajara. As the representative of the largest development company recalls:

> *"... The need to build affordable housing in Guadalajara was extreme. INFONAVIT would put developers under pressure to build as much as possible, since demand has been increasing constantly since the 2000s'. The only way to build massively is to do it in the outskirts of the Guadalajara, but if you do so, you are likely going to build in places that lack of transportation, services and pretty much everything."*

INFONAVIT officials also recognized that abandonment is more of an anticipated side-effect, in a provision system that looks to allocate as many credits as possible. In the end, the institute looks to increase the amount of credits allocated yearly to each state. To achieve this, there needs to be a large-scale provision of affordable housing. This is clear in a conversation with one representative from the Portfolio Management Department:

> *"... We recently reached the 9.5 million credits lent in Mexico. Currently, even with the most recent modifications to the INFONAVIT Law, providing more credits yearly is our main objective. There is no way we can provide more credits if we don't build more. And there's a logic behind this, of course, we have a large demand for affordable housing in Mexico."*

IJALVI officials, who mostly focus on providing affordable housing for very low-income families[30], understand that the scale of the provision system is necessary. Yet, there needs to be some regulation to avoid abandonment,

[30] These are families that can't afford to pay any loan to INFOANVIT or other lending agencies.

"... Mexico and Guadalajara have a significant housing deficit that can't be tackled with small scale developments. This is one of the limitations we have when providing affordable housing- we don't have enough land or enough resources to bridge the housing gap. However, there needs to be some sort of (regulation) for developers so that they can build in places where they can reduce abandonment."

This reality reflects that the need to provide housing also shapes the spatial form of the city. Even developers who have tried to build in the city center recognize that these efforts are minimal. One of the same developers who successfully developed affordable housing in the city center concludes that,

"... For us, it was a good experiment to invest outside U3 or even U2. However, even though we made it work with the proforma, it is no business at the end. The scale of the project was so small compared to other developments that we have near Tlajomulco –we recently developed one of 2,500 housing units-, that it really makes no sense to us to keep investing here. There is no comparison in terms of the financial benefits."

3. Translating Stakeholders' Interests into the POTmet

To recap, in the previous section I introduced three realities that perpetuate the abandonment phenomenon in Guadalajara. For each of them, stakeholders in the affordable housing market not only had different perspectives, but these perspectives reflected interests that do not necessarily match across the stakeholders. In reality, these arguments brought by each stakeholder represented a way for them to cover their interests. Developers don't build anywhere where it is not financially sustainable for them. INFONAVIT looks for the massive allocation of

credits, indirectly incentivizing construction in the periphery. Municipalities capture revenue from new developments, issuing construction permits where it is easier for developers.

The arguments regarding the realities of abandonment portrayed by each stakeholder was a way to introduce their interests into the final proposal of the POTmet. This is better seen in the emergent centralities, the last to be added to the plan, and the ones that align the least with the ideals the POTmet follows.

When talking to IMEPLAN officials, they recognized that, while from their point of view having many emergent centralities would not be ideal, including new emergent centralities proposed by municipalities would be important to make the plan feasible. Along this line, one of the officials stated that,

> *"... Initially we did not have as many centralities as we have now. In fact, the last centralities to be added were the emergent ones. As you can see, their development scheme is different from the other centralities. These centralities were proposed by municipalities and we assume that they are bringing developers' interests when adding them to the plan. To avoid problems of sprawl and abandonment, what we are doing is restricting their development by imposing a radius of development around each centrality. We cannot deny the importance of developing these areas and what it represents to the economy of municipalities. On the other side we need to regulate their development. That's why they're included in the plan, and that's why they're described differently".*

Developers acknowledged that initially they were not involved in the conversations with IMEPLAN. Of the 15 developers interviewed, only eight knew with certainty what the POTmet was, and few could describe who IMEPLAN was. Those eight that knew about the plan had some bad impression of it. During the first phase of the plan, one developer recalls the following:

"We were not included directly in the conversations. IMEPLAN conveyed public hearings open to everyone, but we were not directly invited to discuss the implications of the plan in the affordable housing market. It was not until municipalities reached out that we could have further discussions. In that sense, we were also already having discussions with INFONAVIT public officials, as to how we could best move forward to keep on providing housing to the city of Guadalajara. The initial POTmet draft that didn't include the emergent centralities was definitely out of reality. This was stated both by the group of developers (that work in Guadalajara) and by INFONAVIT. For us it was important to talk with municipalities and include in the plan areas for affordable housing development."

There was a clear disconnection between private developers and IMEPLAN. From one side, developers were against the idea of total restriction, a vision that they were carrying from previous experiences with the Land Reserve's Consolidation Program. On the other side, IMEPLAN was reluctant to add more centralities to its "polycentric" plan, because of what that represented to their ideals of densification and city centrality. However, without participation from private developers in building housing, the plan would be unfeasible.

The main convening strategy came from each municipality in the MAG. When talking to a public official in charge of the strategic planning of IMEPLAN, he mentioned that:

"...After several conversations with municipalities, we assumed and acknowledged that they had already had conversations with ***private developers***"

This makes complete sense. There was a clear confrontation between private developers and IMEPLAN, and representatives of the municipalities were those that brought developers' interests to IMEPLAN. This happened as well from the other side, and resulted in the various centralities

proposed by the POTmet. In fact, there is a clear alienation of interests between developers and municipalities, and as the media reported, some of those interests were directly pushed by mayors (Del Castillo 2016). This reflects that municipal planning capacities were used to find common ground between stakeholders. Significant is the case of the emergent centrality of Colotlán, which Pablo Lemus Navarro, mayor of Zapopan, recognized as an important area for the urban and affordable housing development in the Municipality of Zapopan.

> *"... The most important part, from my point of view, is the creation of alliances, which is what we have done in different parts of the municipality. One example of this is the area of Colotlán (...) where we currently have around 140,000 inhabitants and where we expect to develop more affordable housing, around 80,000 more units (Del Castillo 2016)".*

Once the emergent centralities were officially published, some developers recognized the importance that adding new centralities to the plan had in providing affordable housing in the city. They suggested that this was the only way to effectively tackle housing abandonment. As one of the developers mentioned:

> *"We have never seen abandonment in our developments. When we saw that others were buying land in Tlajomulco to develop housing, we decided not to buy, because it was too far from everything. For us it is very clear: to avoid the problem of housing abandonment we need to be close to a centrality (in reference to an urban center, an element of emergent centralities). One example is our housing development in Tesistan. This development was in fact pretty far from the city center, but integrated very well with the town of Tesistan. It was very close to all types of urban services. We always try to locate our developments close to a centrality, and that's how we avoid the problem of abandonment. We really support more centralities in the POTmet."*

Each of the centralities comes with a land restriction pattern. In general, emergent centralities cannot be developed as aggressively as the other centralities of housing provision. However, with an increased number of emergent centralities in the city, developers feel less reluctant to reject these restrictions. In fact, 12 out of 15 developers agreed that some type of "flexible" regulations are necessary to avoid abandonment,

> *"When the first SEDATU polygons were implemented, they affected us enormously. However, it is true that the problem of housing abandonment was mainly driven by lack of regulations in the market, mostly on where to build (...). These regulations came from the first housing developments around 2010 that were targeted as totally abandoned. However, these regulations are too restrictive, and we cannot accept a plan that is even more restrictive."*

All the previous interviews reflect the complexity that lies behind the POTmet, and how important it was for municipalities to bring different stakeholders to the table to help make decisions. In this particular situation, municipalities used their planning positions to introduce developers' interests in the plan, avoiding conflict with IMEPLAN. In the end, municipalities were the ones entitled to block the plan and not sign the metropolitan agreement. On the other hand, blocking the plan was a political cost they were not going to take. Surely, these interviews only superficially show these negotiation dynamics and there may be nuances that harder to define within all these previous arguments. What is relevant to this discussion, and to the challenge of planning better affordable housing in Guadalajara and Mexico, is that the key actors, in this case each municipality, were able to foresee the reality of affordable housing construction and its limitations, and to push their interests, in the form of emergent centralities, to the plan.

4. The Relevance of Emergent Centralities for Private Developers, and What it Means for Housing Abandonment – Contrasting Data

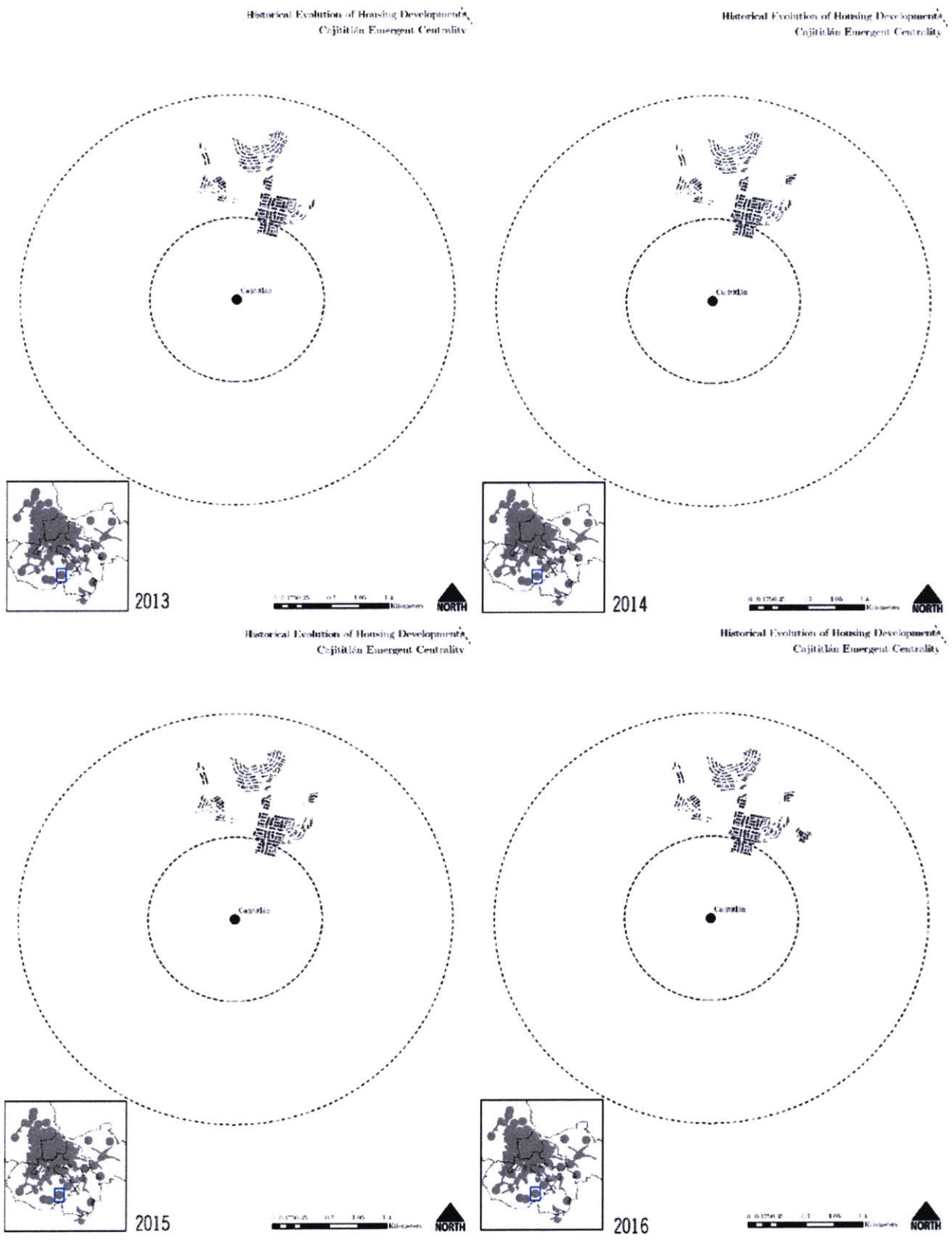
How are emergent centralities covering private developers' interests in continuing to build in the periphery? And how is this going to affect the objectives of reducing housing abandonment? This assumption, one of the most relevant in my analysis, can be further supported by contrasting it with an analysis of the historical evolution of housing developments within emergent centralities (from 2013 to date) and the current state of abandonment within those areas.

As an introduction, housing developments in emergent centralities have increased by 38% since 2010, with Tlajomulco's emergent centralities showing an increase of 62%. Given the fact that only 16% of the total affordable housing market in Guadalajara is built outside any PCU, and most of the stock is concentrated in the periphery, it is valid to say that currently, most affordable housing construction is taking place in the emergent centralities. Furthermore, abandonment is also concentrated within these emergent centralities as confirmed by the geocoded housing made available by INFONAVIT Mexico and CIDS.

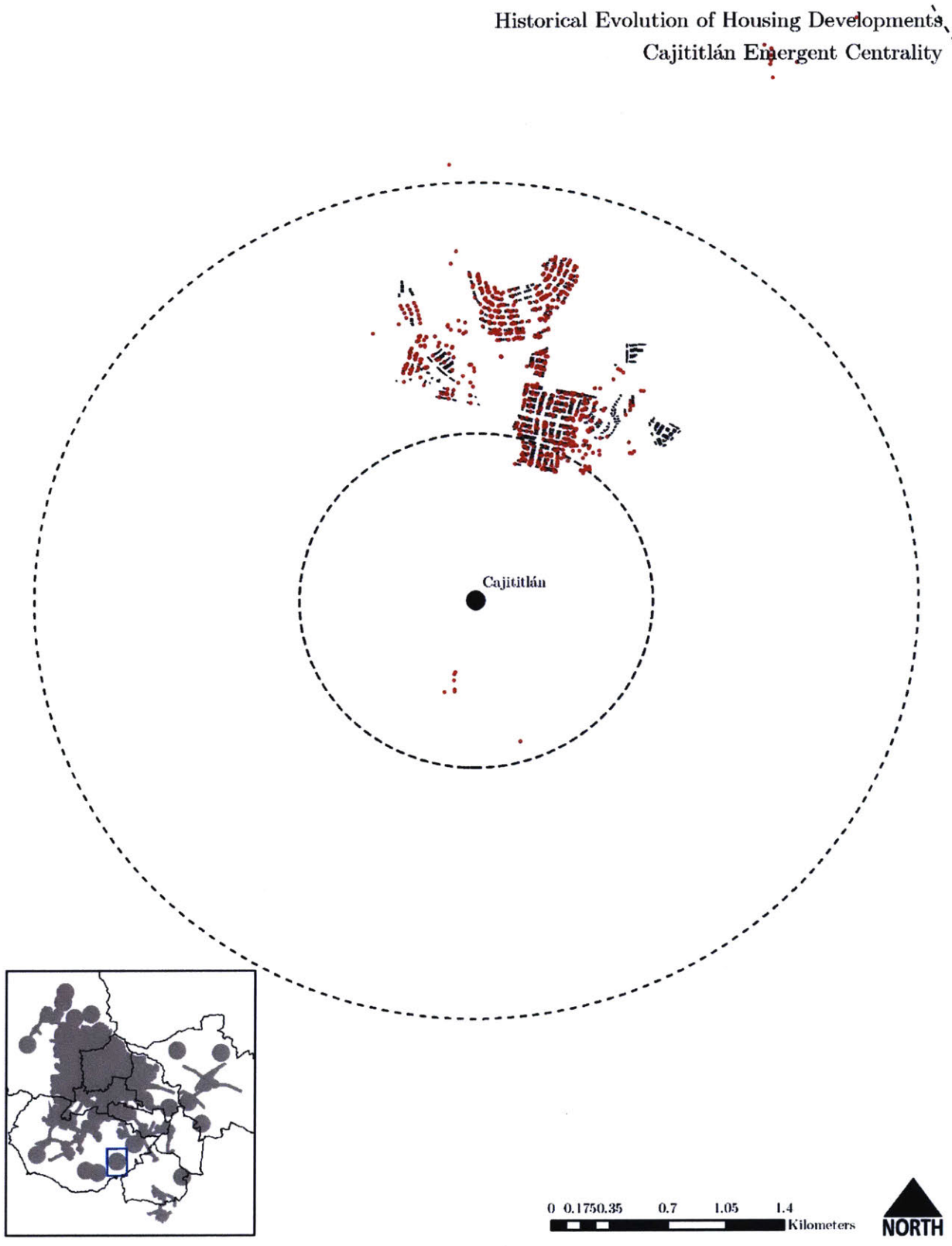
It is impossible to know if developers keep land reserves within emergent centralities because RUV keeps this information confidential. However, RUV has provided the geocoding of all recent housing developments within each emergent centrality built in Land Reserves that were previously registered in RUV. I obtained this information by developer and by emergent centrality. This is a good proxy to understand where developers keep their land reserves and how they develop them through time. The following maps show the relationship between land reserves, housing developments, abandonment and emergent centralities in the MAG. For confidentiality purposes, in the following maps I do not include any information that can help locate the name of the developer or the housing development.

Map 13 shows the evolution of pockets of land (previously registered as Land Reserves) by one particular developer in the emergent centrality of Cajatitlán. Frame 2013 shows the state of three developments by the same owner. Between 2013 and 2014, the developer expanded the development or built another one close that increased the housing area by 7%. By 2016, the developer expanded again by 5%. Surely, these increments are marginal, but we must consider that this is only developer that may be developing in this specific centrality. More relevant to the study is Map 14. This map shows how, by 2016, almost 38% of all houses built by the developer since 2013 were abandoned (note that parts developed in 2016 have 0% of abandonment, demonstrating that the effect of the "Antiquity" predictor in abandonment is true for the case). Having those high rates of abandonment, why would the developer continue building?

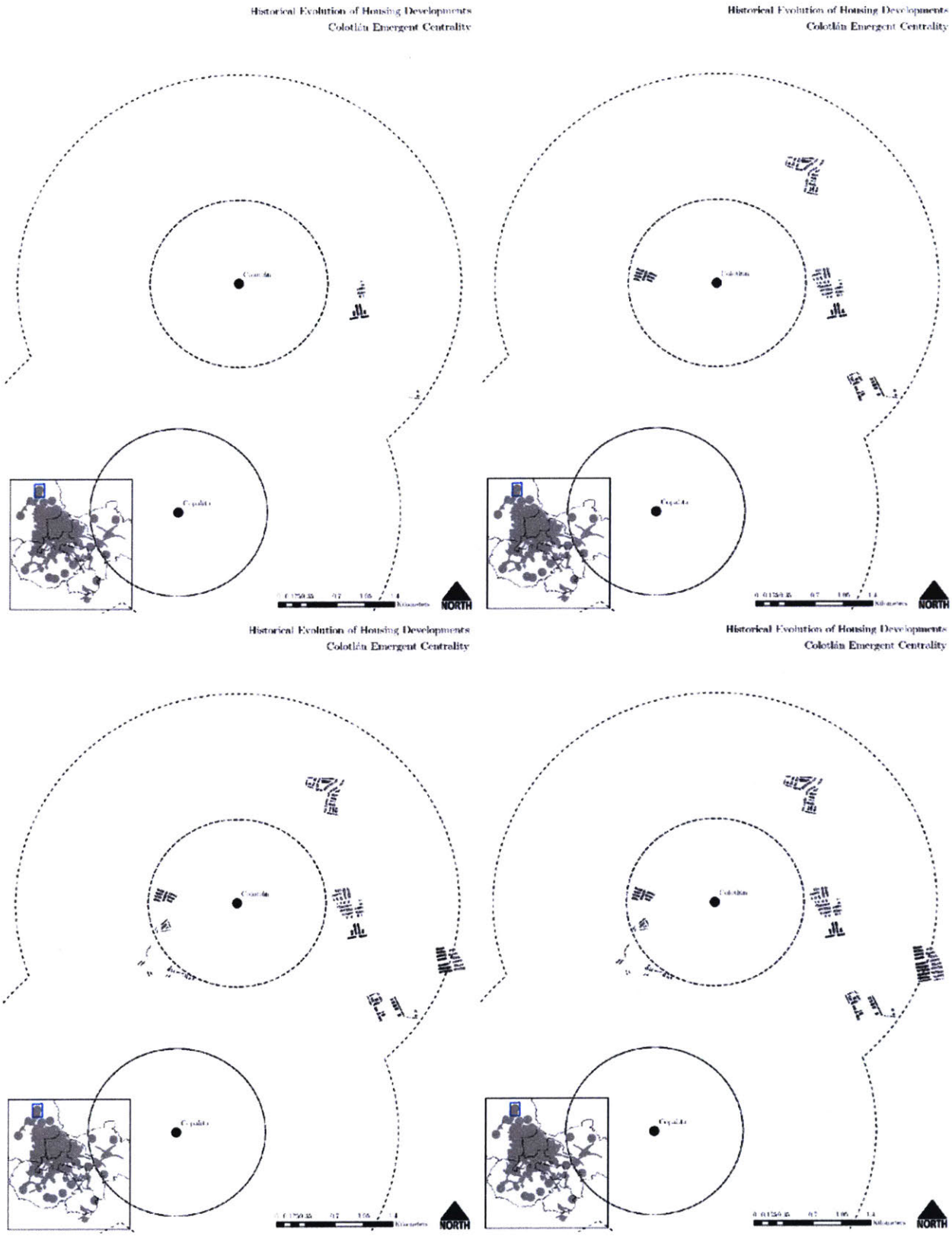
Map 15 shows another significant case: the emergent centrality of Coltlán. Here we can see how, prior to 2016, the same developer had acquired pockets of land scattering throughout the emergent centrality. The developer did not develop everything initially. In the span of 4 years, the developer increased the housing area in the centrality by almost 450%. In this case, the developer bought, built and sold one development, and continued to the next one until the first one was sold in 85% of its totality. Map 16 shows how abandonment is also present in these centralities. Here it is important to note how abandonment is mostly present outside these developers' developments. However, housing developments built by this developer have a rate of abandonment of 8%, above the average of the Metropolitan Area of Guadalajara.



Map 13 - Historical Evolution of Housing Developments in Cajatitlan, Developer 1
Source: Own elaboration based on RUV

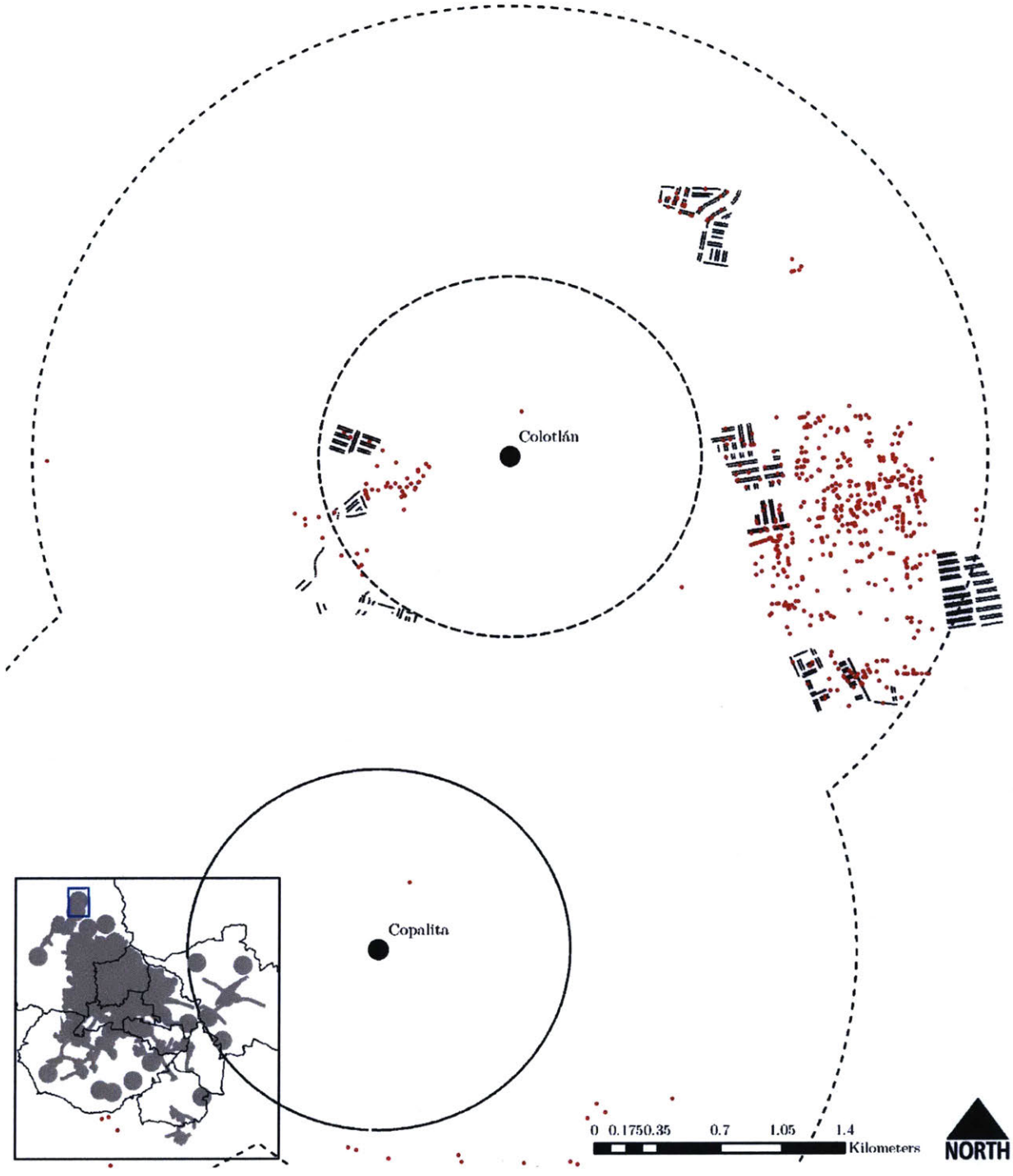


Map 14 - Abandonment in the Emergent Centrality of Cajatitlán
Source: Author's creation based on RUV



Map 15 - Historical Evolution of Housing Developments in Colotlán, Developer 2
Source: Author's creation based on RUV

Historical Evolution of Housing Developments
Colotlán Emergent Centrality



Map 16 - Abandonment in the Emergent Centrality of Colotlán
Source: Author's creation based on RUV

CHAPTER 5: Is the POTmet Going to Solve the Problem of Abandonment? An Interpretation of the Qualitative Analysis

Once the analysis of the interviews was contrasted with findings on the abandonment data and the analysis of the historic evolution of abandonment, I was able to derive three main conclusions. The first conclusion is that because the POTmet carries developers' interests in the housing strategy, its potential to reduce housing abandonment in the metropolitan area will be diminished. Second, there should not only be metropolitan-level planning to reduce abandonment, but the role of credit-holders' financial vulnerabilities in abandonment must be considered. Therefore, to reduce home abandonment in cities, programs like POTmet and the Land Reserve's Consolidation Program might not be enough, as they fail to target these individuals' financial issues. Social development policies that complement urban development policies need to be structured to target these vulnerabilities. Lastly, the process of elaboration of the POTmet exemplifies the importance metropolitan coordination has in addressing planning problems. Specifically, it serves as an example of how key stakeholders could convene conversations to improve the affordable housing system in cities and how they could reduce abandonment. It shows the importance of municipal planning capacities in broader regional issues.

In the following section I will discuss in depth the aforementioned conclusions.

5. Discussion on the Main Conclusions

The first conclusion carries implications of the potential success the POTmet will have in reducing home abandonment and broadly speaking, how we can learn from this experience to better develop plans and policies to reduce housing abandonment in Mexico.

Through the previous sections, I showed how private developers and INFONAVIT expressed their concern on new models of urban growth that restricted construction in areas of the city,

whether it was through limitations on access to federal subsidies or through complete construction restriction from municipal or metropolitan planning bodies, like IMEPLAN. These groups of action are based in the assumption that affordable housing cannot be provided under circumstances other than the existing ones. But from those interviews, it is also clear that these concerns are driven by the core interests these groups carry. Both groups understand that building in the periphery results in clusters of abandonment, because these areas are either under-developed or unserved by public services. However, these same groups have strong interests that go over their acknowledgement of abandonment. On one hand, INFONAVIT has an aggressive policy of credit allocation. This means that they actively look to increase the amount of credits issued in Guadalajara yearly and have credited housing developments developed in the periphery as a way to allocate these credits. On the other hand, private developers find it only financially feasible to build in the periphery of the city. Some developers have tried to build in the city center, but recognize the financial limitations that this presents.

On convening conversations with stakeholders involved in the affordable housing market, IMEPLAN settled the ground for them to bring their interests to the table. However, power dynamics were decisive in integrating all these efforts in the final plan. This is better seen in the informal interaction private developers and INFONAVIT had in building the POTmet. First, IMEPLAN and private developers were in conversations about the future of affordable housing planning in Guadalajara given the new POTmet that looked to bring more restrictions on housing construction. Of the developers who previously knew about IMEPLAN and POTmet, three confirmed that they were already in conversations with INFONAVIT to not allow more land restrictions in the area,

> *"... IMEPLAN had conversations with different institutions and civil groups here in Guadalajara. However we're in discussions with INFONAVIT to maintain the construction and credit allocation rhythms here in Guadalajara. We have*

seen other plans before to densify the city, this is not going to be different and we are not going to stop building."

Later on, municipalities convened conversations with developers about how best they both could keep building housing. These interests and those from INFONAVIT were later translated in the final conversations with IMEPLAN, where only municipalities were involved. The translation of these interests into the POTmet is illustrated in Diagram 4 and shows also the relevance of the relationship between INFONAVIT-developers and Municipalities. As shown, municipalities, through the Metropolitan Coordination Board (JCM) were entitled to approve or reject the plan, so the strategic approaches private developers had in communicating with the municipalities were crucial in approving the emergent centralities.

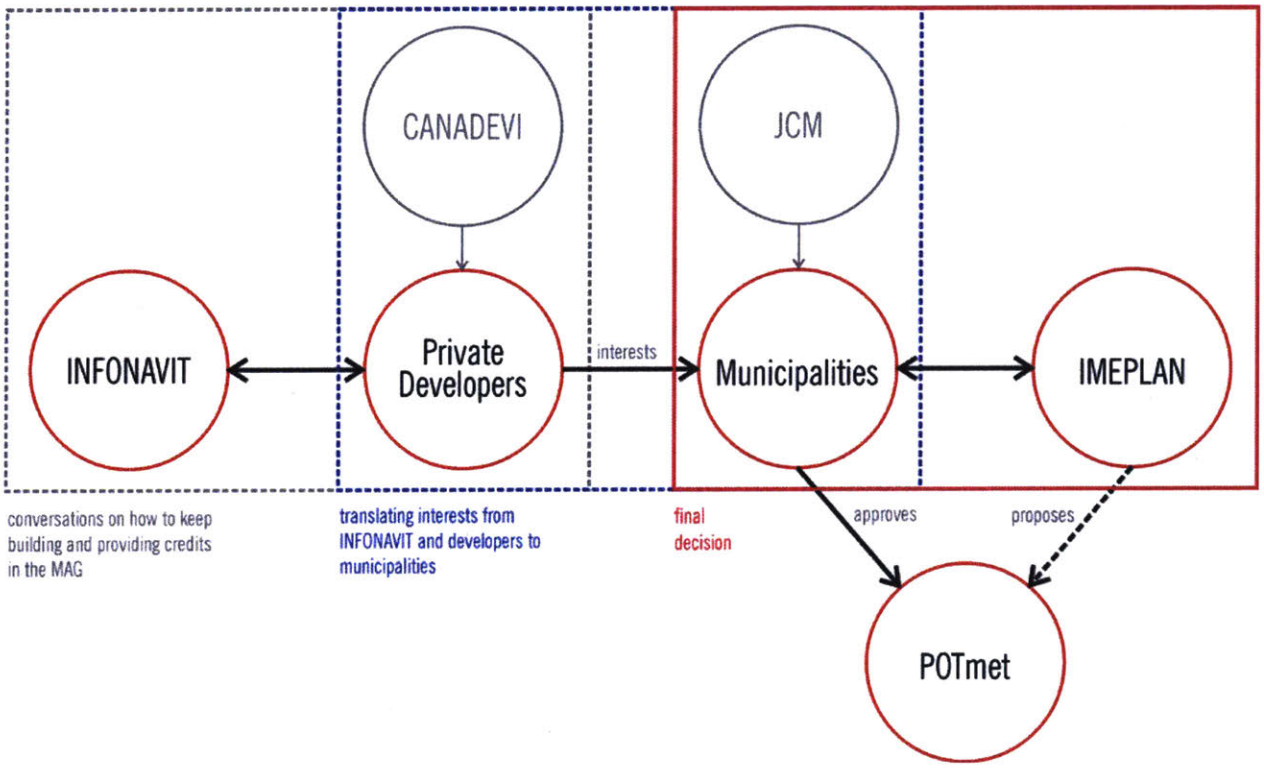
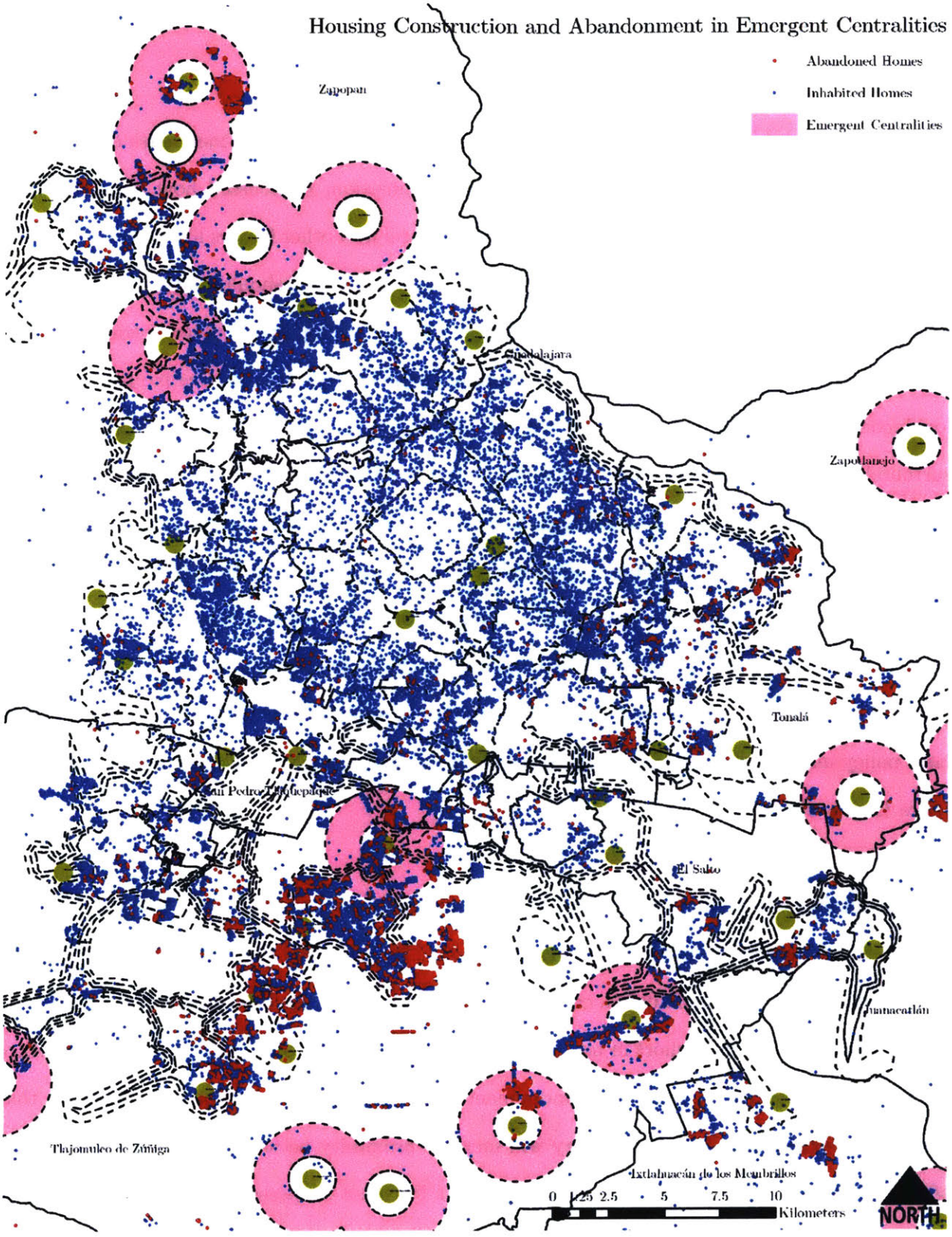


Diagram 5 - Translating interests into the POTmet
Sources: Author's creation based on interviews conducted with key stakeholders

The final result is a Metropolitan Plan that works very conveniently for developers and INFONAVIT. While it introduces a new way to understand city growth and offers new thinking regarding space, it may have little effect in reducing home abandonment. **If these interests continue to prevail, housing abandonment reduction is very unlikely to happen, based on the evidence of what triggers abandonment, how it has happened historically in Guadalajara, and current clustered abandonment patterns.**

Under this scenario, the POTmet will only incentivize more construction in the periphery, in areas that are currently underserved and that can't accept more housing developments. It will also incentivize the current system of credit allocation that works very well for INFONAVIT. In other words, the POTmet perpetuates the system that has produced the abandonment phenomenon historically in Mexican cities. It regulates where development can happen, creating different centers of growth, but these new centers are areas vulnerable to abandonment. This is best represented in Map 17. Here, we can see how clusters of abandonment are currently located in the emergent centralities where developers own land reserves. More importantly to note are those centralities that do not have any patterns of development yet, like the one in Zapotlanejo and those with minimal development in the south of Tlajomulco de Zúñiga, that the POTmet targets as areas where development can happen. Municipalities need to be careful in issuing construction permits here, as it is very likely that the patterns of abandonment present in neighboring centralities will replicate here.



Map 17 - Abandonment in Emergent Centralities
Source: Author's creation based on data from RUV, CIDS, INFONAVIT, INEGI and ESRI

A second conclusion comes from analyzing what determines abandonment in the MAG, and aims to discuss the necessary focus of abandonment policies.

To give a solution to the problem of home abandonment, the POTmet relies on strategies to select areas for future development. In the first conclusion, I discussed how these areas are limited in their capacity to develop affordable housing, and how other factors like political interests drive their existence. However, it is not only physical planning that should matter when thinking about abandonment. As data showed in Chapter 3, other important determinants of home abandonment rely on the financial vulnerabilities of credit-holders. Income, availability of jobs for low-income individuals, access to centers of job concentration, and unemployment in the surrounding areas where these individuals live, determine the probability of someone abandoning their home. These data shows two things: first, that more in-deep research needs to be done to understand what really determines abandonment in Guadalajara, so that future policies and programs, like POTmet, can incorporate strategies to target those factors; second, that it is important to analyze the problem of abandonment at the scale of action where policies are being issued. I agree with Francisco Lara that the variation of analysis through scales of action "affect how policy-makers, practitioners, and researchers understand problems and devise solutions" (Lara García 2016).

Regarding the factors surrounding housing abandonment, it is not clear how POTmet will address those financial vulnerabilities of credit-holders. In this sense, the POTmet's vision on how the city should grow ("a more dense, compact city" (IMEPLAN, Plan de Ordenamiento Territorial Metropolitano 2016)), falls short in understanding the complexities of abandonment factors, hence reducing its potential to achieve abandonment reduction. There may be an argument that restricting development in the periphery will increase proximity between households and centers of concentration. However, the new centralities that POTmet proposes are significantly far from areas that concentrate jobs, additional to the negative livelihood conditions presented in the first conclusion. **In addressing home abandonment, the POTmet is not only incentivizing a system**

that has triggered abandonment in Mexico for decades, but also locates areas for development that are "urbanistically indefensible"[31]

Additionally, another important observation on this conclusion is that future approaches in measuring abandonment should consider behavior at the development level. As Map 16 and Figure 6 showed, within a determined geographic area, housing developments can behave very differently even if they are in close proximity.

Finally, I want to recognize the importance of planning capacities in collective planning processes, and how the POTmet enhances such capacities. In the case of POTmet, it was actually not IMEPLAN who convened conversations across actors. It was municipalities, those entitled to planning capacities in Mexico, who brought everyone's interests in a single plan[32]. Unless modifications are made to the Article 115 of the Mexican Constitution, these planning capacities are unlikely to change in the near future. **Therefore, it is important that collective action planning is supervised and driven by municipal or metropolitan[33] bodies. The realm where these capacities live also speaks to the need of developing policies and strategies at this scale of action, and avoiding top-down solutions. In the case of Guadalajara, it is important that mayors take major action on strengthening their municipal planning capacities. This means that first, they need to see beyond the conventional forms of municipal urban planning that are limited to the elaboration of municipal development plans and to start thinking about the municipality as a component of the metropolitan area; second, they could bring participatory planning strategies where the community and academics can participate in project strategy and municipal need prioritization that can be later brought to discussion in meeting with the MCB; third, they need to build technical capacity and start developing strategies to measure the impacts of municipal policies**

[31] Referencing a concept introduced by Diane Davis in "Building Better Cities with Strategic Investments in Social Housing" (Davis, et al. 2016)

[32] Here, let's remember the importance the Metropolitan Coordination Board, formed by all municipalities, in approving the plan.

[33] Association of municipalities in the Mexican context.

and how they change over time. In the metropolitan setting, those municipalities with stronger planning capacities, like Guadalajara, need to bring their capacities to other less capable municipalities, helping them build their own. This might not be always the case and for different settings and objectives, collective approaches will be driven by other stakeholders, like in Davis's UVCP for INFONAVIT (Diane, Escobedo, et al. 2016).

CHAPTER 6: Moving Forward: What is next for IMEPLAN in the path to reduce home abandonment?

In the most fundamental sense, the research I presented aims to understand what accounts for the realities of abandonment in Mexico, and what changes in the mindset of planning are necessary for home abandonment reduction. The narratives studied to understand the development process of POTmet explain the reality of a complex planning problem that needs further and finer research to be completely understood.

My approach, however, helps explain what challenges or successes planning strategies that aim to address abandonment could face. **My research shows that the POTmet will face serious challenges in reducing home abandonment because it carries the same provision paradigm that has fostered the environment of abandonment in the country and in Guadalajara. Similarly, my research shows that by itself, the POTmet will not be able to address the problem without complementary strategies or policies that target important factors of abandonment that go beyond the spatial allocation of houses and credits, and the conditions of the built environment.** These determinants related to the financial vulnerabilities of credit-holders, need to be explored in more detail to propose those complimentary policies.

Overall, my research faces two main limitations that need to be recognized. The first one has to do with the statistical approach utilized to find the determinants of housing abandonment. While the model I built has a strong predictive capacity (ROC = 0.84), it needs to be reviewed and further verified through validating tests. The second limitation has to do with the proper assessment of the POTmet. It will take years to validate the veracity of my arguments and the challenges and successes the POTmet will face in reducing abandonment.

To finalize, my research also finds value in the way the POTmet was originated. The POTmet has proven the capacities metropolitan institutes and municipalities have in convening

conversations to address regional urban planning problems. The metropolitan government conditions surrounding the POTmet (political, social, economic) settle an environment of great opportunity for municipalities and stakeholders in the affordable housing market to be creative in planning policies and implementation strategies that can enhance the quality of affordable housing provision. Moving forward, this last chapter of my thesis presents immediate and long-term actions/policies that IMEPLAN, in coordination with key stakeholders, can implement to improve planning of affordable housing and reduce abandonment in the area.

But before introducing those final policy recommendations, I want to close with a final reflection drawn from analyzing the POTmet. Metropolitan coordination and planning are important elements of developing proper solutions to regional planning issues, such as housing planning and housing abandonment. By studying the POTmet, I learned that metropolitan planning needs to go beyond convening conversations and "aggregating" municipal development objectives. Doing so can lead in results like the POTmet, where metropolitan planning is not what is happening, but rather an aggregation of local priorities per municipality that might not deliver results at the metropolitan scale. Instead, as planners equipped with multidisciplinary perspectives on urban policy analyses, we have much to learn from these experiences and need to proceed cautiously when evaluating policies at the metropolitan level of action. We, as planners, need to ensure that varying interests are heard, but also ensure that we are navigating those interests as decision-makers in an effort to prioritize needs that can reflect the overall needs of the region

1. IMEPLAN should prioritize as major regional policies, the provision of regional transportation and the diversification of job centers.

Given the current conditions of the POTmet, the proposed emergent centralities will likely perpetuate patterns of abandonment in the region. At this point, if the Metropolitan Government wants to explore these areas as future areas of growth, they need to think about connecting them to the city center, creating a network around them and bringing jobs to them. As evidence shows,

access to services and transportation, and the lack of jobs or the lack of access to jobs, represent key reasons for abandonment. These are areas that currently, cannot provide these services.

Building over the POTmet, to make it a stronger plan against abandonment, IMEPLAN could consider different strategies to connect centralities with transportation. One, that is currently being explored, is the investment on Regional Rail or Light Rail. This is in fact a significant investment. However, IMEPLAN can directly access the Metropolitan Fund of the federal government, and they can provide funding for this project. Also, IMEPLAN can explore regional TOD. In the end, these centralities will work as poles of attraction, bringing new services, jobs and development. IMEPLAN could take advantage of this and use strategies like Land Value Capture to fund this project as well.

2. IMEPLAN should consider access to federal funding for affordable housing through federal programs like the Metropolitan Fund

As I mentioned in more detail in the first chapter, the current strategy in Mexico and Guadalajara to provide affordable housing is based on credit-allocation. More specifically, it is based on the amount of credit, savings and subsidies a right-holder can access. Early this year, CONAVI announced that they would restrict access to land-subsidies to individuals that earn less than 4VSM[34]. With fixed or fewer subsidies credit-holders can access, under the current provision system, the only ways low-income individuals can access better homes are either by increasing the amount of credit they can undertake, or by waiting longer before requesting credit, increasing their INFONAVIT savings.

It is somewhat logical that if we want to provide affordable housing, we can't expect low-income individuals to undertake higher loans. In the end, they will end up abandoning their loans and their homes. However, there are other federal resources Guadalajara could access to secure

[34] Currently, individuals earning equal or less than 5VSM can access CONAVI'S land subsidy

affordable housing for low-income individuals. IMEPLAN could secure federal funding that can be used to subsidize housing purchases for low-income individuals. But this federal funding should target places that can help individuals ease the burden of undertaking a loan, in better located areas, with diverse land uses.

Through the POTmet, IMEPLAN could access federal subsidies from the Federal Metropolitan Fund (FMF). The Plan can be accredited on three of the six conditions from the FMF Terms of References (SHCP 2016), particularly the one that states that the Metropolitan Fund can be used to "*Acquire land reserves (...) to develop works, projects and plans that aim to develop metropolitan areas*". In 2016, the MAG issued 19,000 credits approximately, for which 65% targeted low-income individuals (INFONAVIT 2017, CONAVI 2016). Of those credits, 45% received at least the minimum amount of subsidy from CONAVI (around 30,000 Mexican Pesos). If IMEPLAN gets access to the Metropolitan Fund, money from the fund can be used to subsidize land in Guadalajara, and it can be assigned to those who can't access to the land subsidy (even if they are low-income individuals) or to those who receive some subsidy but not enough to buy a house in a well-located area.

3. IMEPLAN should rethink its core strategy of affordable housing allocation.

The current growth model IMEPLAN proposes in the POTmet in which affordable housing can be allocated in emergent centralities, only responds to interests from INFONAVIT and developers. IMEPLAN needs to rethink the system of affordable housing allocation, considering that municipalities are the ones who issue construction permits and openly, some have admitted the economic importance of this.

A good strategy is from the UVCP platform, where the IMEPLAN director can serve as convener and mediator of meetings, but also decision-maker that looks for the metropolitan needs and conveniences (Davis, Escobedo, et al. 2016). During the meetings with the Metropolitan

Coordination Board, IMEPLAN can bring the discussion of where municipal investments for affordable housing should be allocated, including site selection and credit allocation. IMEPLAN already has a strong GIS platform that can incorporate the UVCP suggested metrics, or elaborate their own building based on those metrics. In the end, what IMEPLAN needs to consider is how housing can be planned in more land use diverse places that can currently provide urban services as to avoid abandonment. This strategy or whatever metrics IMEPLAN implements, should not be driven by the same interests that have brought home abandonment to cities.

Also, IMEPLAN could further explore allocation and planning strategies even if they seem financially infeasible. Along this line, IMEPLAN should study and analyze how to successfully replicate affordable housing allocation near transit stations, as it has been done in the past by some private developers in Guadalajara (See Chapter 4, section 2.2). Diagram 5 revises the process of TOD implementation in Guadalajara and what financial strategies IMEPLAN can use to make it feasible.

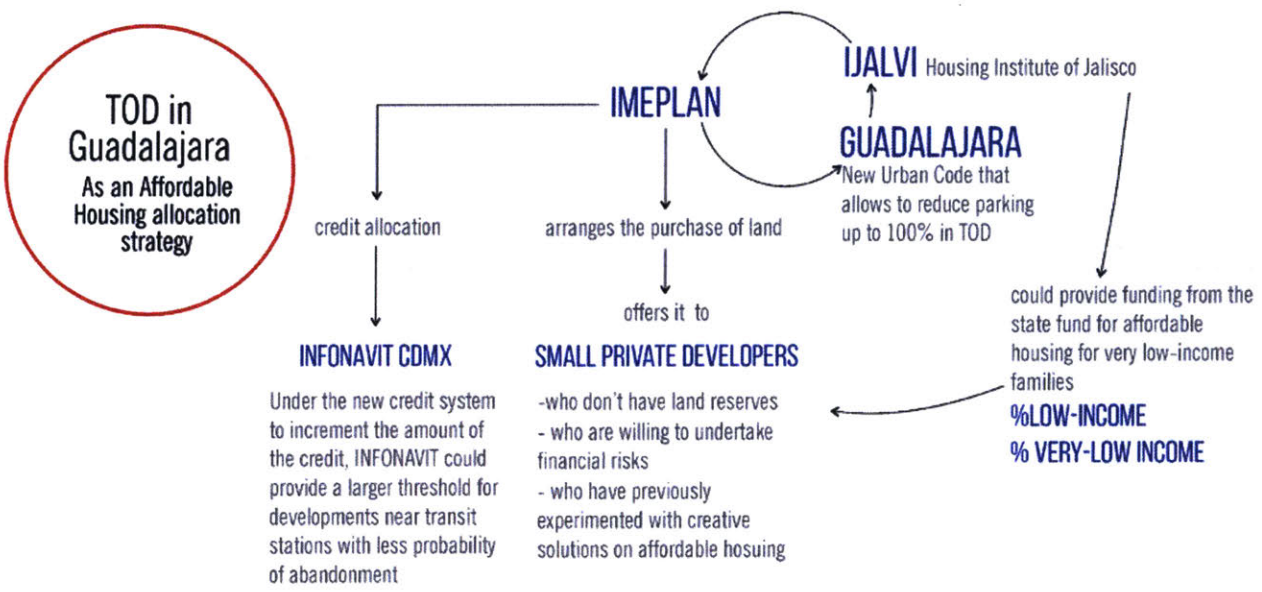


Diagram 6 – Proposal for TOD coordination in Guadalajara
Sources: Own elaboration

4. In-depth research needs to be conducted to understand the complexities of home abandonment in Guadalajara and other Mexican Cities.

As I noted before, my statistical approach of measuring abandonment factors has some procedural weaknesses. But more importantly, the analysis of data both from the model and geographically brings new evidence that the problem of abandonment, at least in Guadalajara, is very complex. Analysis should be done at the development level, to understand why some result in abandonment while others in close proximity do not result in abandonment. This might be analyzed through the qualitative conditions of the houses or the antiquity of the development. However, more complex issues could explain this behavior, such as specific types of amenities developers provide within a housing development, or community engagement and development programs that they implement with the families arriving. A good example of this is San Carlos Developers, who since the first decade of 2000, have implemented a program of community engagement in all of their developments. Also, INFONAVIT has incorporated similar efforts through *Fundación Hogares*, to strengthen community networks. These, among other effects, need to be explained at the development level.

5. INFONAVIT needs to rethink the way they allocate credits, whether it is based on geographic principles or through different programs of crediting.

It's important that INFONAVIT reconsiders the current system of credit allocation. Evidence shows that this system directly affects the rates of abandonment in cities. Further studies on the financial capacities of credit-holders and their needs must be done by INFONAVIT or CIDS to better understand how they can allocate their credits or target specific needs. INFOANVIT's credit programs have diversified recently, including a renting program. Renters, a market that INFONAVIT has not yet explored enough, might be one solution to the abandonment problem, as people can re-allocate according to their needs.

Another area of improvement for INFONAVIT is how credits are geographically allocated in cities. Public officials at INFONAVIT Mexico City Offices have shared their concerns about the high rates of abandonment in Mexican cities, and how this is reflected in the high rates of non-performing loans the Institute carries out. Particularly, a representative from a department that oversees abandonment mentioned that,

> *"... One of the problems that we have here in INFONAVIT is that we can't influence where credit-holders buy their houses. We provide guidance when they're in the process of obtaining the credit, and we recommend that they think carefully about where they are investing their money. Unfortunately, they sometimes feel set on buying a house when visiting it in a development, or developers trick them into buying a house. We need to have more influence on that and rethink how we distribute those credits and how we can avoid placing them where they will eventually stop paying them".*

Along this line, I propose that INFONAVIT explores a strategy to allocate credits based on geographic conditions, using Guadalajara as a pilot city. Geographic allocation is important because INFONAVIT needs greater awareness of pre-existing conditions[35] or existing conditions at the moment of construction of the housing development that can influence abandonment. Also, INFONAVIT needs to be aware that one non-performing loan that ends up in abandonment can create a spillover effect in neighboring houses, resulting in larger-scale abandonment. Figure 6 shows this effect graphically. This geographic allocation strategy would be based in a single principle: invest more in areas where the likelihood of abandonment is lower. This means that INFONAVIT could make a flexible scoring system to assign credit to those individuals that invest in areas where abandonment is less likely to happen.

[35] Built-environment conditions or individual specific characteristics that INFONAVIT cannot control, and that they failed to target in the screening process of verifying developments as suitable for INFONAVIT credits.

BIBLIOGRAPHY

(2) Cabrero Mendoza, Enrique. 2000. *Los Dilemas de la Decentralización en México.* Centro de Investigación y Docencia Económica and l'École Normale Supérieure de Cachan, Programa de colaboración: ECOS/Anuies/Conacyt.

Ackermann, Klaus, Eduardo Blancas Reyes, Sue He, Thomas Keller , Paul van der Boor, and Romana Khan. 2015. "Reducing Home Abandonment in Mexico." *Bloomberg Data for Good Exchange Conference* 7.

Arellano Ríos, Alberto. 2014. "La Condición Política de la Coordinación Metropolitana en Guadalajara, México." *Revista Estado, Gobierno, Gestión Pública* 89-119 .

Arias, Adrián. 2015. "Abandonadas, 119,960 viviendas; no se ocupan ni en remate: CIDOC." *La Crónica Web site.* 02 09. Accessed 03 21, 2017. http://www.cronica.com.mx/notas/2015/882585.html.

Basset, Ellen M., John Schweitzer, and Sarah Panken. 2006. *Understanding Home Abandonment and Owner Decision-Making in Flint, Michigan: An Exploratory Analysis.* Michigan: Lincoln Institute of Land Policy.

Boils, Guillermo. 2004. "El Banco Mundial y la política de vivienda en México." *Revista Mexicana de Sociología* 345-367.

C230 Consultores. 2012. *Estudio Nacional de Vivienda Deshabitada, Fase II: causas de deshabitación.* Policy Report, Mexico City: INFONAVIT.

Cabrero Mendoza, Enrique. 2010. "Government and Local Policy in Mexico: Lights and Shades of the Decentralization Reforms." *Política y Sociedad* (Centro de Investigación y Docencia Económicas (CIDE)) 47 (3): 165-186.

Camara de Diputados del H. Congreso de la Unión. 1972. *Ley del Instituto del Fondo Nacional de la Vivienda para los Trabajadores.* Policy Document, Mexico City: Diario Oficial de la Federación.

Cantera, Sara. 2017. "INFONAVIT aumenta el monto máximo de su crédito." *El Universal.* 04 04. Accessed 05 11, 2017. http://www.eluniversal.com.mx/articulo/cartera/finanzas/2017/04/4/infonavit-aumenta-el-monto-maximo-de-su-credito.

Cárdenas Mendoza, Manuel. 2014. "Primer Director General del IMEPLAN: Alberto Orozco Ochoa." *Seminario Conciencia Pública.* http://concienciapublica.com.mx/personalidades/primer-director-general-de-imeplan-alberto-orozco-ochoa/.

Carrasco Soto, Horacio. 2012. "Viviendas abandonadas, una historia de crisis e inseguridad." *El diario.mx.* 12 15. Accessed 04 01, 2017. http://diario.mx/Local/2012-12-15_b43d8890/viviendas-abandonadas-una-historia-de-crisis-e-inseguridad/.

CIDOC. 2004. *Estado Actual de la Vivienda en México 2004.* Summary Report, Mexico City: CIDOC.

CIDOC. 2005. *Estado Actual de la Vivienda en México 2005.* Summary Report, Mexico City: CIDOC.

CIDOC. 2006. *Estado Actual de la Vivienda en México 2006.* Summary Report, Mexico City: CIDOC.

CIDOC. 2007. *Estado Actual de la Vivienda en México 2007.* Summary Report, Mexico City: CIDOC.

CIDOC. 2009. *Estado Actual de la Vivienda en México 2009.* Summary Report, Mexico City: CIDOC.

—. 2015. *Estado Actual de la Vivienda en México 2015.* Edited by Editorial Program of the Republic Government. Mexico City: Mexican Library for the Knowledge.

—. 2016. "Estudios y Publicaciones." *Fundación CIDOC, Centro de Investigación y Documentación de la Casa, A.C.* . Accessed 04 08, 2017. http://www.cidoc.org/publicaciones.php.

CIDS. 2017. *Registry of all households developed since 2010 and for which ECUVE was calculated.* Mexico City, 04 15.

—. 2016. *Vivienda.* Mexico City: INFONAVIT.

Comisión de Asuntos Metropolitanos LX Legislatura. 2012. *Programa anual de trabajo de la Comisión de Asuntos Metropolitanos para el año 2013.* Guadalajara: Gaceta del Estado de Jalisco.

Comité Organizador del Foro. 1995. *Foro Nacional: Hacia un Auténtico Federalismo (Memory).* Guadalajara.

CONAPO. 2010. *Índice de Marginación por Entidad Federativa y Municipio 2010.* Policy Report, Mexico City: CONAPO Publishing.

CONAPO. 2012. *Sistema Urbano Nacional 2012.* Policy Report, Ciudad de México: Secretaría d Desarrollo Social.

CONAVI. 2016. "Datos Abiertos - Financiamiento de Vivienda." *Sistema Nacional de Información e Indicadores de Vivienda.* Accessed 03 27, 2017. http://sniiv.conavi.gob.mx/Financiamientos/DescargaFinan.aspx.

CONAVI. 2015. *Modelo Geoestadístico para la Actualización de los Perímetros de Contención Urbana 2015.* Presentation, Mexico City: SEDATU.

CONEVAL. 2015. *Medición de la pobreza en México y en las Entidades Federativas 2014.* Summary Presentation , Mexico City: CONEVAL.

Congreso Constituyente. 1917. *Constitución Política de los Estados Unidos Mexicanos.* Political Constitution, Mexico City: Diario Oficial de la Federación. http://www.sct.gob.mx/JURE/doc/cpeum.pdf.

Congreso de los Estados Unidos Mexicanos. 1931. *Ley Federal del Trabajo.* Law, Mexico City: Diario Oficial de la Federación. http://www.diputados.gob.mx/LeyesBiblio/pdf/125_120615.pdf.

—. 1976. "Ley General de Asentamientos Humanos." Mexico City: Diario Oficial de la Federación.

Congreso del Estado de Jalisco. 2008. *Código Urbano para el Estado de Jalisco.* Guadalajara: Gaceta del Estado.

Croissant, Yves. 2011. *Estimation of multinomial logit models in R: The mlogit Packages.* Paper, Saint-Denis Messag: Université de la Réunion.

Davis, Diane E. 2016. *Building Better Cities with Strategic Investments in Social Housing.* Policy Report, Cambridge: Harvard Graduate School of Design.

Davis, Diane E., Nélida Escobedo, Ann Forsyth, and Margaret Scott. 2016. *Building Better Cities with Strategic Investments in Social Housing.* Policy Report, Cambridge: Harvard Graduate School of Design.

del Castillo, Agustín. 2014. "Denuncian "vicios de origen" en instituto metropolitano." *Milenio.*

Del Castillo, Agustín. 2016. "Zapopán impone Colotlán en el POTmet." *Milenio.* 07 04. Accessed 05 12, 2017. http://www.milenio.com/region/Zapopan-impone-Colotlanen-POTmet_0_767923242.html.

Diane, Davis. 2016. *Rethinking Social Housing in Mexico.* Cambridge: Harvard Graduate Schoold of Design.

Diane, Davis, Nélida Escobedo, Ann Forsyth, and Margaret Scott. 2016. *Rethinking Social Housing in Mexico.* Cambridge: Harvard Graduate Schoold of Design.

Díaz Cayeros, Alberto, and Sergio Silva Castañeda. 2004. *Decentralización a escala municipal en México: la inversión en infraestructura social.* Unidad de Desarrollo Social, Comisión Económica para América Latina y el Caribe, Mexico City: United World Nations, 20.

El Informador. 2014. "Alberto Orozco es el director del IMEPLAN." *El Informador.* http://www.informador.com.mx/jalisco/2014/516339/6/alberto-orozco-es-el-director-del-imeplan.htm.

El Informador. 2014. "Arranca el Instituto Metropolitano, buscan dierctor." *El Informador.*

El Informador. 2012. "Estado y municipios crean Instituto Metropolitano de Planeación." *El Informador.*

El Informador. 2012. "Falta de coordinación frena al Instituto Metropolitano." *El Informador.* http://www.informador.com.mx/jalisco/2012/405240/6/falta-de-coordinacion-frena-al-instituto-metropolitano.htm.

—. 2012. *Guadalajara define su agenda metroplitana.* 10 11. Accessed 03 21, 2017. http://www.informador.com.mx/jalisco/2012/410620/6/guadalajara-define-su-agenda-metropolitana.htm.

EL INFORMADOR. 2010. "Necesario, un nuevo modelo: Emilio." *Informador.mx.* Guadalajara, Jalisco, 03 04. http://www.informador.com.mx/jalisco/2010/183168/6/necesario-un-nuevo-modelo-emilio.htm.

Enríquez Acosta, Jesús, and Sarah Bernal Salazar. 2013. *Vulnerabilidad Social y Vivienda en Sonora, México.* Ciudad Juárez}: Universidad Autónoma de Juárez.

EXPANSIÓN. 2010. "Infonavit reasignará vivienda abandonada." *Expansión, En Alianza con CNN.* 02 14. Accessed 04 01, 2017. http://expansion.mx/economia/2010/02/14/infonavit-reasignara-vivienda-abandonada.

Fernández Reyes, Santiago. 2016. *Station-level ridership on Mexico City's Subway and BRT.* Masters Thesis, Cambridge: Massachusetts Institute of Technology.

Finot, Iván. 2001. *Decentralización en América Latina: teoría y práctica.* Comisión Económica para América Latina y el Caribe, Instituto Latinoamericano y del Caribe de Planificación Económica y Social - ILPES, Santiago de Chile: United World Nations, 133.

Fuentes, César M., and Vladimir Hernández. 2014. "Housing finance reform in Mexico: the impact of housing vacancy on property crime." *International Journal of Housing Policy* 368-388.

García Moreno, Gabriel. 2012. *El abandono de la vivienda como consecuencia de la delincuencia e inseguridad urbanas.* Masters Thesis, Ciudad Juárez: INFONAVIT - REDALYC.

—. 2012. *El Abandono de Vivienda como Consecuencia de la Delincuencia e Inseguridad Urbanas.* Mexico City: INFONAVIT - REDALYC.

Gobierno de Guadalajara. 2016. *Reglamento para la gestión integral del Municipio de Guadalajara.* Policy Report, City of Guadalajara: Gaceta Municipal.

Gobierno del Estado de Jalisco. 2014. *Estatuto Orgánico de las Instancias de Coordinación Metropolitana del Área Metropolitana de Guadalajara.* Guadalajara: Periódico Oficial del Estado de Jalisco.

Gobierno del Estado y Municipios. 2014. *Convenio de Coordinación Metropolitana del Área Metropolitana de Guadalajara.* Guadalajara: NA.

Gómez, Ricardo. 2015. *Ordenamiento y Desarrollo, prioridades del IMEPLAN.* 10 16. Accessed 04 05, 2017. http://www.cronicajalisco.com/notas/2015/53760.html.

Han, Hye-Sung. 2013. *A longitudinal analysis of the linear and nonlinear impacts of housing abandonment on neighborhood property values.* Doctoral Thesis, University of North Carolina Chapel Hill.

Hillier, Amy E., Dennis P. Culhane, Tonny E. Smith, and C. Dana Tomlin. 2003. "Predicting Housing Abandonment with the Philadelphia Neighborhood Information System." *Journal of Urban Affairs* 91-105.

Housing Single Registry. 2017. *Universe of Houses in Mexico since 2008.* Mexico City, 03 15.

IMEPLAN. 2016. "Gobierno de Tonalá, México." Vers. IIIFB. *Gobierno de Tonalá.* Edited by IMEPLAN. IMEPLAN. Accessed 03 20, 2017. http://tonala.gob.mx/portal/assets/Mapas%20POTmet.pdf.

—. 2016. *Plan de Ordenamiento Territorial Metropolitano.* Guadalajara: IMEPLAN.

INEGI. 2010. *Censo y Conteo de Población y Vivienda 2010, Tabulados Principales.* Mexico City: INEGI. Accessed 12 11, 2016.

INEGI. 2012. *Resultados de la encuesta de verificación de viviendas deshabitadas y de uso temporal del Censo de Población y Vivienda 2010.* INEGI, Mexico City: INEGI, 50.

INFONAVIT. 2012. *Estudio Nacional de Vivienda Deshabitada Fase II: cuasas de deshabitación.* Internal Policy Report, Mexico City: INFONAVIT.

—. 2017. "Indicadores Operativos." *INFONAVIT Web Site.* Accessed 03 15, 2017. http://portal.infonavit.org.mx/wps/wcm/connect/infonavit/el+instituto/infonavit_en_cifras/indicadores_operativos/indicadores+operativos.

INVESTING. 2017. "Habita (IH)." *Investing.com Web site.* Accessed 04 07, 2017. https://mx.investing.com/indices/habita-historical-data.

ITDP. 2014. *TOD Standard.* Policy Report, Washington, DC: ITDP.

King, Gary, and Langche Zeng. 2001. "Logistic Regression in Rare Events Data." *Society for Political Methodology* 137-163.

Lara García, Francisco. 2016. *¿Te vas o te quedas? Variations in Explanations for Housing Abandonment in Tijuana, Mexico.* Cambridge, Massachusetts: Harvard Graduate School of Design.

Lee, Dukjae. 2013. "A Comparison of Choice-based Landscape Preference Models between British and Korean Visitors to National Parks." *Life Science Journal* 2028-2036.

LIX Congreso del Estado de Jalisco . 2011. *Ley de Coordinación Metropolitana del Estado de Jalisco.* Guadalajara: Gobierno del Estado de Jalisco.

Marcuse, Peter. 1985. "Gentrification, Abandonment, and Displacement: Connections, Causes and Policy Responses in New York City." *Journal of Urban and Contemporary Law* 28: 195-240.

McFadden, Daniel. 1978. "Quantitative Methods for Analysing Travel Behaviour of Individuals: Some Recent Developments." In *Behavioural Travel Modeling*, by David A. Hensher and Peter R. Stopher, 279-318. Connecticut: Yale University .

Méndez, José Luis, María del Carmen Prado, Manuel Alejandro González Arreola, Alonso Cerdán Verástegui, Ernesto Velasco Sánchez, and José Luis Méndez. 2006. *El Proceso de Modernización en el INFONAVIT 2001-2006, Estrategia, Redes y Liderazgo.* Edited by Maria del Carmen Prado and Ernesto Velasco Sánchez. Mexico City: El Colegio de México.

Milenio Jalisco. 2014. "IMEPLAN nace con las aportaciones pendientes." *Milenio.* http://www.milenio.com/region/Imeplan-nace-aportaciones-pendientes_0_248975143.html.

Monkkonen, Paavo. 2009. *The Housing Transition in Mexico: Local Impacts of National Policy.* PhD Thesis, Berkeley: Institute of Business and Economic Research, Fisher Center for Real Estate and Urban Economics.

Monkkonen, Paavo. 2014. *The Role of Housing Finance n Mexico's Vacancy Crisis.* Working Paper, Los Angeles: UCLA Luskin School of Public Affairs.

Monroy, Jorge. 2016. "Infonavit busca acabar con la vivienda abandonada." *El Economista Web site.* 11 22. Accessed 03 15, 2017. http://eleconomista.com.mx/sistema-financiero/2016/11/22/infonavit-busca-acabar-vivienda-abandonada.

Morckel, Victoria. 2014. "Predicting Abandoned Housing: Does the Operational Definition of Abandonment Matter?" *Community Development* 13.

Nikola Vujic, Suncica. 2009. *Econometric Studies to the Economic and Social Factors of Crime.* Amsterdam: Tinbergen Institute Research Series.

OECD. 2015. *OECD Urban Policy Reviews: Mexico 2015: Transforming Urban Policy and Housing Finance.* OECD Publishing.

Ordoñez Barba, Gerardo, and Marcos Sergio Reyes Santos. 2006. *Los retos de la política social en la frontera norte de México.* Tijuana: El Colegio de la Frontera Norte.

P. Montero, Alfred, and David J. Samuels. 2004. *Decentralization and Democracy in Latin America.* Notre Dame, Indiana: University of Notre Dame Press.

Patricio Bouillon, César. 2012. *Un espacio para el desarollo: los mercados de vivienda en América Latina y el Caribe.* Edited by César Patricio Bouillon. Washington, D.C.: Banco Interamericano de Desarrollo.

Pérez Viramontes, Gerardo, José Bautista Farías, and Carlos Armando Peralta Varela. 2015. *Conflictividad y Empoderamiento en Agrupaciones Sociales Contemporáneas.* Guadalajara: Instituto Tecnológico y de Estudios Superiores de Occidente.

Pineda Pablos, Nicolás. 1994. "La decentralización fiscal en México." Edited by El Colegio de México. *Foro Internacional* (EL Colegio de México) 34 (2): 252-268.

Portfolio Management Department, and Credit Department. 2017. *Historic of Credits lent by INFONAVIT since 2008.* Mexico City, 03 15.

Portfolio Management Department, INFONAVIT. 2017. *Total number of abandoned homes by 2017.* Mexico City, 04 15.

Presidency of Mexico. 2001. *2001-2006 National Development Plan.* Policy Document, Mexico City: Presidency of Mexico.

Raleigh, Erica, and George Galster. 2014. "Neighborhood Disinvestment, Abandonment and Crime Dynamics." *Journal of Urban Affairs* (Journal of Urban Affairs) 367-396.

Reyes, Carolina, and Eduardo Cabrera. 2013. "Vecinos en Fuga; crece el número de casas abandonadas." *EXCELSIOR Web site.* 12 16. Accessed 03 18, 2017. http://www.excelsior.com.mx/nacional/2013/12/16/934011.

Reyes, Juan Manuel. 2012. "Dejan 25 mil casas en Tamaulipas por la inseguridad." *EXCELSIOR Web site.* 07 22. Accessed 04 09, 2017. http://www.excelsior.com.mx/2012/07/22/nacional/849191.

RUV. 2017. *Registry of all households since 2008 captured in the Single Housing Registry.* Mexico City, 02 15.

Salinas Cesáreo, Javier. 2015. "Abandonadas, al menos 400 mil viviendas financiadas por el Infonavit en el Edomex." *La Jornada Web site.* 02 11. Accessed 03 21, 2017. http://www.jornada.unam.mx/2015/02/11/estados/031n1est.

Sánchez, Landy, and Clara Salazar. 2011. *Lo que dicen las viviendas deshabitadas sobre el censo de población 2010.* Academic Report, Mexico City: Coyuntura Demográfica.

Sandoval Alarcón, Francisco. 2012. "Familias abandonan 2 millones de viviendas por no poder pagarlas." *Animal Politico Web site.* 02 8. Accessed 04 01, 2017. http://www.animalpolitico.com/2012/02/familias-abandonan-2-millones-de-viviendas-por-no-poder-pagarlas/.

Scafidi, Benjamin P. 1998. "An Economic Analysis of Housing Abandonment." *Journal of Housing Economics* 287-303.

Schteingart, Martha, and Beatriz García. 2006. "Nuevas políticas de vivienda en México. Nuevas relaciones entre sector público y privados y retos para el futuro." In *La vivienda en México: construyendo análisis y propuestas*, by Adriana Borjas Benavente and Mónica Bucio Escobedo, 39-50. Mexico City: Centro de Estudios Sociales y de Opinión Pública.

SEDATU. 2014. *Programa Nacional de Vivienda 2014-2018.* Policy Document, Mexico City: Diario Oficial de la Federación.

SEDATU. 2016. *Reglas de Operación del Programa de Acceso al Financiamiento para Soluciones Habitacionales, para el ejercicio fiscal 2017.* Policy Report, Mexico City: Diario Oficial de la Federación.

SEDATU. 2016. *Reglas de Operación del Programa de Consolidación de Reservas Urbanas, para el ejercicio fiscal 2016.* Policy Document, Mexico City: Diario Oficial de la Federación.

SEDESOL. 2012. *La expansión de las ciudades 1980-2010.* Mexico City: SEDESOL.

SEDESOL, CONAPO, and INEGI. 2010. *Delimitación de las Zonas Metropolitanas de México 2010.* Policy Report, Mexico City: Secreyaría de Gobernación.

SEGOB. 2014. *Programa Nacional de Vivienda 2014-2018.* Policy Report, Mexico City: Mexican Federal Government.

SHCP. 2016. *Reglas de Operación del Fondo Metropolitano.* Policy Report, Mexico City: Diario Oficial de la Federación.

Toca Fernández, Antonio. 2013. "¿Quién es responsable del abandono de vivienda?" *Obras Web.* 05 07. Accessed 04 09, 2017. http://www.obrasweb.mx/vivienda/2013/05/07/quien-es-responsable-del-abandono-de-vivienda.

Tucker, Andrae M. 2013. *Determinates of Urban Housing Abandonment and Homesteading* . Master Thesis, New Brusnwick: Rutgers, The State University of New Jersey.

Villaseñor, Thamara. 2016. "Aprueban Oficialmente el Plan de Ordenamiento Territorial." *El Informador.* 06 27. Accessed 03 19, 2017. http://www.informador.com.mx/jalisco/2016/669121/6/aprueban-oficialmente-el-plan-de-ordenamiento-territorial.htm.

Villavicencio Blanco, Judith, and Ana María Durán Contreras. 2003. "Treinta Años de Vivienda Social en la Ciudad de México: Nuevas Necesidades y Demandas." *Scripta Nova, Revista Electrónica de Geografía y Ciencias Sociales.* http://www.ub.edu/geocrit/sn/sn-146(028).htm.

White, Michelle J. 1986. "Property Taxes and Urban Housing Abandonment." *Journal of Urban Economics* 312-330.

Wilson, David, and Harry Margulis. 1994. "Spatial aspects of housing abandonment in the 1990s: The Cleveland experience." *Housing Studies* 493, 18.

World Bank. 2017. "Data Bank | Health, Nutrition and Population Statistics: Population Estimates." *The World Bank Web Site.* Accessed 03 26, 2017. http://databank.worldbank.org/data/reports.aspx?source=Health%20Nutrition%20and%20Population%20Statistics:%20Population%20estimates%20and%20projections#.

Zegras, Christopher P. 2005. *Sustainable Urban Mobility: Exploring the Role of the Built Environment.* PhD Thesis, Cambridge: Massachusetts Institute of Technology.

Appendix A

Descriptive Data of the Metropolitan Area of Guadalajara

Municipality	Housing Units Built since 2010	Percentage
Tlajomulco De Zuñiga	111761	41.84%
Zapopan	40530	15.17%
Tonala	22422	8.39%
Tlaquepaque	17725	6.64%
Ixtlahuacan De Los Membrillos	13856	5.19%
El Salto	12103	4.53%
Guadalajara	10207	3.82%
Tala	7311	2.74%
Lagos De Moreno	5389	2.02%
Juanacatlan	5230	1.96%

Table 2 - Municipalities with the highest concentration of affordable housing in Jalisco
Source: Own elaboration based on data from CIDS (2017)

Municipality	Economic	Social	Traditional	Medium	Medium-Residential
Tlajomulco De Zuñiga	702	87537	18311	3165	2033
Ixtlahuacan De Los Membrillos	335	13176	309	33	1
Lagos De Moreno	160	4402	676	134	17
El Salto	139	9555	2324	83	1
Tala	70	6563	583	92	1
Zapotiltic	33	266	140	18	0
El Arenal	24	828	341	5	1
Tlaquepaque	16	5307	7233	4568	597
Tonala	13	11712	8964	1706	21
Guadalajara	9	1336	4943	3123	792

Table 3 - Distribution of House Typology in Municipalities with highest concentration of housing
Source: Own elaboration based on data from CIDS (2017)

State	Social Gap Index	Municipalities	Housing Deficit Average accross Municipalities 1995	Housing Deficit Average accross Municipalities 2000	Housing Deficit Average accross Municipalities 2010	Housing Deficit Average accross Municipalities 2015	Porcentual Decrease in 20 years	Population Increment through 20 years	Federal Subsidy	Tax Collection	First Major Municipality	Second Major Municipalit	Third Major Municipalit y	Forth Major Municipality	Fifth Major Municipality	Cummulative of Major Municipalities over State's total population
Oaxaca	Very High	570	86.95	95.09	91.38	88.06	6.69%	782,402	64.72%	5.62%	6.93%	4.10%	2.45%	2.17%	2.05%	17.68%
Puebla	Very High	217	86.56	91.60	84.48	80.22	15.89%	1,653,728	58.62%	7.75%	26.64%	4.76%	2.44%	2.20%	2.08%	38.12%
Veracruz de Ignacio de la Llave	High	212	75.60	88.12	82.69	78.71	7.45%	1,414,955	52.04%	6.58%	7.22%	5.99%	3.99%	2.57%	2.53%	22.31%
México	Low	125	69.89	76.30	64.60	58.54	17.31%	5,360,067	38.53%	17.40%	10.91%	7.32%	5.49%	5.40%	4.38%	33.50%
Jalisco	Low	125	61.91	56.71	43.88	38.08	19.49%	2,047,993	49.90%	9.28%	20.34%	16.92%	8.27%	6.51%	5.67%	57.71%
Chiapas	Very High	122	90.41	94.30	91.55	89.81	8.00%	1,586,084	53.54%	5.01%	11.54%	6.68%	4.15%	3.88%	2.94%	29.18%
Michoacán de Ocampo	High	113	69.12	72.76	62.32	58.96	12.89%	802,838	60.68%	5.36%	16.76%	7.25%	4.28%	4.11%	3.57%	35.97%
Yucatán	High	106	85.04	90.56	80.14	69.01	18.81%	592,637	53.01%	9.48%	42.48%	4.02%	3.80%	3.74%	2.76%	56.80%
Hidalgo	High	84	80.86	82.63	72.39	66.77	23.81%	776,652	64.99%	4.68%	10.05%	5.69%	4.78%	4.61%	3.90%	29.03%
Guerrero	Very High	81	89.89	91.78	87.30	82.89	13.28%	768,131	73.03%	3.51%	23.31%	7.13%	4.14%	3.56%	3.49%	41.64%
Sonora	Very Low	72	73.71	85.57	80.75	78.88	20.44%	838,874	36.38%	14.62%	29.46%	15.37%	8.27%	6.70%	5.92%	65.73%
Chihuahua	Low	67	79.11	85.96	82.52	82.21	25.70%	964,592	47.07%	20.99%	39.11%	24.06%	4.54%	4.05%	3.14%	74.90%
Tlaxcala	Medium	60	82.83	76.55	59.22	56.69	27.67%	408,659	52.52%	3.18%	7.68%	7.26%	6.54%	5.95%	5.65%	33.08%
Zacatecas	Medium	58	72.54	67.01	50.41	48.38	21.47%	214,345	66.49%	5.46%	14.33%	10.75%	9.29%	4.69%	4.21%	43.27%
San Luis Potosí	High	58	79.17	83.18	77.17	74.01	12.71%	582,331	58.25%	10.19%	29.88%	10.36%	6.49%	3.74%	3.56%	54.03%
Nuevo León	Very Low	51	66.63	62.98	52.89	42.91	14.70%	1,554,722	45.25%	17.34%	24.40%	14.57%	11.25%	9.53%	7.69%	67.44%
Guanajuato	High	46	69.57	69.58	58.11	50.55	23.70%	1,503,779	54.26%	13.70%	26.18%	9.65%	8.54%	4.75%	3.15%	52.28%
Tamaulipas	Very Low	43	72.62	77.38	67.85	61.35	25.49%	1,018,973	52.44%	11.44%	18.63%	14.97%	11.75%	9.85%	9.10%	64.30%
Durango	Medium	39	73.81	77.99	66.55	66.65	19.17%	283,556	64.15%	6.61%	35.66%	20.09%	8.64%	3.01%	2.75%	70.15%
Coahuila de Zaragoza	Very Low	38	67.52	68.93	54.50	47.17	17.78%	776,051	47.53%	11.72%	24.81%	22.58%	18.44%	17.33%	4.41%	87.57%
Morelos	Medium	33	75.56	83.33	74.07	68.37	13.61%	582,168	56.48%	6.45%	20.55%	11.08%	9.86%	6.08%	5.50%	53.08%
Nayarit	Low	20	82.30	74.75	59.91	58.31	29.36%	260,336	53.64%	4.76%	35.05%	11.45%	8.58%	6.49%	4.53%	66.09%
Querétaro	Medium	18	77.23	80.18	65.05	59.59	19.94%	776,702	51.05%	13.22%	43.87%	13.22%	7.83%	6.37%	3.51%	74.80%
Sinaloa	Low	18	75.71	73.20	59.91	52.83	26.48%	563,707	58.00%	7.90%	31.02%	15.84%	15.04%	10.33%	4.90%	77.13%
Tabasco	Medium	17	87.42	86.04	80.56	75.13	13.70%	736,859	48.94%	6.78%	28.61%	11.10%	8.61%	8.01%	6.84%	63.17%
Distrito Federal	Very Low	16	44.44	42.59	30.65	25.63	17.16%	615,336	15.49%	38.24%	20.51%	13.40%	8.21%	7.35%	7.01%	56.49%
Campeche	High	11	82.99	86.83	82.04	76.88	13.30%	287,256	49.38%	13.09%	31.49%	26.88%	10.09%	6.59%	6.43%	81.49%
Aguascalientes	Very Low	11	61.91	57.40	43.43	38.22	12.71%	465,337	54.30%	8.11%	67.26%	8.40%	4.57%	4.15%	3.84%	88.22%
Quintana Roo	Medium	11	76.51	77.51	63.99	58.04	23.21%	832,301	45.33%	14.61%	49.88%	18.45%	12.02%	6.00%	5.66%	92.01%
Colima	Very Low	10	64.06	62.26	53.03	48.42	18.83%	222,045	60.12%	7.70%	24.81%	22.58%	18.44%	17.33%	4.41%	87.57%
Baja California Sur	Low	5	72.55	68.79	54.83	50.20	23.72%	319,262	61.63%	5.84%	39.54%	37.44%	11.12%	9.28%	2.63%	100.00%
Baja California	Very Low	5	85.06	79.50	46.83	40.74	50.20%	1,494,215	43.87%	10.35%	49.43%	29.69%	14.80%	3.20%	2.87%	100.00%

Sources: Instituto Nacional para el Federalismo y el Desarrollo Municipal, "Ingresos brutos por entidad federativa 1995-2014".
"Ingresos brutos por municipio. 1989-2013"
Instituto Nacional de Estadística, Geografía e Informática, "Censo Poblacional y de Vivienda 1995", "Censo Poblacional y de Vivienda 2000", "Censo Poblacional y de Vivienda 2010", "Inter-Censo Poblacional y de Vivienda 2015"
Instituto Nacional de Estadística, Geografía e Informática, "México en cifras"
Consejo Nacional para la Evaluación de la Política de Desarrollo Social "Índice de Rezago Social por entidad federativa"
All additional data was obtained from authors' calculations

Table 4 - Housing Deficits in Mexican States
The table shows the disaggregation of the housing deficit by level of analysis

Appendix B

Data on Housing Abandonment in Guadalajara + Statistical Approach to find Determinants

Statistical Approach to find the Determinants of Housing Abandonment in Guadalajara

To build the model, I constructed a database comprising different variables (shown in Figure 8 and Table 3 and Table 4) that capture characteristics of the built environment, the financial capacities of credit-holders and their individual characteristics. The dataset is built at the household level and includes all houses built from 2010 to 2016 in the MAG. In total, 184,551 households were recorded. To build each variable, I used different data sources and building methods including indexing and geospatial analysis. With the database I estimated the choice decision of abandoning a house using a simple logit model. The universe of data used to feed the dataset is presented in Diagram 4.

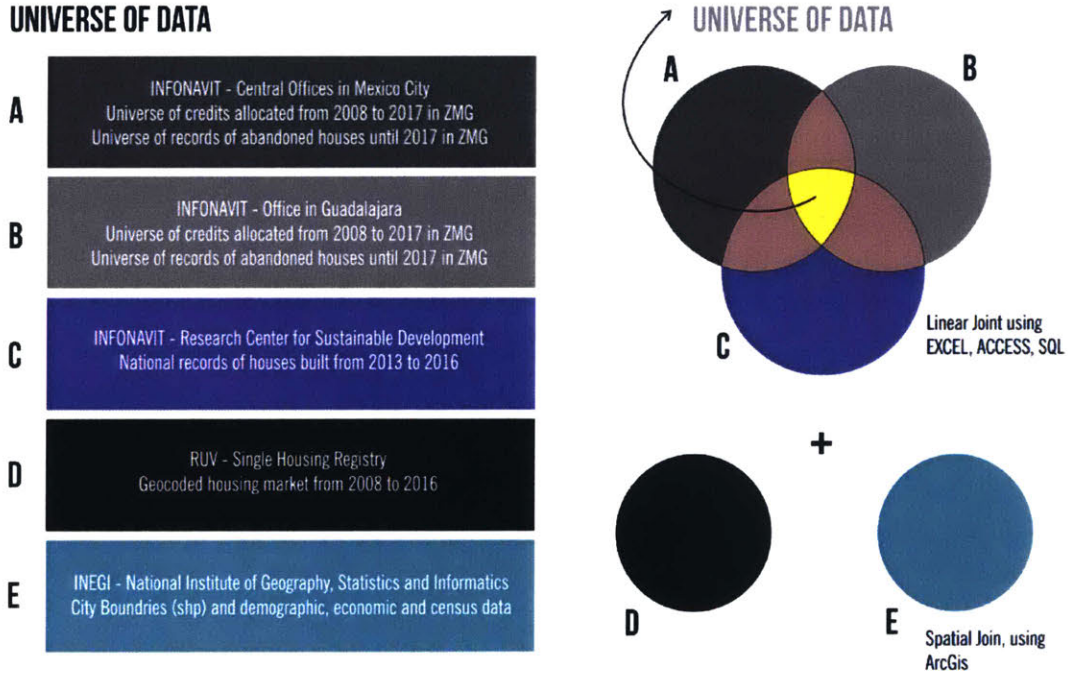


Diagram 7 - Universe of data and joints
Source: Own elaboration

	Variable	Description
Dependent Variable	Abandonment	Within this dataset, abandonment is present in 3.5% of all observations. As it was mentioned in previous chapters, abandonment in Guadalajara reaches currently almost 7%. These figures consider houses built since 2008 for which complete recordings were not found or were not available. The decision to move forward with the 2010-2016 sample is justified even though the number of successes (choice = 1) is rare compared to the number of observations. This is because it is not the rarity of events that matters in a logistic regression, but rather the possibility of small number of cases for the rarer choice (King and Zeng 2001). In our case, it is safe to proceed as we have 6,124 units observed as abandoned.
Built Environment Conditions	Diversity Index	A measure of the "mix" of land uses within a particular defined area relative to a perfect distribution of uses (Zegras 2005), the Diversity Index is used here as a proxy of close-proximity to different types of commercial and urban services from households. Values from the index range from 0 to 1, where values closer to 0 reflect single-use AGEBs.
	Housing Type	INFONAVIT and developers classify housing units in terms of their price. They use 4 classes to identify them: Economic (less than $15,500), Social ($15,500 - $24,300), Traditional ($24,300 - $42,500) and Medium-Residential (More than $42,500). More recently, INFONAVIT introduced two new classes, one between Traditional and Medium-Residential known as "Medium", and another one that has higher values than Medium-Residential, known as "Residential Plus". Most of INFONAVIT's housing market is comprised within Economic and Social Housing. Historically, these two classes have been represented by very small housing units (less than 450ft^2) developed this way to achieve the threshold of maximum credit from INFONAVIT while ensuring good revenue for developers.
	Antiquity (Type)	For each house in my dataset, I recorded type of house in terms of its antiquity class, which could be New or Old. Houses are considered Old if they were at least 7 months old at the moment of the purchase.
	Antiquity (Years)	Similar to the previous variable, this variable accounts for the accumulated number of years since the house was purchased, using as a reference 2017.
	Housing Typology	In a broader sense, for INFONAVIT and developers houses are classified in two types: Vertical and Horizontal. Vertical homes are those that have 3 or more stories. Duplex units are not considered Vertical. Horizontal units are those that include row houses and "pic de casas[1]". Horizontal housing is the most common typology used for economic and social housing in Mexico and Guadalajara.
	Price/Square Meter of Housing	There is a clear correlation between price and area in the affordable housing market, demonstrated by the logic of housing provision (the five classes of houses based on their price). I use this measure to account for the decreasing marginal returns when consuming land.
	ECUVE Index	An indicator developed by INFONAVIT to measure the built environment conditions surrounding a house, ECUVE captures different qualitative variables that have been previously used to understand what determines abandonment.
	LRCP Polygons	While these polygons have been highly criticized, they serve as a good proxy to understand where affordable housing is built geographically. In Guadalajara, most affordable housing is built in PCU3, areas that under perform in urban services provision and that are commonly isolated from the city center.
	Distance to CBD	Measured as the Euclidian distance in kilometers between each house and the Central Business District, this variable serves as a proxy of accessibility to regional or metropolitan services that are clustered in the city's financial district. In Guadalajara there are 3 major CBD's located close to each other in the core of the metropolitan area. For the purposes of this study, I selected that located in the municipality of Guadalajara, where the Historic Center is located.
	Distance to Closest Urban Center	Similar to the previous variable, this variable is measured as the Euclidian distance in kilometers to the closest urban center. An urban center is defined as an area in the city that concentrates civic-related activities and municipal agencies. For some municipal services, people is requested to go to the closes municipal facility. Access to these facilities is crucial to process construction permits and connect to urban services, like water and electricity.
	Jobs Accesibility	Perhaps the variable that best represents the most cited reason for abandonment, accessibility to jobs is an index that measures how well connected each household is from job centers. The 2016 ISA shows that most credit-holders complain to some extent about the time they spend commuting to work. Additionally, surveys conducted to people that has in fact abandoned their homes, show that their top reason is that their job was too far from where they lived (CIDOC 2015). Following a recent study on job accessibility conducted in 2016 in Mexico City (Fernández Reyes 2016), I calculate a gravity-based measure to develop the accessibility index.
	Municipality	These are control variables that represent each of the nine municipalities that comprise the MAG. Because of the low rates of abandonment for INFONAVIT accredited units, Guadalajara municipality was removed from the analysis to properly calculate estimates for the others.

Table 5 - Dependent Variable and Built Environment Conditions Variable for Model
Source: Own elaboration

	Variable	Description
Demographic Conditions	Marginalization Index	According to the National Council of Population, the Marginalization Index identifies areas in cities that lack of public services, such as health, water and sewage services (CONAPO 2010). Additionally, the Index accounts for the educational attainment levels of households and the housing deficit, which is a measure of the number of people living per room in a housing unit. The importance of this measure is that public services have shown to be relevant in the decision of abandonment. Similar to accessibility to jobs, results from the 2016 ISA survey show that among the top 3 reasons why people abandon their homes is the lack of basic public services, such as water and sewage connections. The results also show that people bought their homes with temporary services planned to provide up to 6 months after developers concede the control of the development to the municipality. In some cases, services infrastructure was also temporal, leading to high rates of households without proper connection to water and sewagre
	Jobs-Population Ratio	These measure accounts for the maximum number of jobs available in terms of the total population living at a particular AGEB. Similar to the Diversity Index, this variable is a proxy to measure how mixed an AGEB is relative to residential and job-generating uses. Low ratio numbers show that the AGEB is more residential and has few opportunities for people to work, but also few opportunities for communities to access to different services in their proximity.
	Unemployment Rate	Unemployment rate measures the percentage of unemployed population that is economically active within each AGEB. As Nikola Vujic mentions, unemployment is a proxy of lack of legal income opportunities and represents a proxy as well in measuring property crime (Nikola Vujic 2009). In INFONAVIT developments, its frequent to find that abandoned homes turn vandalized within a couple of months after abandoned. Likewise, this triggers a spillover vandalized effect on other neighboring houses. While crime rates in Guadalajara are not as high as other cities, and other studies have shown that in some Mexican cities with high rate crimes, crime and abandonment are not correlated (García Moreno 2012), unemployment as a proxy of abandonment is an important variable to consider when measuring abandonment.
	Population Density	Studies on property and violent crime have shown that decline in population triggers crime rates and correlates to property abandonment (Raleigh and Galster 2014). INFONAVIT developments are usually characterized by very low population density rates, and abandonment itself represents a decline in the already scarce population of these developments. This variable accounts for those demographic characteristics, and is measured by the total population within a determined AGEB, over thhatAGEB's area in square meters.
	Migration Rate	The first signs of abandonment in Mexico were found in the border cities with United States, like Ciudad Juárez and Tijuana. In the late 90's and early 2000's, these cities lived a rapid economic development because of the *maquila* effect. Industries focused on massive production products settled in those cities and started to employ large numbers of employers. Eventually, people from other southern Mexican states moved to these border cities to work in the *maquilas*. Usually, these jobs were temporary, and those who bought their homes and had to move to find a new one, eventually abandoned them. In these cities, migration rates were high and after they decreased, physical signs of abandonment started to appear in INFONAVIT developments. While Guadalajara's migration rate are not high compared to those border cities, the migration rate is a proxy of that transit population that currently has temporary jobs and eventually could move to another city, potentially abandoning their homes. The migration rate is measured by the total amount of population that was born outside Jalisco that lives in one AGEB, over the total population of that AGEB.
Financial Conditions	Income	There is no data on the specific amount of monthly income each credit-holder earns. However, INFONAVIT classifies credit-holders according to the amount of VSM, in five ranges: those who earn less than 2VSM, those that earn between 2 and 4VSM, 4 to 7VSM, 7 to 11VSM and more than 11VSM. Most INFONAVIT credits are given to the first income brackets.
	Risk Index	The Risk Index, developed by INFONAVIT's Portfolio Management Department, measures the likelihood of each credit-holder to lose their jobs, and eventually, underperform in their loan payments. Low values of the Index represent more likelihood of underperforming on payments. Also, low values of the Index have shown to be correlated to low-income individuals.
	Savings at the Moment of the Purchase	As it was mentioned in the first chapter, INFONAVIT credit-holders can access to savings from their personal fund. Additionally, they can access to the CONAVI subsidy and use their personal savings to finalize the purchase of a house. This variable is the sum of all savings (personal savings, fund savings and federal subsidies) at the time they undertook the mortgage.
	Amount of the Loan	This variable is the total amount of the loan accepted from credit-holders.
	Loan Interest Rate	INFONAVIT's interest rates varies across programs, regions and years. These rates are fixed, however, perceptions on these interest rates are not necessarily fixed. In recent call-surveys conducted by INFONAVIT, credit-holders recognized that the interest rate of their loan was too high, even if they knew the amount and impact on the loan at the moment of accepting the loan.
	Difference to be paid	This variable is the difference between the price of the house and the amount of savings at the moment of accepting the loan.
	Gender and Age	These are two individual specific variables, one binary (Gender, 1 Male, 0 Female) and other continuous (Age).

Table 6 - Demographic Conditions and Financial Conditions Variables for Model
Source: Own elaboration

To predict the effects of regional planning policies of affordable housing in abandonment, I build a model that estimates the effect of different household-level variables in the decision of abandoning a house. In its most basic form, my model assumes the following functional form:

$$\text{Abandonment} = f(\text{Housing and Built Environment Conditions, Demographics, Credit} - \text{holder's Individual Characteristics}) + \text{error term}$$

Within the literature reviewed, there have been few attempts that aim to predict the probability of abandonment given specific social, financial and built environment conditions. Initial models to understand what determines home abandonment in Mexico have done it using the percentage of housing abandonment in a geographic area, as dependent variable. These models use OLS regression methods to estimate the built environment effects on the rate of abandonment. More recently, Ackerman et al. developed a model to predict the likelihood of home abandonment based on loan, personal and location characteristics (Ackermann, et al. 2015) that overall, is an improvement from previous models. However, the model has important limitations due to the scale and quality of data that reduces its prediction capacities that could be used for policy recommendations on affordable housing planning. Some of these limitations are the scale of the study (they have 700,000 observations nation-wide) and the lack of relevant data (no input from transportation data or Euclidian distances).

Building over Ackerman's et al. model, I developed a Multinomial Logit model (MNL) to determine the probability of home abandonment in the city of Guadalajara, and estimated the effects of different variables on it. My model is a better specification of previous models, reaching an AUC of almost 0.85, suitable for policy recommendations. To select my best model specification, I test different models on forward-backwards variable selection using Likelihood Ratio Tests and McFadden's Pseudo r^2. To validate my model, I use my model's Receiving Operating Characteristics (ROC) to measure its classifying performance.

To validate my model I estimate its Receiving Operating Characteristics Curve, which is a measure of its classifying performance. Its AUC is 0.8443, which demonstrates that the model is robust and has good performance when predicting abandonment. My model is also robust in predicting true positives (abandoned houses), with a prediction rate of 90.31%. Similar to Ackerman et al., I also experienced a high rate of false positives due to the unbalanced nature of the data, with almost 63,700 observations flagged that way. Figure 9 shows the ROV curve.

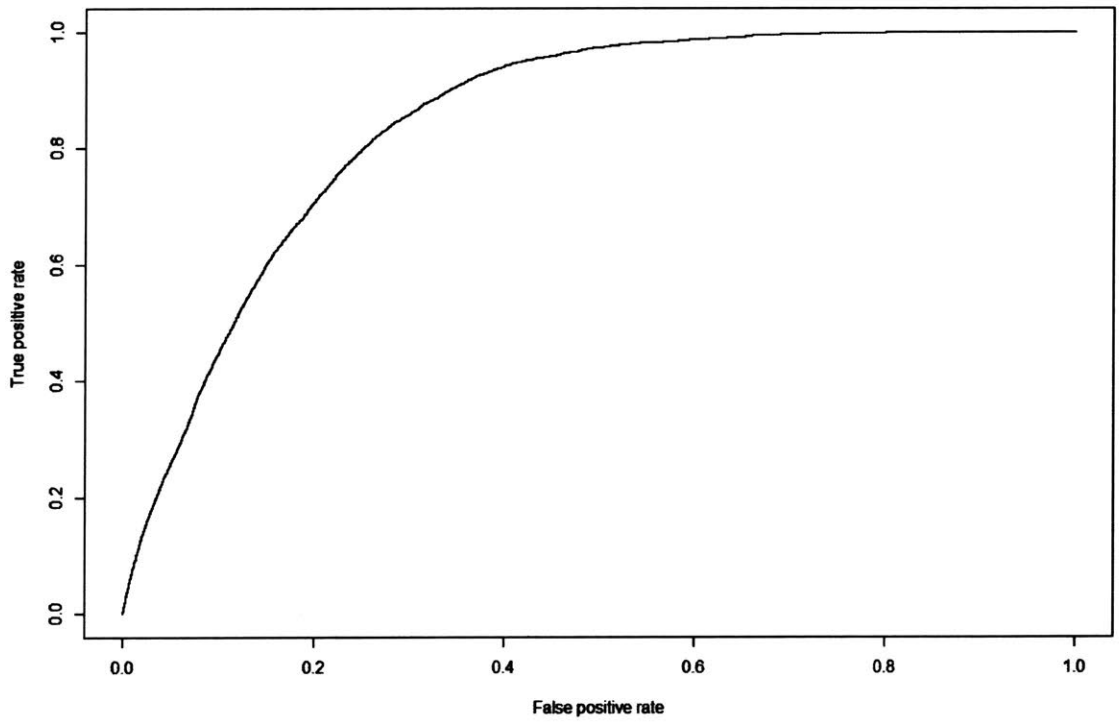


Figure 7 - ROC Curve of my best model specification

The results of the model can be shown in an illustrative way in Figure 9 and **Error! Reference source not found.**. However, as I mentioned before in Chapter 3, the results are not final and not suitable for final conclusions. They only intend to illustrate the potential a statistical model can have in explaining abandonment.

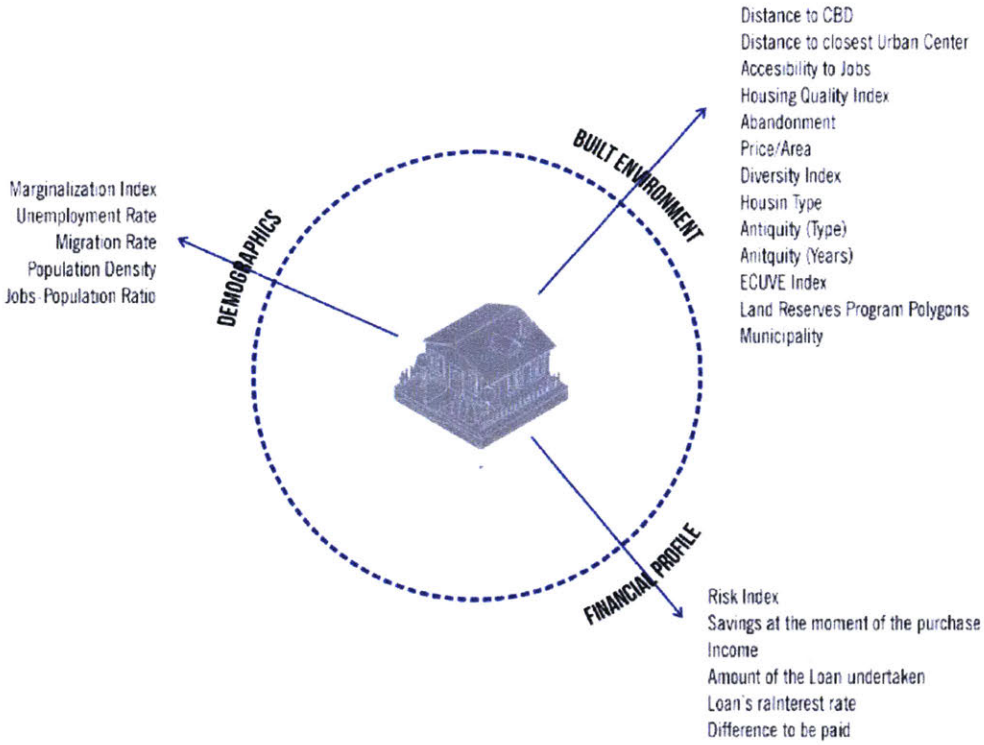


Figure 8 - Selected variables for the analysis
Source: Own elaboration

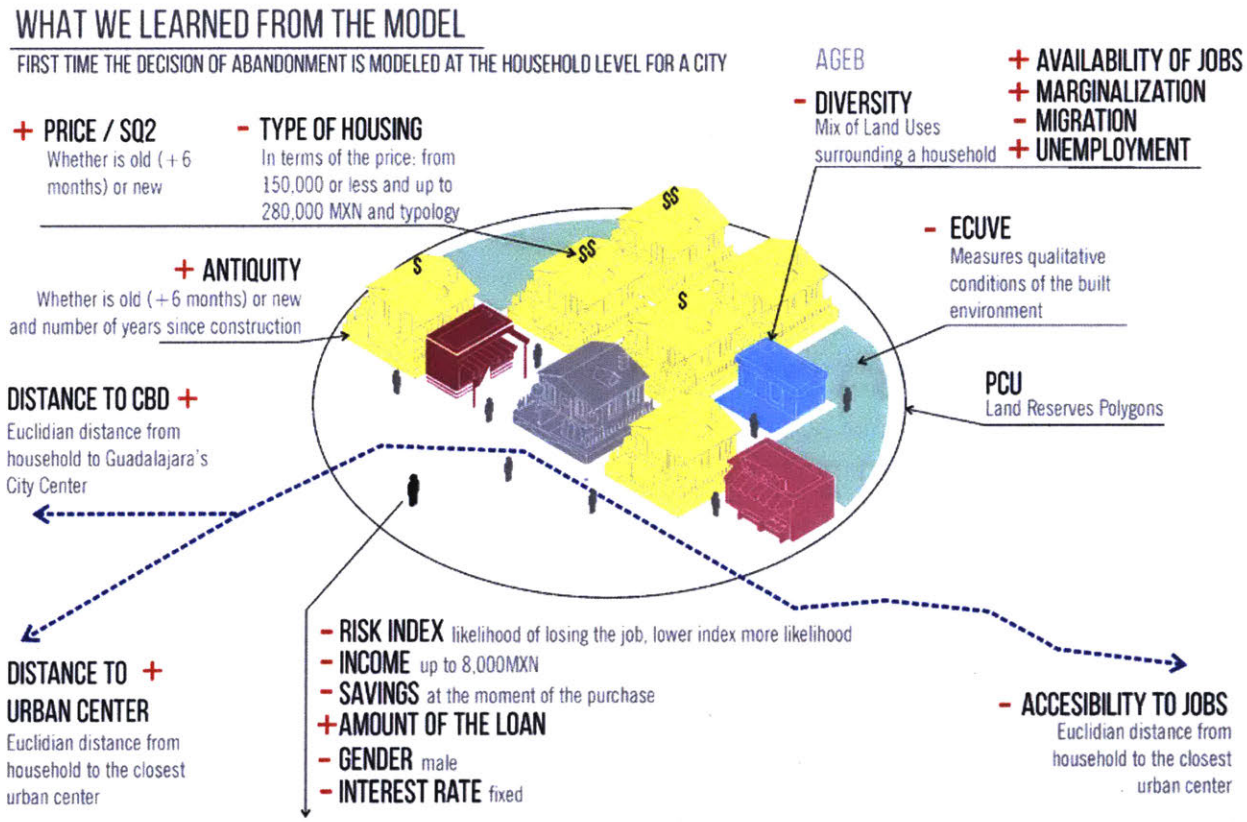


Figure 9 – Illustration of results from a Model to Determine Home Abandonment
The sign explains the kind of situation in respect to the decision of abandonment. For instance, an increment in the price per square meter of land increases the likelihood of home abandonment.
Source: Own elaboration based on results from a logit model used to predict home abandonment, using data from INFONAVIT Mexico, INFONAVIT Guadalajara, RUV, CONAVI, INEGI, and CIDS