UNFOLDING THE PATTERNS OF INFORMALITY IN THE CITY OF QUERETARO

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Abstract

Most spatio-morphological studies have centered their attention in what is known as the "formal" city. In Latin America, the development of cities has been ruled by political forces that have determined its form and evolution, from their establishment with the arrival of the Spanish. Even before that, the organisation of most of these Pre-hispanic settlements was ruled by cosmogonic forces. We refer then to top-down processes. Bill Hillier names this type of cities "of reproduction" because the main purpose underlying their structure is the reproduction of certain political and/or social structures. On the other hand, we find traditional European cities with organic origin and morphology, that is, they are guided by local rules of growth or bottom-up processes. Opposed to the former, these, as Hillier proposes, are "cities of production" because the force underlying their structure is economic transaction through social interaction.

this work explores the urban structure of a third kind of settlement, way less explored than the previous ones, the so-called informal or irregular settlements in the city of Querétaro. This is done by means of the analysis of their urban, morphological and spatial patterns. Even when they are within the vicinity of the "formal" Latin American city, their structure corresponds to that of cities of production, reinforcing social interaction and economic transaction spontaneously at the local scale.

Keywords: *informal settlements, social production, bottom-up, Latin America.*

Theme: *Urban Space and Social, Economic and Cultural Phenomena*

1. Introduction

Even though the relationship between spatial and morphological properties of a number of urban systems and the processes that take place in them has been demonstrated (Desyllas, 1997; Hillier, 1999; Hillier & Iida, 2005; Ortiz Chao, 2008; Porta, Crucitti, & Latora, 2007; Strano, et al., 2007), most studies have centered their attention in what is known as the "formal" city. This implies that irregular or informal human settlements (IHS) have been left behind. Nevertheless, this is a relevant topic, especially in developing countries where 75 to 90% of new housing is built irregularly and is occupied by around two thirds of the population (Pacione 2005, 523).

UN-Habitat estimates that Latin America and the Caribbean is the region with the highest rate of urbanisation in the world with 75% of the population living in cities in 2000 and a forecast of 83% for 2030 (2005, p. 4). In addition, demographic growth in irregular settlements in this region is nearly twice that of the corresponding population growth (p. 12).

In the case of Mexico, UN-Habitat indicators (2008) point out that in 2005 14.4% of urban population lived in slums. However, informality in Mexico has a variety of manifestations. Some of them are related with land tenure and/or the provision of urban facilities/amenities (Cymet, 1992).This, together with unsatisfied need of quality dwelling, has resulted in a coverage of only 60% of urban families in Latin America with houses that comply with appropriate characteristics. (UNCHS-Habitat, 2001, p. 197).

This work pretends to contribute to show that, even given their condition of informality, irregular settlements are closer to traditional urban centers' logical functioning that some contemporary developments of formal cities, at least in their urban structure. The aim of this is to put forward the concepts of regular and irregular settlements which are often understood as opposite, at authorities, specialists and, generally, at urban inhabitants. What kinds of forces or processes underlie the structure of irregular settlements in Queretaro? What are the implications of the spatial properties that characterise them?

Given that most of the available studies about irregular settlements come from disciplines such as public policy, economies or urban sociology, they are focused on social and economic contexts and look for a conceptual understanding at the territorial scale (El_Colegio_Mexiquense, 2007; Jimenez Huerta 2000, UN-Habitat, 2003, 2005). Little has been discussed about structure and the local scale in this kind of studies. Besides, available literature has centered mainly in analyzing the self-construction-consolidation process of built structures (Bazant, 1985; Padilla & Ribbeck, 2009). In some cases, the urban landscape of this kind of settlements has also been studied (Espinosa, 2009).

Work by Hillier and the Space Syntax group has proven that urban configuration plays a determinant role on the formation-consolidation process of non-formal settlements (Hillier, Greene, & Desyllas, 2000). However, opposed to other processes such as land use distribution (Mora, 2003; Ortiz Chao, forthcoming), rents, (Desyllas, 1997; Hillier & Wedderburn, 2008) or security levels (Hillier & Sahbaz, 2005), the relationship between form and function in IHS has been studied to a lesser extent.

This study explores the structure of three informal or non-regular agglomerations of settlements located in different zones of Queretaro through the analysis of morphology and space syntax and their relationship with the distribution of available land use. The results are also compared with the Historic Centre of Queretaro and El Campanario development, as

references of urban systems with high and low levels of urban vitality. On the other hand, preliminary results of the Map of Organized Participation in Queretaro (MPQ) are shown for one of the study areas to discuss its results in the context of the importance of social capital.

2. Irregular settlements and the role of urban morphology

According to Cymet (1992), there are three types of irregular settlements in Mexico regarding its origin: invasions or slums, irregular developments and irregular settlements in communal land (ejido). The first type, invasions, may occur through surprise operations happening literally overnight where leaders previously plan the division of plots, generating "*colonias paracaidistas*" or through concentrations of individual irregular occupations in marginalized or risk areas and without planning along a large period. The latter lack geometric morphology and become "*lost cities*".

As for irregular developments, they happen when companies or individuals divide into plots and sell land, which is unsuitable for urban development because of its marginal situation and/or undefined tenure. This kind of land is usually located on the periphery, is inexpensive and fails with minimal requirements of service provision, generating popular or proletarian neighborhoods. Finally, the author refers to irregular settlements in communal land, specifically in *ejidos*[1], as the subdivision and commercialisation of them outside the law[2] and, therefore, without providing them with any service.

According to Pacione (2005), the attitude of governments towards settlements of irregular origin vary depending on factors such as their origin. Generally, the perception of this kind of settlements has changed in the last decades to a more positive image that recognizes them as productive places, able to self-organize and satisfy their own needs. Despite this, their morphology, internal structure and form-function relationship has not been studied deeply. Is it somehow possible to point out these self-organized structures in the physical form of these settlements? Can this structure contribute to their well-functioning as urban systems?

In this sense, space syntax work contributes to the study of the city as a material artifact that can be studied by itself, not just as a consequence of the processes happening in it (Hillier & Hanson, 1984). The key idea is that the structure of each city implies certain kind of *spatial culture* (Hillier 1989). It refers to how different cultures order space and so promote or restrict opportunities for encounter between members of a society or between them and their symbols. This means that space implicitly establishes the rules of *social reproduction through configuration*. The author defines two kinds of cities: *cities of production* and *cities of reproduction*. These ideas will be further discussed at the end of this section.

In order to understand the structure or configuration of the urban object it becomes necessary to think of the city as a network of interconnected spaces so we can quantify their relations. Under these principles, a model that extracts and calculates the relationships between spaces is used. It was decided to use a segment map. The starting point for this is an axial map, an abstraction of an urban environment that represents it as "the least number of straight lines that cross each bi-dimensional space making all possible connections of the system" (Hillier &

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[1] The "*ejido*" is a modern version of an old semi-communal land tenure where the State provides a portion of land to a group of peasants, subdividing it into equal plots for their use and benefit. Until 1992, with the reform to constitutional article 27th this tenure was supposedly limited as common land that could not be sold, leased or used as guarantee of credit operations, although this was done illegally (Luiselli, 2003, p. 138).

[2] After 1992 a change in the law to the 27th article created mechanisms and procedures to revert illegal transactions of *ejidos* and integrate them to urban development legally (Olvera, 2005).

Hanson, 1984, p. 91-92). This model calculates the relative closeness (and encounter potential) from each axial line (potential movement axis) to all the others as nodes of a network and represents it using a range of colors that go from red (closest or most accessible) to blue (furthest or most segregated).

In a segment map, on the other hand, movement axes are fragmented on each crossing with another axis. In this representation, each segment becomes a node in the network giving a higher degree of detail to the accessibility analysis where the number of connections is weighted with change of direction (Hillier & Iida, 2005). In other words, a connection with a smaller degree of angular change (almost a straight line) has less weighting than detouring over a "Y", and this is considered a smaller angular change than a street at an angle of 90 degrees, for example.

According to the premise of *movement economy* (Hillier, 1996), the formation of areas of higher or lower activity in cities responds to the configuration of urban structure where places (or nodes) that are, in average, closer to the rest, attract more movement. This, in turn, can influence processes such as land use distribution and retail in higher activity areas, leading to a higher flow of people so the form of the city is capable of unchaining a multiplier effect (Hillier, 1999).

In *cities of production*, says the author (Hillier, 1989), the closest or most accessible places in relation to all others connect center to periphery, have the highest flows of people and, as a consequence, function as interface between locals and strangers. The main role of space is practical or instrumental. In *cites of reproduction*, on the other hand, space is discontinuous, main axes or spaces do not connect centre and periphery and tend to have little or no interface with built structures (building entrances), so they do not promote encounter. Its main function is symbolic or the reproduction of social structures. Probably the clearest example of this type of settlement is the prehispanic city of Teotihuacán.

In fact, the regular grid morphology of Latin American cities has its origin in the cosmogony of prehispanic cultures which marked the orientation and position of the most important religious buildings (Luiselli, 2003). Then, after the arrival of the Spanish, in the ordinances of Felipe II with his orthogonal plan and distribution based on social class starting from the centre (Garcia-Ramos 1983): *cities of reproduction*. In this work, the first analysis of some irregular settlements in Querétaro are presented, indicating that the function of urban structure in this areas is closer to that of a city of production than to others considered formal or regular.

3. About the urban context of Querétaro

Querétaro is located in central Mexico, in a region known as El Bajío. The Metropolitan Zone of Querétaro (MZQ) comprises the municipalities of Querétaro, El Marqués, Corregidora and Huimilpan. The municipality of Queretaro which has the majority of population and area of this conurbation, is sub divided into seven units known as *delegaciones*: Santa Rosa Jáuregui, Epigmenio González, Félix Osores, Felipe Carrillo Puerto, Cayetano Rubio, Centro Histórico and Josefa Vergara.

The population of the MZQ amounts to 1,097,025 inhabitants, making it the tenth most populated city of the country. The average population density is 63.54 inhab/ha, while average housing density is 20.17 units/ha. (Secretaría de Desarrollo Social 2011). The process of urban growth of the MZQ has also been impacted by the proliferation of IHS, together with the fact that their illegal status implies that official information available is limited to very general

statistical data.

In this context and, as part of a coordination project between the Ministry of Urban Development and Public Works of the State of Queretaro, Queretaro Housing Institute and the Research Group New Urbanism in Mexico (CINUM), a state database of IHS was put together. This database includes 971 IHS, 433 are in the Metropolitan Zone formed by the municipalities of Querétaro, El Marqués, Corregidora and Huimilpan (**Figure 1**). The database contains infrastructure and service availability percentiles per IHS which include power supply, public lighting, curbing, sidewalks, drainage network, paving and potable water, but this information is incomplete. Out of 971 IHS 17.7% have information about power supply, 14.78% on public lighting, 13.39% on potable water, 11.31% on drainage network, 9.23% for curbing, 9.23% for sidewalks and just 9% for paving.

Once this information was classified in a GIS database, those IHS with the highest percentiles of data were mapped into the MZQ to explore their form and structure, together with their relationship to the context and the possibility that continuous groups of IHS with certain uniformity in these two criteria could be considered as clusters and study areas.

Three areas were selected, all of them located north of the city, in the *delegaciones* of Félix Osores and Epigmenio González. These zones have different morphologies from one another, but share similar demographic characteristics. These zones are also compared with Querétaro's Historic Centre (QHC) and the exclusive development *El Campanario* (**Table 1**). Each study area concentrates several settlements (**Table 2**) and was named according to the area of the city where they are located: 1. San Pedro Mártir, 2. Francisco Villa, 3. Altos de San Pablo (**Figure 1**).

Table 1 Basic statistics about the study areas. SOURCE: Elaborated by the authors based on demographic census (INEGI 2005)

	Area	Number of IHS	Total Population	Density (inhab/ha)
1	San Pedro Mártir	4	5092	47.8
2	Francisco Villa	5	4040	54.23
3	Altos de San Pablo	11	3947	55.42
4	El Campanario	NA	1591	2.77
5	Centro Histórico	NA	10553	49.5

Table 2 IHS forming each study area

NO. OF IHS	SAN PEDRO MÁRTIR	FRANCISCO VILLA	ALTOS DE SAN PABLO
1	San Pedro Mártir COMEVI	Francisco Villa I	Los Arroyitos
2	Rubén Jaramillo	Francisco Villa II	Josefa Ortíz de Domínguez
3	La Esmeralda	Morelos	Nueva Creación
4	Laderas de San Pedro	Miguel Hidalgo	Libertadores de América
5	-	Revolución	Valles de San José
6	-	-	Villas de San José
7	-	-	El Oasis
8	-	-	Ampliación El Oasis
9	-	-	Real de España
10	-	-	Lomas de San José
11	-	-	Santa Fe

Figure 1 Location of study areas and their context SOURCE: Irregular Human Settlements, (CINUM, 2012)

The following maps show location of facilities, services and small retail according to the National Directory of Economic Units (DENUE).   Recreation facilities (**Figure 2a**) are concentrated in the Historic Centre with some units in the other delegaciones but none in the study areas. Educational facilities and services show the same pattern, concentrating in the city centre (Figure 2b). Health facilities and services are denser than the former, even though they are concentrated in the city centre (**Figure 2c**). Social assistance facilities are the most dispersed, including more points in the periphery of the study areas (**Figure 2d**). This survey shows a health unit in San Pedro Mártir and three units in Francisco Villa. Finally, small retail distribution is illustrated (**Figure 3**), unlike the rest of the maps, it is mostly uniform with different size concentrations over the city including study areas. It is also important to mention that there are just a few facilities and retail points all the way from El Campanario to its connection to a main avenue (Blvd. Bernardo Quintana).
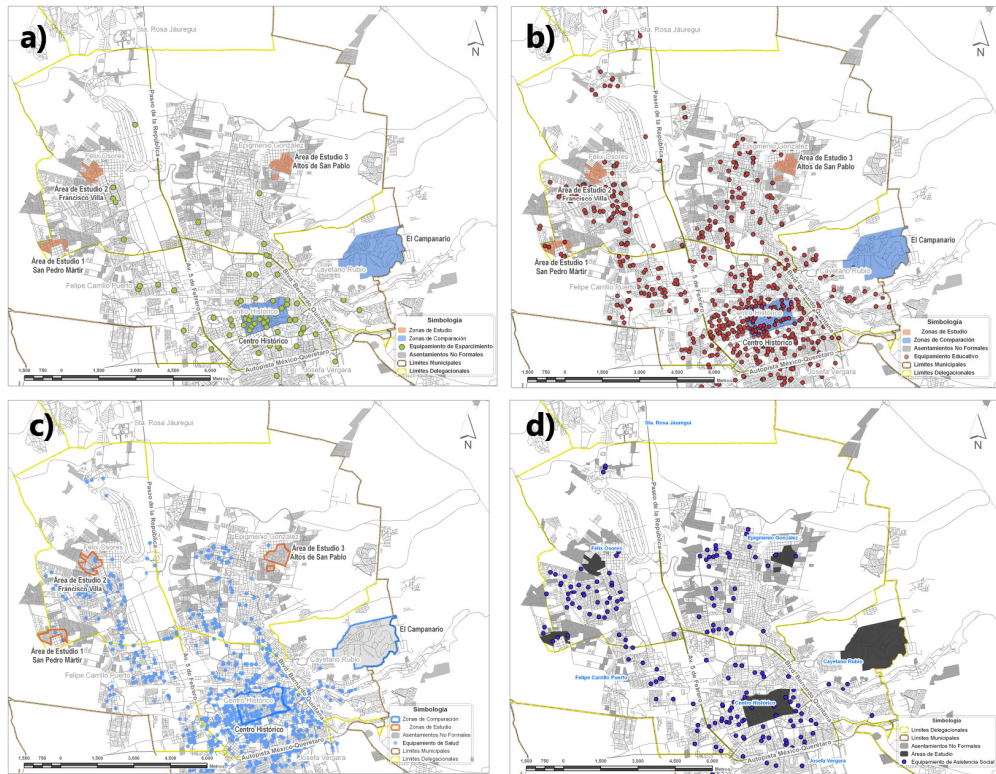
Figure 2 Facilities, services and small retail in the Metropolitan Zone of Querétaro. a) Recreation facilities, b) Education facilities and services c) Health facilities and services and d) Social Assistance facilities and services. SOURCE: Elaborated by the authors based on INEGI, 2011, *Directorio Estadístico Nacional de Unidades Económicas (DENUE)* Commercial surveying in San Pedro Martir and San Pablo based on Google Street View, 200
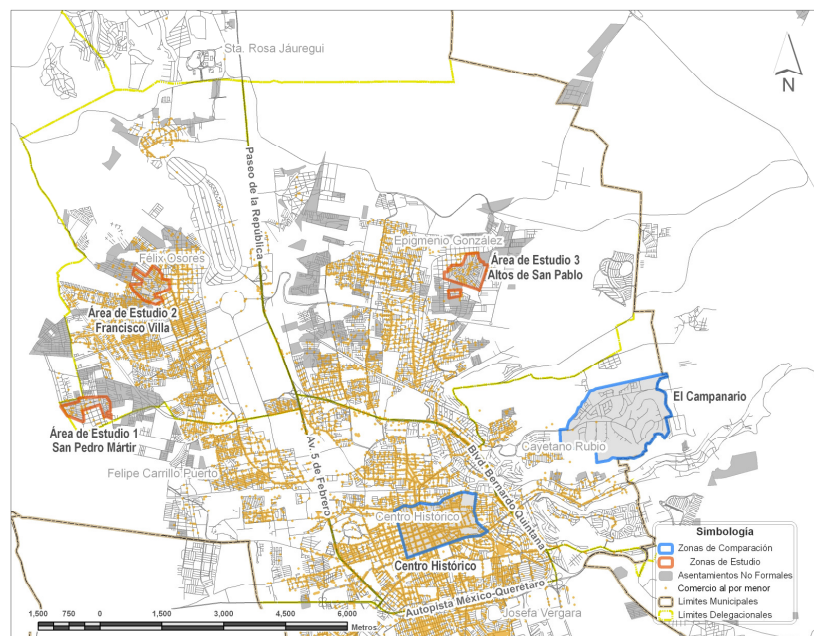

Figure 3 Small retail in the Metropolitan Zone of Queretaro. Source: Elaborated by the authors based on INEGI, 2011, *Directorio Estadístico Nacional de Unidades Económicas (DENUE)* Commercial surveying in San Pedro Martir and San Pablo based on Google Street View, 2009

Another criteria considered was the angular analysis of a segment map (see section 2) built from an axial map of the MZQ that included irregular settlements. This map was made as a CINUM project (Ortíz-Chao et al. 2012). The segment analysis was calculated using metric radii in such a way that not only global integration was measured (the system of all interconnected spaces as a whole), but also local integration looking for urban sub centres that responded to 800, 1200 and 2000 meter radii. The analysis of this map was done on Depthmap software (Turner y Friedrich 2011)[3].

Global integration map of the MZQ shows that the core of highest centrality or relative closeness is on the city's Historic Centre, that is the ring delimitated by 5 de febrero Av, Bernardo Quintana Blvd and Constituyentes Av and their extensions towards the edge (red and orange). The three study areas are located in the middle ranges of global integration (green) while El Campanario is found in blue colors, representing the highest segregation (**Figure 4**).
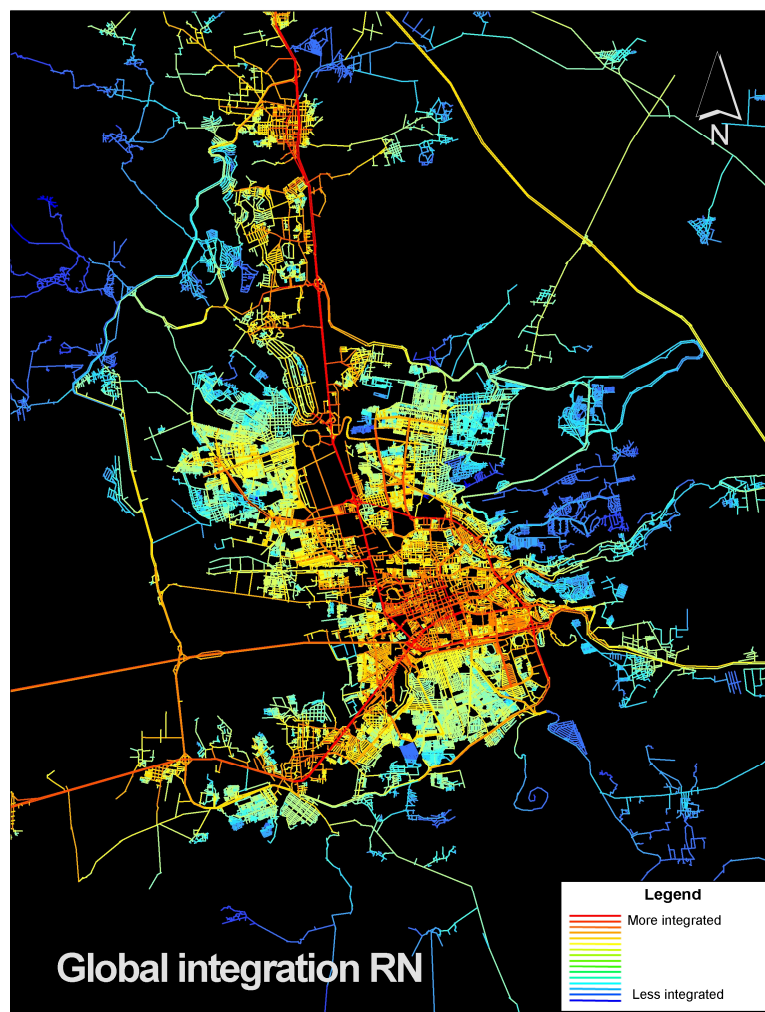

Figure 4 Global integration based on angular segment analysis of the MZQ SOURCE: CINUM, ITESM Campus Querétaro (Ortíz-Chao, Llamas, et al., 2012)

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3 Depthmap is a software developed by the University College of London used for space syntax analysis.

4. Study Areas

The first of three study areas, *San Pedro Mártir,* is located in Félix Osores. It comprises four IHS (**Table 2**). It has a population of 5092 inhabitants and an average population density of 47.8 inhab/ha (**Table 1**). **Figures 5a**, **5b** and **5c** show the analyses of facilities and services, local integration with an 800m radius and block size, respectively.

Lack of recreation and health facilities is obvious, considering that even when outlets with these land uses can be observed in the map, they correspond to services, that is, to the private sector. The analysis also shows that the area has educational facilities (**Figure 5a**). San Pedro's morphological characteristics include geometric grid with some fragmented streets. In general, there is continuity between the grid and its immediate context and, even though there is no previous planning, there is plenty of local retail (orange dots), especially on the most integrated or central streets at the local scale (east-west axes of the middle third in yellow to green scale) coinciding with the principle of movement economies (**Figure 5b**). This idea is confirmed by block size in the lowest ranges, meaning that it is a permeable place that offers choices o movement to its inhabitants, even by foot, promoting social interaction (**Figure 5c**).

The second study area, *Francisco Villa*, is located northwest of the MZQ. It is characterized by a patchwork of grids structure (Ortíz-Chao and Hillier 2007), visibly more fragmented than San Pedro Mártir. Just like the first example, this zone lacks recreation and education facilities (**Figure 5d**), while retail is found all over the area, in spite of more evident concentrations over the southwest limit and all northeast section of the site (yellow). This may be given to the way in which the study area is inserted into the surrounding grid since it is at the northeast where this connection is more continuous. Southwest it is connected to existing streets forming a kind of *"s*car" or edge. In both cases, retail outlets are concentrated over the areas with more accessible or more integrated segments (both outside and within the IHS) (**Figure 5e**). Block size map of this study area also shows how this zone is within the small block size ranges and, therefore, accessible ones (**Figure 5f**).

Altos de San Pablo, the third study area, has the most irregular morphological structure. Besides, it is linked to its context partially and asymmetrically. However, it keeps the same pattern than the other study areas for retail location (**Figure 5g**). It also shares the lack of educational and recreation facilities (**Figure 5h**) and, except for a big block representing a clear interruption to permeability on the east, it follows similar patterns to the others (**Figure 5i**).
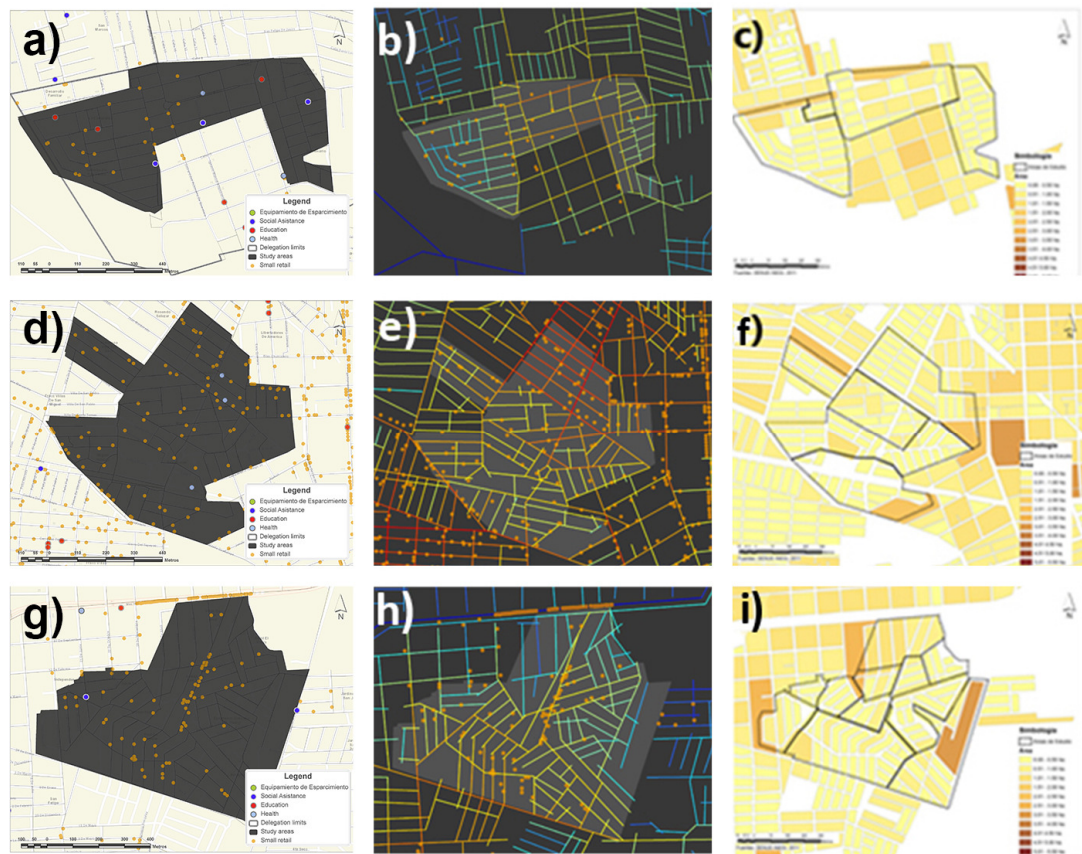
Figure 5 Analysis of study areas including Facilities and services, Retail versus local integration 800m and Block size
SOURCE: a) Elaborated by the authors based on Directorio Estadístico Nacional de Unidades Económicas (DENUE),
2011), Axial map of the metropolitan zone of Querétaro (CINUM, ITESM Campus Querétaro (Ortíz-Chao, Llamas,
et al., 2012), (INEGI, 2010).

Once these informal settlements are analysed, questions about the way they work in comparison to other type of settlements arise. Based on this, another two zones of the city of Querétaro were analysed, the Historic Centre of Querétaro and the private development El Campanario, both within the framework of formality but with different spatial features.

El Campanario is a high-income private housing development which has its origin in the 90's. It is located in the eastern part of the city, in the *delegación* Cayetano Rubio. It has an estimated population of 1591 inhabitants and an average population density of 2.77 inhab/ha (**Table 1**). Its grid shows a tree-like structure with clusters or *cul-de-sacs* and it lacks any kind of facilities (**Figure 6a**). **Figure 6b** displays the development's accessibility in a segment analysis together with the lack of commercial activity (orange dots). It can also be seen that the place's structure creates very large blocks (brown polygons in **Figure 6c**) that become obstacles for permeability and accessibility within the development. It is possible to say then that the form of the place itself prioritises and promotes motorised over pedestrian mobility hence, limiting the interaction between inhabitants but overall, interaction among inhabitants and strangers.

The Historic Centre of Querétaro has attributes that set it as a successful urban space, including land use diversity mixed with the presence of facilities of all kinds including a great variety of retail, health, recreation, social assistance, education, everything accessible at walkable distance, with the existence of pedestrian paths, leading to constant social interaction (**Figure 6b**).
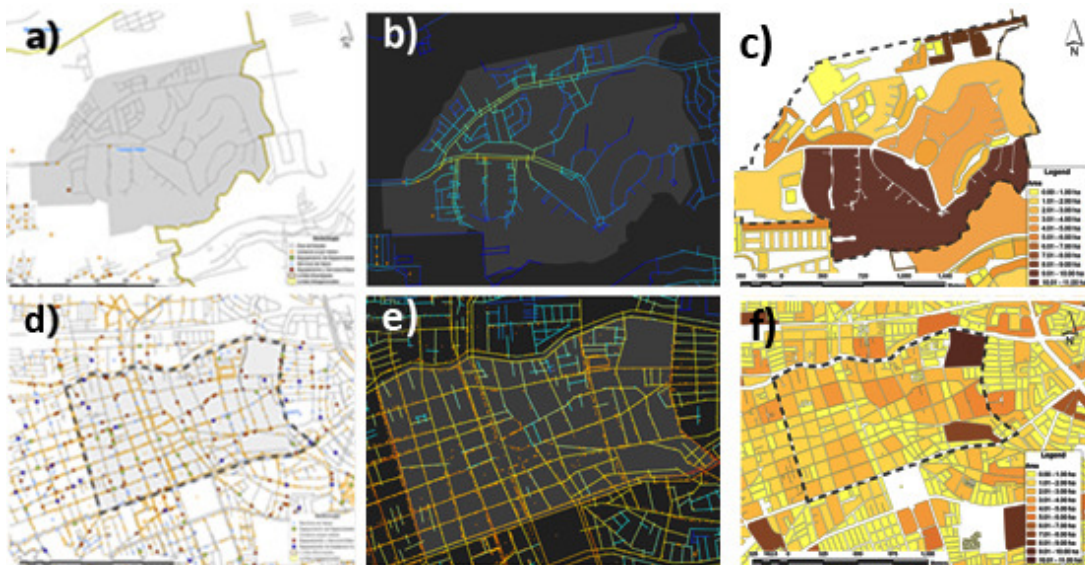
Figure 6 Comparative analysis of the Historic Centre of Querétaro a) Facilities and services, b) Small retail versus local integration 800m c) Block size SOURCE: Elaborated by the authors based on a) a (Directorio Estadístico Nacional de Unidades Económicas (DENUE), 2011), b) Axial map of the metropolitan zone of Querétaro (CINUM, ITESM Campus Querétaro (Ortíz-Chao, Llamas, et al., 2012) c) Elaborated by the author based on (INEGI, 2010).

From these observations it is clear how, regardless of their spontaneous and/or informal origin, the urban logic of the three IHS study areas is similar to that of a functional place like the HCQ. It can be observed that morphology and structure of these zones makes them permeable and accessible, which promotes interaction and, within it, the existence of facilities, services and retail whereas the structure of El Campanario inhibits it.

Table 3 shows that average global and local spatial values of the three IHS areas are higher to those of El Campanario. In a global scale, centrality values are closer to the ones obtained for the MZQ, indicating that the IHS areas replicate the city's logic at a smaller scale. Their local integration or centrality values at an 800m radius fluctuate between those of the HCQ and the MZQ while centrality at 1200m is close to that of the HCQ. The study area of *Francisco Villa* stands out showing local values above those of the HCQ for both radii.

Table 3 Comparative summary table of global and local centrality. SOURCE: Elaboration by the authors based on a local integration analysis. (CINUM, ITESM Campus Querétaro (Ortíz-Chao, Llamas, et al., 2012)

	Study Area	Average global integration	Average local integration (800m)	Average local integration (1200m)
1	*San Pedro Mártir*	*3915.16*	*151.01*	*102.58*
2	*Francisco Villa*	*4178.58*	*245.34*	*141.72*
3	*Altos de San Pablo*	*3844.72*	*140.41*	*100.86*
4	*El Campanario*	*2715.60*	*76.31*	*48.58*
5	*Centro Histórico*	*5913.44*	*226.15*	*113.53*
6	*Zona Metropolitana de Querétaro*	*4373.13*	*102.18*	*64.07*

Table 4 summarises the offer of facilities and services by area. It also points out the number and percentile of retail premises on the 5% most accessible streets of each area. The percentages of the three IHS areas range between 12 and 32%. This supports the theory of movement economies even though their figures are under that of the HCQ (55.34%). This argument is

reinforced when block size is analysed. The most frequent size range for all IHS is smaller than half a hectare in more than 72% of blocks. Meanwhile, the most frequent range for El Campanario is half to one hectare; this applies to 17.6% of blocks only.

Table 4 Statistic summary of study areas. SOURCE: Elaboration by the authors based on DENUE 2011 and INEGI 2010

	Study Area	Area (hectares)	Facilities (units)	Services (units)	Facilities and services by hectare	Number of retail units on 5% most integrated lines (800m)	Block size (Most frequent range and number of occurrences)
1	San Pedro Mártir	38.66	5	2	0.181	9/28 (32.14%)	0.00-0.50 ha (55/73) 75.3%
2	Francisco Villa	50.57	1	3	0.079	31/107 (28.97%)	0.00-0.50 ha (75/90) 83.3%
3	Altos de San Pablo	59.34	0	2	0.033	9/73 (12%)	0.00-0.50 ha (66/91) 72.5%
4	El Campanario	371.80	0	1	0.002	0 (0%)	0.50-1.00 ha (6/34) 17.6%
5	Centro Histórico	217.07	39	238	1.276	1418/2565 (55.34%)	0.00-0.50 ha (45/143) 31%

5. Relationship between social participation and urban context

Why is unplanned closer to what is considered successful, both in its structure and in the way it works? To begin to understand this issue, participation and social capital are explored based on research about the Map of Organized Participation in Queretaro (MPQ) also being developed by CINUM (Biondi, Barbosa, y Llamas 2013)[4]. This project tries to represent inhabitants' success promoting actions and allocating funds for communal benefit. At the moment, the MPQ includes two out of seven *delegaciones* of the MZQ: Epigmenio González and Cayetano Rubio. Therefore, out of the three study areas only *Altos de San Pablo* is included. The study is based on four basic indicators: Number of actions, Type of actions, Type of funding and Social perception. A Final index combines all previous indicators.

The map of Number of actions (**Figure 7a**) measures the count of activities promoted by the inhabitants committee and it suggests a general idea of the population's predisposition to collaborate and organise themselves. *Altos de San Pablo* study area comprises 11 IHS, and one of those, shows the highest number of actions of the whole sample. However there are also neighborhoods with lower number of actions in the area (**Figure 7**).

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[4] Project supported by CONACyT (National Council for Science and Technology).
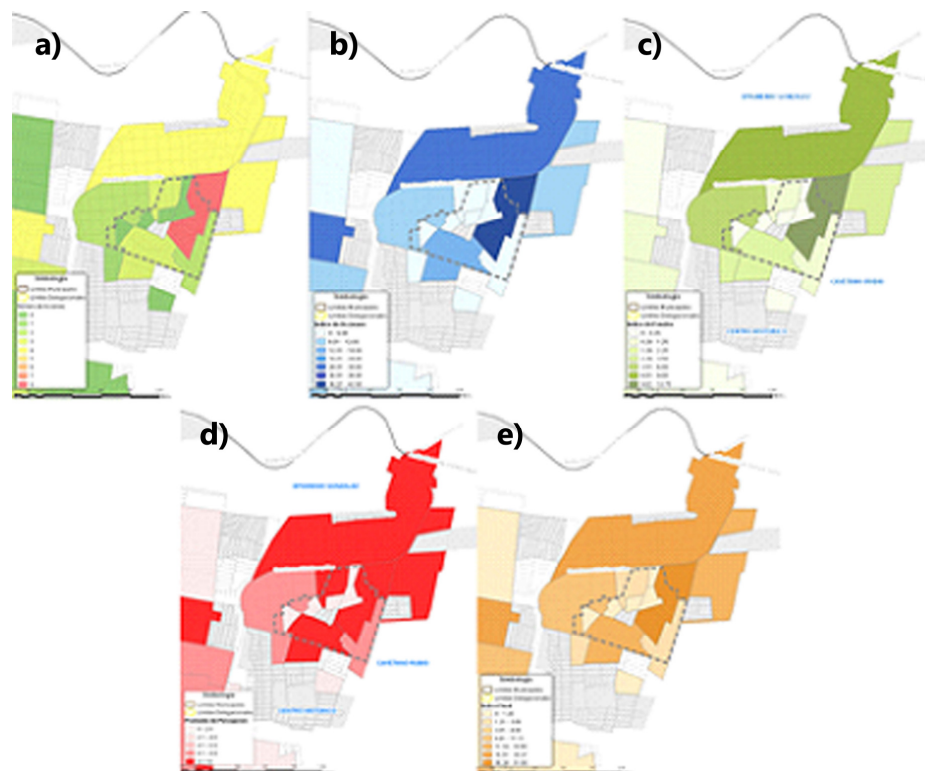
Figure 7 Indicators from the Map of Organized Participation in Queretaro (MPQ) for the third study area (Altos de San Pablo) in Epigmenio González a) Number of actions, b)Type of actions, c)Type of funding, d) Social perception, e) Final Index SOURCE: Organized Participation in Queretaro Map (MPQ) (Biondi, Barbosa, & Llamas, 2013) (CINUM, 2013)

The main purpose of the Type of actions indicator is to measure the complexity of actions according to its kind (Infrastructure = 1 point, Facilities = 2 points, Public space = 3 points, Community fund allocation = 4 points) and diversity. The higher the number and variety of actions, the higher the indicator (**Figure 7b**).

In this case, the study area displays very similar results compared to the Number of actions. The neighbourhood showing the highest Number of actions of the whole sample reflects high Type of actions index while most of the neighbourhoods that are part of the study area are closer to the lowest range of the indicator. However, as shown in **Figure 7a**, the study area presents a cluster with visibly higher values than the rest of the sample in both delegaciones.

In its part, Type of funding indicator intends to reflect the variety and corresponding complexity of the allocated resources (Municipal = 1 point, State = 2 points, Federal = 3 points, NGO's = 1 point, private company = 2 points, financial entity = 2 points, inhabitants = 3 points) for the development of actions programmed by the inhabitants committee. This indicator evaluates best those neighbourhoods involved with funds of diverse origins. Just like the Number and Type of actions, it shows a group of neighbourhoods with high and medium values. One locality within the study area appears with a higher indicator whereas the rest vary between low and medium values (**Figure 7c**).

The Social perception map reflects inhabitants' opinion about the actions carried out in their neighbourhood according to five basic criteria ranking excellent, very good, good, fair, and poor (**Figure 7d**). Average perception expresses very interesting and, perhaps more specific, information about our case study. It is evident that the cluster of neighbourhoods registering

high indexes in all the previous indicators is even higher on this one regardless of the fact that their actions and funds seemed non-significant. The perception of actions executed by inhabitants themselves puts on the table the discussion on the role of IHS morphology together with social capital.

At last, the Final index shows the combination of all the indicators previously described (**Figure 7e**). It shows the same cluster of neighbourhoods with medium and high indicators in our study area, Altos de San Pablo. Even when this is not the only zone with higher scores, it clearly defines an area with medium-high prevalence.

It is worth mentioning that given that the MPQ analyses these two delegaciones of Querétaro as sample, El Campanario development is also included within. Yet, this neighbourhood is not registered in the inhabitants' committee database of Félix Osores.

6. Discussion and conclusions

Data presented in this paper expresses that irregular settlements adapt to their formal contexts despite the unfavourable situation they are in in aspects as important as facilities, services and infrastructure provision. In addition, that their urban structure can function better towards the inside, with permeability and accessibility conditions according to their scale, land use mix and, in general, urban vitality and healthy social interaction levels, compared to contemporary formal developments.

As the MPQ shows, an important difference seems to lie on the existence or lack of participation and social capital. As an example, the study area has good perception of actions by its inhabitants and good levels of participation in spite of low indexes on actions and funding.

So, what is the relation between morphology and social structures? How are these structures reflected in the urban context? It is clear that the logic behind the form of IHS is similar to that of old European cities of production. This is to say that the raison d'être of its structure is instrumental and relates to day-to-day practices that guarantee the survival of this kind of settlements. As in most functional cities, the organization of society is given by organic solidarity, and is defined by the division of labour (Durkheim 1893).

In places like El Campanario, on the other hand, form acts as a mechanism for social reproduction, but not with a symbolic character as in prehispanic cities, but as reproduction of economic power through exclusion of those who "do not belong". In cases like this, the form itself and consequent mono-functionality of space limit the flow of strangers. Security grills and surveillance cabins only reinforce this practice. It might seem that some societies are undergoing a setback to mechanic solidarity (ibid) where there are a group of guilds (or ghettos) formed by members with similar categorical characteristics, but without a true collective conscience that gives them a meaning.

Borja argues that the "civitas[5] cohesion is based on citizen's equality, access to all urban services and activities developed in the city and the existence of mechanisms that reduce inequality and stimulate social mobility" (Borja 2003). Apparent spatial disadvantage of the IHS analysed seems to be compensated by their bottom-up process of growth, emphasizing the dynamics of production above those of power reproduction. Which of the two types of settlements presented contributes to an equitable city?

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[5] *Civitas* or the city as a place that produces citizenship and the field to exercise it (Borja 2003). pág. 64

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