🏆 *reviewed paper*

Density Exercises in Projects of Oriol Bohigas. Density as a Tool for Suburbs Regeneration

Cecilia De Marinis

(PhD Student Cecilia De Marinis, Roma tre university, DIPSA – Dipartimento di progettazione e studio dell'architettura, Piazza della Repubblica, 10 00135 Rome, arch.ceciliademarinis@gmail.com)

1 ABSTRACT

The starting point of this research is the assumption that nowadays to regenerate – rather than to build from scratch – is a necessity. Regeneration is fundamental to avoid further land consumption, curb urban sprawl and reduce resources consumption.

In the context of urban regeneration, residential periphery deserves special attention.

Residential peripheries are nowadays marginal, because they are awfully connected, undifferentiated, mono-functional and lacking in basic services. They are unable to respond to changed housing requirements, and inadequate from morphological, typological and energetic perspectives.

At the same time, these neighborhoods are a significant resource, because of their size and transformation potentialities.

The chosen approach considers density as the main criterion to guide and check the projects of reconstruction of residential periphery.

Density, as an urban variable, is a quantitative parameter that affects both architecture and life quality, i.e., the quality of life of the inhabitants of the architecture. In this research the concept of density is extended to a three-fold meaning: density of buildings (with particular attention to density interpretation in terms of surface: FAR – floor area ratio), density of encounter (whose values are randomness and closeness), and density of uses (differentiation of activities and functions).

The choice to focus on Oriol Bohigas, architect that works in Barcelona since 1951, is justified by his vision of planning and also by his determination to promote city reconstruction rather than city expansion. Indeed, he is in favor of a compact city, with a high density of people and activities. The work of Bohigas takes place in the space between plan and project: the plan tends to the project and the vision of the process is always recognizable.

From this perspective, the local dimension gains a relevant value and the transformation strategy for the city is improved through punctual actions for services development and reconstruction of public spaces. The elements involved in regeneration are housing, city block and urban space, whose hierarchies and forms are pivotal points for planning. Following this recipe, the urban project becomes a strategy for high impact changes.

To compare with criteria and solutions in plans and projects of Oriol Bohigas, a selection of representative projects will be analyzed, through the reading key of density, with focus on residential themes and actions in the consolidated city.

The outcomes of this research will include an evaluation of the relevance of cognitive contents that relate the work of Bohigas with the concept of density. Also included will be the extrapolation by deduction of a possible "Bohigas Method", an intervention method, defined by project and process strategies, for the regeneration of urban periphery. These strategies are based on concepts like: functional differentiation, strong relation between plan and project, local dimension, city block as regulation element and urban space differentiation, through hierarchies and forms.

2 URBAN REGENERATION AND SUSTAINABILITY

Urban regeneration, a central issue in current urban planning, is a strategy for the sustainable development of cities.

The term urban regeneration has taken partially the place of more traditional terms like renewal, redevelopment, renovation, and restoration. The term refers to something "organic", embodying the changing and unpredictable transformation of the contemporary city.

Cities are among the main culprits and victims of ecosystem destruction. The first step towards limiting the damage caused by cities to the ecosystem is overcoming the linear metabolism model, which consumes

ISBN: 978-3-9503110-4-4 (CD-ROM); ISBN: 978-3-9503110-5-1 (Print)
Editors: Manfred SCHRENK, Vasily V. POPOVICH, Peter ZEILE, Pietro ELISEI

energy and produces huge amounts of waste. The alternative approach is the circular metabolism model (Rogers and Gumuchdjian, 1997), that reduces resources consumption and increases recycling, thereby reducing the production of waste, in a circular system of use and reuse.

The aim of urban regeneration is therefore the construction of a sustainable built environment, in which the word sustainability applies to welfare, safety and environmental care. Urban regeneration aims at improving the quality of life in the city, in a constant comparison between the potential of existing buildings and user's changing needs.

3 BUILDING ON BUILT

The starting point of this research is the assumption that, today, regenerating rather than building from scratch, is a necessity. Regeneration is fundamental to prevent further land consumption, limit urban sprawl and reduce resource consumption.

The compact city is the best model to reduce consumption. It focuses on the density of compact urban fabric as opposed to uncontrolled urban growth. This defines a new paradigm: building on built.

Nowadays choosing regeneration over substitution is an ethical imperative that becomes an aesthetic choice, which has been named duration aesthetic (Magnago Lampugnani, 1999).

The regeneration process has an added value: temporal continuity. The radical break accomplished through demolition and reconstruction is replaced by a continuity in urban development: it's the renewal, achieved through building the city layer by layer. It's a mechanism that allows a gradual and seamless urban development, like the process of a river's bed sedimentation (Van Schagen Architekten et al. 2009).

The history of the place is a value, the traces of the past can be found in the ground, in buildings, in the countryside, in the views, but also in space, obstacles, borders, links, intentions, successes and the failures.

There is a need to understand and exploit the opportunities offered by the existing buildings, trying to awaken their potential, rather than destroy them.

The renewal of existing assets is today both a requirement of sustainability and an opportunity. The existing assets is not only a problem to be solved, but also a great resource.

4 RESIDENTIAL SUBURBS: PROBLEM AND RESOURCE

Suburban districts merit a special attention in the context of urban regeneration. Suburban districts are today marginalized places, because they are badly connected, undifferentiated, monofunctional, lacking the most basic services, and gravitating around overcrowded urban centers. Furthermore, this housing stock is incapable of responding to changing housing needs and inadequate with regard to morpho-typological and energy requirements.

At the same time, these neighborhoods are a substantial resource, because of their size and potential for transformation.

Periphery is often defined by negation: as the place of lack or the place of loss [1]. The suburbs lack quality, meaning, and identity. Space organization, consistency, shape, boundaries are all lost.

The term periphery derives from the greek "peri" ("around") and "pherein" ("carry") and indicates areas of a city outside the historic center, in a vision antithetical between center and periphery.

Today it is more evident than ever that the geographical dichotomy center-periphery is passed. It is common to come across suburban areas that are part of the urban development. The definition of these areas is no longer based on geographical location but depends on the their characteristics. One can speak of a new peripheral condition[2] which includes space, society and culture.

[1] Concept defined by Paola Di Biagi in her article “La periferia pubblica: da problema a risorsa per la città contemporanea” (2006).

[2] Giovanni Caudo in his article “Periferia di cosa?” (2009) says that there is a way to be peripheral even before being grounded in a peripheral location in a interstitial city, where the casualization of the statutes draws unexpected geographies that out alongside forms of so-called exclusion with normal integration. Original text: “Emerge un modo di essere periferici prima ancora di radicarsi in localizzazioni periferiche descrizione di una città interstiziale nella quale la

Today two main features identify the peripheral areas: provisionality and incompleteness, especially in the use of the open space and community facilities. Often these areas are incomplete with respect to the original project. Planned services are missing or there is no design of public space.

These characteristics of impermanence and non-finiteness reveal the potential for transforming the suburbs. The suburbs are indeed able to regenerate themselves and become an active resource.

The provisional character is accompanied by a number of problematic aspects that define the peripheral areas. The existing buildings are increasingly lacking and defective, they do not meet changed and changing needs of users, and do not meet minimum requirements for energy efficiency. Buildings built before the 70s did not include any device for energy saving and need today a strong action in this regard. Moreover, we are witnessing an increasing diversification of housing demand: increasing number of families, progressive reduction of the nuclear family, aging population, growing presence of foreign families, young people living in the household. This diversification compels to act on the existing offer of undifferentiated accommodation in residential complexes.

Other problematic aspects of the suburbs are size and proportion. Size is often too large, distances are too wide, open spaces are empty and huge. The large scale discourages people to stay and do activities.

This leads to a lack of recognition and identification and to an almost total disuse of those spaces that should contain the core of urban life in these neighborhoods, at the expense of those relationships that could and should occur in those open areas. "Great distances between people, events, and functions characterize the new city areas. Transportation systems, based on the automobile, further contributed to reducing outdoor activities. In addition, the mechanical and insensitive spatial design of individual building projects has had a dramatic effect on outdoor activities" (Gehl, 1987).

Furthermore, the post-war planning has changed the way of life between the buildings. Urban life was taken outside of the housing complexes, forcing them to depend from the nearest urban centers. This has discouraged pedestrian circulation in favor of motor traffic.

Fig. 1: Examples of peripheral areas where regeneration is completed or in progress. 1) Park Hill, Sheffield. The housing complex was built in '60s and partially renovated. 2) Bijlmermeer, Amsterdam. Housing complex built in '70s and completely renovated. 3) San Cristobal de los Angeles, Madrid. Neighborhood built in '60s and partially renovated.

precarizzazione degli statuti disegna geografie impreviste che rendono contigue forme di cosiddetta esclusione con situazioni di normale integrazione basterebbe a testimoniare di una simile evoluzione".

ISBN: 978-3-9503110-4-4 (CD-ROM); ISBN: 978-3-9503110-5-1 (Print)
Editors: Manfred SCHRENK, Vasily V. POPOVICH, Peter ZEILE, Pietro ELISEI

An interesting term to define this type of urban planning is desert-planning [3]; peripheral areas take the form of no man's land, lifeless places, deserts.

The negative characteristics mentioned above are at the same time considerable potentials for transformation. One example are the great outdoors, today among the largest green and open spaces, that creep in urban areas and are very useful elements for action.

The redevelopment of peripheral housing is a key element to restore urban quality of life in large degraded urban areas.

5 DENSITY AS REGENERATION TOOL

In the proposed approach density is the main criterion for guiding and controlling the redevelopment of residential suburbs. As an urban variable, density is a quantitative parameter, that has implications for the quality of both the architecture and the life of those who live there.

In this research the concept of density has a triple meaning: density of built, density of encounter and density of uses.

The first aspect, built density, reads the density in terms of quantity measured in numbers. Density is a ratio, a tool of analysis, interpretation, planning and control of urban development.

In this analytical approach, density is defined as the "relationship between architectural consistence and anthropized surface"[4] (Reale, 2011). It has a great value in measurement and control of urban space, indeed "to study urban density means going back to measure the space"[5] (Reale, 2011).

There are three main types of density measurement from the point of view of urban planning: lodging per hectare; inhabitants per hectare; surface per hectare.

The last type of measurement highlights a value equivalent to the ratio between all floor area and the settlement area, and it's called FAR: floor area ratio. This type of measurement does not give functional information but volumetric consistency information. It's useful to represent the relation between the density and shape of built. Thus it refers to morphological and volumetric features of urban system, rather than to population's demographics.

Different densities define different qualities of space. It may be interesting to do an analysis of this type applied to Rome, comparing center and periphery. Comparing the density values of some peripheral areas of Rome with the values of some areas of the center is possible to have an immediate feedback on the relationship between density number and the quality of life in the considered areas. The density in the central districts of the city settles something over 2 [6]: 2.71 in Prati district, 2.91 around Bologna Square, Balduina district is 2.56, and nearby Re di Roma square the ratio is 2.38. In remote areas density drops significantly: 1.01 in San Basilio district, 1.34 in Laurentino, 0.69 in Val Melaina, 0.64 in Spinaceto.

These data by themselves speak of how density can be a powerful key for reading urban quality.

In this research we want to emphasize density understood in qualitative terms, i.e. urban intensity. The idea is to go beyond quantitative measurement of urban environment's density to measure qualitative density, i.e. the features of built environment. These features affect relationships between people by realizing, hindering or facilitating them.

The degree, extent and nature of outdoor activities are influenced by the physical design of space "through planning decisions to influence patterns of activities, to create better or worse conditions for outdoor events, and to create lively or lifeless cities" (Gehl, 1987).

Accordingly, it is possible to speak of encounter density. Proxemics is the discipline dealing with personal and social space and the way in which man perceives it. In addition, proxemics considers distances between

[3] The term desert-planning was introduced by Gordon Cullen in his text "Townscape" published for the first time in 1961.
[4] Translation by the author. Original text: "il rapporto tra consistenza architettonica e superfice antropizzata"
[5] Translation by the author. Original text: "Studiare la densità urbana significa tornare a misurare lo spazio"
[6] All values are calculated as F.A.R. floor area ratio. Values are defined by Luca Reale in his text "Densità, Città, Residenza" (2011).

people, which vary according to culture and history. In our culture, proximity is a value and a necessary element of the definition of the city. Together with random personal interaction and neighborly relations.

The density of meeting refers to frequency, character, and controllability of random encounters. It defines the quality of urban life, in contrast with loneliness and dispersion of the suburbs: " This density of encounter is the substrate of sociability and the material basis of democracy"(Sorkin, 2003)

A neighborhood where you can live well is also represented by another type of density: density of uses. The quality of urban density refers to the quantity and diversity of functions, necessary elements for promoting the variety of everyday experience: " Cities are public reservoirs for the production of private experience" (Sorkin, 2003)

Hence to act on urban density "is not simply to densify or infill but establishing new relationships, building close relationships"[7] (Caudo, 2009). The goal is to grow what has been called the third city [8], which is not city's expansion nor conservation, but is the city of regeneration, of redevelopment, transformation of what was built, in relation to ability to create a human scale city. In such a city the boundary is not a site of separation but a meeting place between differences.

6 ORIOL BOHIGAS: A REFLECTION ABOUT THE CITY

The choice to focus on Oriol Bohigas, architect active in the city of Barcelona from 1951, is based on his work's appraisal. Since the '80s, Oriol Bohigas was an advocate of city reconstruction versus city expansion. He promoted returning to a compact city, with a high density of people and activities. He has actively contributed in the '80s and '90s, to transform the city of Barcelona, participating both as a designer and as technician of the municipality city-plan office, moved by the idea to give urban value to architecture. Bohigas planned expansion and opening of the city towards the sea, through the transformation of the Barceloneta neighborhood.

He has a vision with a planning flavor. His work is at the junction between plan and project: the plan tends to the project and the relationship between them is always recognizable.

Oriol Bohigas sees the city not as an unicum but as a juxtaposition of parts. He defines the neighborhood as the main urban planning unit. In this view, the local dimension acquires great value. The strategy of city transformation is implemented through precise actions for services development and reconsideration of public spaces.

He has contributed greatly through ad hoc actions to urban transformation through interventions in the consolidated city, that is inside the Eixample district, created by the Cerdà plan [9], focusing on the theme of the city block.

Oriol Bohigas, as designer, has in fact worked a lot on housing, mainly focusing on urban space design and community services. Indeed, he considers urban design a strategy for high impact changes. City regeneration begins from building community space. Hierarchies and forms of urban space are key points for planning. Streets and squares are pivotal points for designing public space. The street is important on a small scale, corresponding to the dimension of urban life. The square is also important on a small scale, because it expresses place's spatial culture. It is necessary to understand and interact with the site to build quality public spaces.

The elements involved in regeneration are: housing, city block, and urban space. The latter with its hierarchies and forms. Actions should be taken to regenerate attraction capabilities and recovering formal dignity, that helps improving the sense of community (Bohigas, 1986).

Bohigas, in his reflections on the transformation of the city, attaches great matter to density. He believes in the necessity to rebalance city's density and uses. A qualitative and quantitative homogenization of the city is, for Bohigas, necessary. You have to rebalance meanings and uses, and restore or provide urban quality of

[7] Translated by the Author. Original text: "Non è semplicemente densificare o riempire (infill) ma stabilire nuovi rapporti, costruire relazioni di prossimità"

[8] The term Third city is defined by Giovanni Caudo in his article "L'abitare e la città al tempo della crisi" (2009). Third city is densification, is building the city into the city (...) therefore is not a merely quantitative operation". Original text: "La terza città è densificazione, è costruire la città nella città (…) quindi non è operazione meramente quantitativa"

[9] Urban plan for the expansion of the city of Barcelona, created by Ildefons Cerdà and approved in 1860.

life in the spaces of suburbs. Indeed, he focuses on the density of use. An effective method for regeneration is to reconsider the intended use of a neighborhood in a sort of Plan of Uses. The combination of work, housing and leisure activities allows to define the city.

It is important to include the work of Bohigas in the regulatory environment in which he operates, and then study what he achieved in relation to city laws. The reference urban plan in Barcelona is the PGM-76, which is the achronym for Plan General Metropolitano de Ordenación Urbana, drawn up in 1976. This plan defines rules for soil use, density limits and standards.

The regulation of soil regime is very interesting for this research. Urban development areas are defined according to the intensity of use. Areas with specific physical features and urban classification are assigned a definite intensity of use [10].

The plan does not give a detailed order, but clearly defines the proportions between volume and empy space. The plan defines first the minimum standards to be met, and then gives an index of buildability based on the different density of use attributed to the various areas.

Reflections on urban density and intensity are strongly considered in the urban plan that includes Bohigas's projects.

Fig. 2: Some case studies: projects of Oriol Bohigas. 1) La Maquinista Block, Barcelona, 1983. 2) La Salut Block, in Sant Feliu de Llobregat (Barcelona), 1973. 3) Housing block in Mollet (Barcelona), 1983.

7 RESEARCH METHOD: AN EMPIRICAL COGNITIVE PROCESS

To evaluate the criteria and solutions in the plans and projects of Oriol Bohigas, a sample of representative projects will be analyzed. The key to select the projects is density, with a focus on residential themes and actions in the consolidated city.

Case studies will be selected that meet the following criteria: must be a predominantly residential complex, must be actions on a whole city block. The latter criterion permits to understand clearly the practices applied.

The research is based on an empirical cognitive process. The analysis is based on detailed and thorough study of physical features and use of space, as defined in the projects.

A table of assessment indicators will be defined for case studies analysis. Indicators aim to provide an assessment as objective as possible of building complexes rated by qualitative density. That goal is to gather information about those design procedures that modify space and the way in which it is lived, and that determine ultimately whether or not there is a good quality of life in urban areas.

[10] Normes urbanístiques del Pla General Metropolità. Títol II, Règim urbanístic del sòl.

Indicators for analyzing projects will be divided into two main types: indicators describing physical space and indicators showing interaction between space and users. Indicators of the first type refer to build space in function of its physical, dimensional, aesthetic properties.

Indicators that describe physical space will respond to the following questions: How are inner and outer space connected? Are boundaries defined or fluid? Is there a gradual transition between the public and private space? What is the relationship between built and empty space? How much outdoor space is green? How much open space is walkable and how much is private? How is the ground floor organized? What is the relationship between building height and open space width? Are there any services for residents? Is there a differentiation in colors? How is the system of routes configured? Distances are long or short? Walkways are covered or not? Are there are spaces to rest, to walk, to sit? What kind of paving is used?

Indicators which describe the interaction between space and users respond to questions such as: In outdoor space are there optional activities besides the basic ones [18] ? What is the frequency of interactions between people? Are there passive, chance encounters? What is the traveling speed outdoors? What activities will be carried outdoors and for how long? Is a sense of safety perceived? Is there a protection against noise, weather, traffic, hazards?

The method of analysis is to be based on perceptions of space. Carrying out such an analysis requires a prolonged stay in the building complex being analyzed, in order to understand how the space is used at different times of day. Indicators are therefore analytical tools necessary to give objectivity to observations.

The next step, after case studies description, is comparison between cases. By comparing data obtained through the indicators it is possible to deduce the constant features which determine the good quality of urban spaces.

8 CONCLUSIONS

These constant features can become design guidelines for the reconstruction of city character in peripheral urban areas. Those areas where this character has been lost or city qualities have never existed. The goal is to extrapolate by deduction design strategies to be applied extensively. The outcome of this research prefigures the definition of a possible method based on intervention design strategies, extrapolated from the comparative analysis. Such strategies are based on architectural devices, able to provide urban quality of life in spaces of suburbs.

This method can be an answer to the regeneration requirement of peripheral areas. This method can provide information about the elements on which to act and the methods of intervention, modifying urban density and intensity. The final goal is to provide or restore urban quality of life in degraded urban areas and thus allowing a wide-ranging regeneration.

The research will add an innovative contribution to the issue of regeneration of suburbs, using urban density as means of regeneration, using the example of Bohigas's work.

A possible development of this research is a feasibility test of this method applied through a simulation. The simulation could be applied for a suburban area in Rome metropolis, with the involvement of city government and inhabitants.

9 REFERENCES

BAUMAN, Zygmunt: Trust and fear in the Cities. It.tr. Milan, 2005.
BOHIGAS, Oriol: Reconstrucción de Barcelona. Madrid, 1986.
CAUDO, Giovanni: Periferia di cosa?, in Macramè, 3. Florence, 2009.
CAUDO, Giovanni: L'abitare e la città al tempo della crisi, in Ambiente Italia 2011. Il consumo di suolo in Italia. Annual report Legambiente, Edizioni Ambiente. Milan, 2011.
CULLEN, Gordon: Townscape. London, 1961.
DI BIAGI, Paola: Città pubbliche: linee guida per la riqualificazione urbana. Milan, 2009.
DI BIAGI, Paola: La periferia pubblica: da problema a risorsa per la città contemporanea, in: Oltre la città: Pensare la periferia. Naples, 2006
FRAMPTON, Kenneth: Bohigas, Martorell, Mackay. Milan, 1990.
GEHL, Jan: Life between buildings: Using Public Space. New York, 1987.
GELSOMINO, Luisella; MARINONI, Ottorino : Territori europei dell'abitare 1990-2010. Bologna, 2009.
HERZBERGER, Herman: Space and the architect. Rotterdam, 2000.
MAGNAGO LAMPUGNANI, Vittorio: Modernità e durata. Proposte per una teoria del progetto. Milano,1999.
MARTORELL, Josep; BOHIGAS, Oriol; MACKAY, David: MBM: fiaschi. Florence, 2001.

MBM Arquitectes: Obras y proyectos 1993-2006. Barcelona, 2006.
NANNERINI Giuseppe; MANDOLESI Domizia: Lo studio MBM: O. Bohigas, J. Martorell, D. Mackay, A. Puigdomenech: progetti e opere. Rome, 1996.
REALE, Luca: Densità Città Residenza. Rome, 2011.
ROGERS, Richard; GUMUCHDJIAN, Philip: Cities for a small planet. London, 1997.
SORKIN, Edward: Pensieri sulla Densità, in Lotus, 117. Milan, 2003.
VAN SCHAGEN ARCHITEKTEN; MOSCOVITER, Herman; MEURS, Paul: De Bestaande stad asl uitdaging. De Methode Van Shagen. Amsterdam, 2009.