

When a Patio Becomes a City

(In)volution of Carrières Centrales, Casablanca (1953–2018)

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Abstract

In the 1950s, the city of Casablanca underwent a surge in demographic growth. Having become a strategic port during the French protectorate, it quickly had to accommodate more than 140,000 new arrivals from the countryside.

The most extensive urban development project in the city was Carrières Centrales, introduced as a case study in the CIAM IX by the GAMMA team. Michel Écochard, Candilis and Woods reinterpreted the traditional Moroccan house in a compact horizontal fabric as well as in singular buildings. This became the typology not only for a house, but for the whole city.

A revisit to Carrières Centrales 65 years after its construction provides an understanding of the metamorphosis that the urban fabric has undergone over time. The critical analysis in this research aims to uncover the main architectural and social parameters that have influenced its transformation.

To achieve this goal, fieldwork was carried out during a research trip in October 2018. The work involved contacting local professors, accessing the archives of the University of Casablanca, interviewing the residents, and redrawing and graphing all the architectural elements that had changed since their construction.

The urban fabric of Carrières Centrales was found to have evolved in a way that supports the following hypothesis: if an urban model imported into a developing country does not adapt to the changes in the life of its residents, it is considered a failure.

Time defines, modifies and adapts architecture to meet the needs of society. Similarly, culture, politics and the economy influence the transformation of the city as a reflection of its population. The Carrières Centrales experience teaches us the need to include time as a parameter in the design process to address the increasingly complex contemporary city.

Keywords: Carrières Centrales, Casablanca, Time, Change, Society, Patio House, Modern Heritage.

Historical introduction

Casablanca during the French Protectorate (1912–1956)

Casablanca underwent rapid growth in a short period of time. In less than a century its population and economy grew exponentially, leading to intense social problems.

It was not until the 19th century that European merchants began to settle in the city. Its port went from exporting only 3% of Morocco's goods in 1836 to becoming the country's main port by 1906. During this period, the high demand for workers led the population to swell from seven hundred to twenty thousand inhabitants.

As the population and economy soared, so did port activity, resulting in the need to extend and improve the port's facilities. However, because the Moroccan government was economically unable to undertake the improvements, Spain and France decided to expand the port of Dar el Beida and thereby strengthen their hold in Morocco. Thus, the French protectorate began in Casablanca in 1912 and lasted until 1956.¹

During the protectorate, Casablanca experienced uncontrolled growth. The presence of the port turned the city from a semi-rural settlement to the country's international business centre. As the industrial sector developed, the demand for labour increased, but the city was unable to absorb the large number of immigrants.



Figure 1. Casablanca's extension plan: Development for 140,000 inhabitants. Michel Écochard, 1953 Drawing by: García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución.* Valencia: ETSAV (UPV), vol. B, 36.

Between 1900 and 1926, more than forty thousand people arrived in Casablanca from the rural countryside. In 1929 most of Morocco's industries were in Casablanca, but they only created employment for twenty-five thousand workers, most of whom were Europeans. This complicated social situation proved unwieldy for a city with such intensive development. Despite the scarcity of work, the rural exodus towards the cities continued unabated, with newcomers settling in five large development areas around Casablanca.

¹ Puschmann, P. 2011. *Casablanca. A Demographic Miracle on Moroccan Soil?* Leuven: Acco Academic, pp. 47-49.

Carrières Centrales' Bidonville

In 1953 there were approximately a hundred and forty thousand people living in slums in Casablanca. The most crowded one was Carrières Centrales, with fifty-six thousand inhabitants. Because it was located close to the port and well connected to the rest of the city, it became the first *bidonville* of immigrants from rural areas.²

The literal translation of *bidonville* is 'city of cans'. The term refers to slums that grew spontaneously and haphazardly, with no regard to city ordinances. These settlements reflected the population's need for affordable housing. They were structured similarly to Morocco's traditional rural settlements. However, high population density coupled with a lack of resources resulted in these neighbourhoods becoming unhealthy, unsafe and overcrowded.



Figure 2. Carrières Centrales' Bidonville: Bird's eye view, Casablanca South, 1950. Available through: Archnet website. https://archnet.org/sites/10130/media_contents/93707 [26 August 2020].

Within a few years, the *bidonvilles* urgently needed a renovation to rehouse thousands of people crammed into precarious dwellings. To address this objective, the architect Michel Écochard (1905–1985) was appointed by the French protectorate as the director of the *Servicio de l'Urbanisme* and leader of the GAMMA group (*Groupe d'Architectes Modernes Marocains*), which also included the architects Georges Candilis (1913–1995), Shadrach Woods (1923–1973) and Vladimir Bodiansky (1894–1966), among other professionals dedicated to the study and improvement of Morocco's urban planning.³

² See García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución*. Valencia: Universidad Politécnica de Valencia, Escuela Técnica Superior de Arquitectura.

³ See Écochard, M. 1955. *Casablanca. Le roman d'une ville*. Paris: Ed. de Paris.

'L'habitat pour le plus grand nombre'

In 1953, at CIAM IX in Aix-en-Provence (*Congres Internationale d'Architecture Moderne*) Michel Écochard presented a detailed research study on Morocco's urban situation and ideas for rationalisation and growth to be carried out in Casablanca. As the leader of the GAMMA group, he wrote '*Habitat pour le plus grand nombre*', a compilation of guidelines to give affordable housing to the inhabitants of the *Carrières Centrales bidonville*.



Figure 3. '*Habitat pour le plus grand nombre*': Guidelines for the development of *Carrières Centrales*. Grupo GAMMA. CIAM IX, Aix-en-Provence, 1953. Image in: Risselada, M. & Van den Heuvel, D. 2005. *Team 10, 1953–81, in search of a Utopia of the present*. Rotterdam: Ed. Nai Publishers, pp. 28.

To provide shelter for the masses, Écochard redefined the neighbourhood structure: the most basic level was defined as a 'neighbourhood unit': a group of one thousand eight hundred inhabitants, with basic services such as an oven, a mill, a playground and commerce. Five 'neighbourhood units' formed a neighbourhood quarter for nine thousand inhabitants with public resources: a mosque, a market, schools and other collective services.

Each quarter was articulated through its public spaces, which maintained a hierarchy. On a smaller scale, small-sized pedestrian streets gave access to dwellings and small squares to promote the social relations of the immediate neighbourhood. On a larger scale were avenues and squares of greater entity, reserved for traffic and public services that provided assistance to the quarter. Thus, the quarters had a condition of autonomous and independent management.

Écochard also noted the consequences of these neighbourhoods changing over time: an increase in the purchasing power of their inhabitants could trigger a formal growth and evolution of the habitat. In his urban vision, Écochard differentiated between the permanent part of the city (urban planning) and the transient part (construction). He saw buildings as a changing element that depended on economic conditions, on the pursuit of modernisation and on the change in the forms and needs of housing. In contrast, the urban fabric itself remained immutable:

*He qualified the inhabitants of his projects as évolués, which means that they were at an intermediate point between the rural and urban way of life.*⁴

⁴ Avermaete, Tom. "Farming the Afropolis. Michel Écochard and the African City for the Greatest Number". *L'Afrique, c'est chic. Architecture and Planning in Africa 1950– 1970*, OASE, 2010 (82), 77–89, pp. 91.

Re-interpretation of the traditional patio-house

The rehousing plan was modelled on the *bidonville* residents' way of life as well as on their rural home habitat, their customs and Muslim culture in general. Moroccan traditions allow several families to coexist in the same house: when a son became an adult and started his own family, he would continue to live in the same house along with his parents. Traditional houses had at least two rooms, as men and women lived in different spaces. The intense need for intimacy of this culture influenced the openings of the house: the windows were few and minimal, just enough to allow natural ventilation and lighting. Openings were placed high up to keep out of view from the street, thereby ensuring privacy.⁵

These influences were integrated into a prototype of housing: the patio-house, recognizable in historical medinas but also as pattern in the *bidonvilles*. The reinterpretation of the patio-house preserved the elements of vernacular architecture while defining a modern architectural proposal, granting health, flexibility and spatial richness.



Figure 4. Re-interpretation of the traditional patio-house: Historical Morocco kasbah (left) and new urban fabric based on the Écochard Grid (right). In: Risselada, M. & Van den Heuvel, D. 2005. *Team 10, 1953–81, in search of a Utopia of the present*. Rotterdam: Ed. Nai Publishers, pp. 298.

To this end, the *Trame Écochard* was established: an 8x8 m grid that organised the space geometrically. It was the basic structure and represented the minimum unit of single-family housing with a patio.⁶

Access to each house was through a 5x5m patio. All the openings that illuminated and ventilated the interior of the house looked onto it as well, thereby avoiding the need for exterior windows.

⁵ See García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución*. Valencia: Universidad Politécnica de Valencia, Escuela Técnica Superior de Arquitectura, vol. B, pp. 48.

⁶ Écochard defined the modulation of the 8x8 m grid according to similar measurements of the *bidonville*'s informal patio-houses.

The *Trame Écochard* not only delimited the measurements of the patio-house, but also served to create the urban layout from its first cluster to the entire fabric.

High-rise buildings were also given a place within this habitat, such as the *Nid d'Abeille*, the *Semiramis* and the *Tower* introduced by architects George Candilis and Shadrach Woods as a vertically configured reinterpretation of the patio-house.⁷

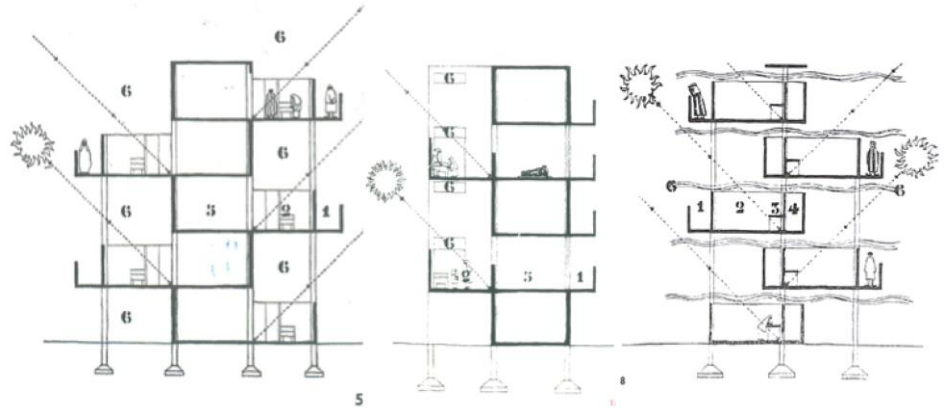


Figure 5. Vertical Patio-House Study: Candilis & Woods, 1952. Image in: MNAM-CCI, Dist. RMN-Grand Palais / Jean-Claude Planchet. *Habitat musulman, Types: Cellules*. Paris: Centre Pompidou, 1953, [https:// www.photo.rmn.fr](https://www.photo.rmn.fr).

The stacking of the patio-house unit was intended to be a model for the future growth and evolution of a denser city. It would be an example of the coexistence of Islamic and European cultures while meeting the needs of the Moroccan population through modern architectural design.



Figure 6. The Carrières Centrales neighbourhood: ATBAT + GAMMA group, Casablanca, 1953. Image in: García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución*. Valencia: ETSAV (UPV), vol. B, 55.

⁷ In 1951, Georges Candilis and Shadrach Woods travelled to Africa to lead the ATBAT office (*Atelier de B'isseurs*) along with Henry Piot: a research centre on architecture, engineering and urban planning founded by Le Corbusier in 1947.

Physical description

‘Écochard’s Grid’

The original model designed by M. Écochard for the horizontal fabric was organized into 8x8 meter patio-houses grouped into clusters⁸ of four dwellings. The location of a 2.40-metre-wide access street caused the variation in size of the four grouped units. The result was the diversity of the courtyards, the number of rooms (2–3) and the relative position of the entrance and services.



Figure 7. Écochard Grid: 8x8 m Four-patio-house cluster. Author’s drawing, 2018.

Through repetition, rotation and symmetry, the clusters formed a compact, continuous and complex horizontal fabric laid out around small community squares.

These patio-houses were built as a prototype in 1952. They were sold mostly to railroad workers, manufacturers, and individuals; only a minority the inhabitants were actually rehoused from the *bidonville*. At the following stage, however, the urgent need for rehousing prevailed, so the housing type was unified as a way to speed up mass production.⁹

Construction process efficiency led to the solution of a single housing type: two rooms around a 12 m² courtyard plus an outdoor shed for the kitchen and the toilet. The 8x8 fabric was interwoven with narrow streets (2 m wide) that gave access to the dwellings. In addition, the uneven terrain fragmented the original grid, which thus lost its condition of comprising a continuous fabric.

Repetition of a single module resulted in mass production of housing,¹⁰ but also in a monotonous grouping, offering the image of a horizontal honeycomb of a beehive.

⁸ Cluster was the word used by Team X to define the recognizable grouping of urban elements.

⁹ See Cohen, J., Eleb, M. 2004. *Casablanca. Mythes et figures d'une aventure urbaine*. Nanterre: Ed. Haza, pp. 319.

¹⁰ See Smithson, A. & P. "Criteria for Mass Housing". *Forum*, n° 1, 1960, pp.16-17.

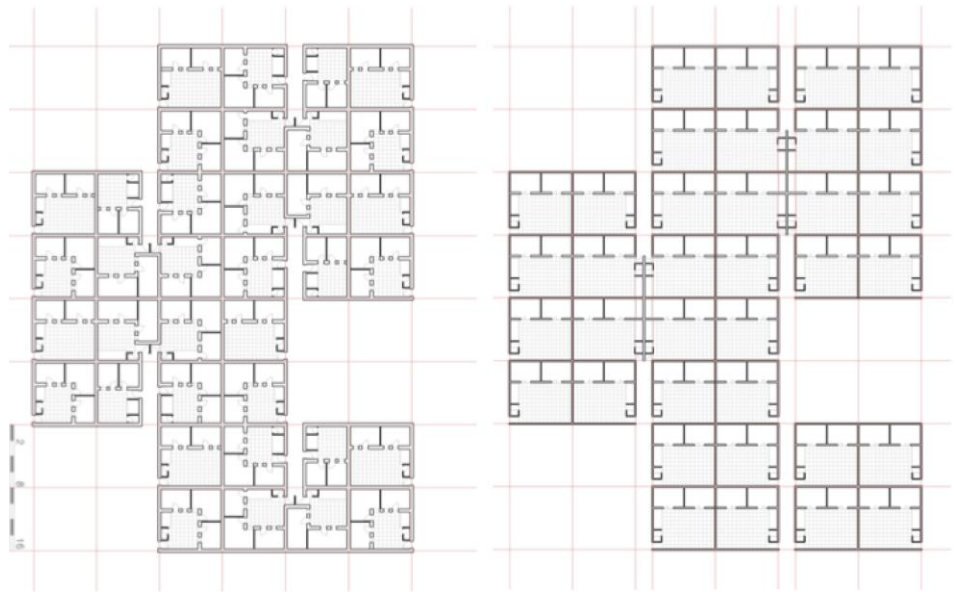


Figure 8. Écochard's Grid: Theoretical design (left) and as-built urban fabric (right). Author's drawing, 2018.

Nid d'Abeille

The ATBAT group, led by Candilis and Woods, reinterpreted the patio-house as a vertical housing development. Its first approach, still low rise, investigated the overlapping of patio-houses by using a three-dimensional configuration.

Arranged on two floors, the upper houses moved a module from the lower level. Two types of ground floor patio-house completed a 'zippered' system, where infill and void had the same value.

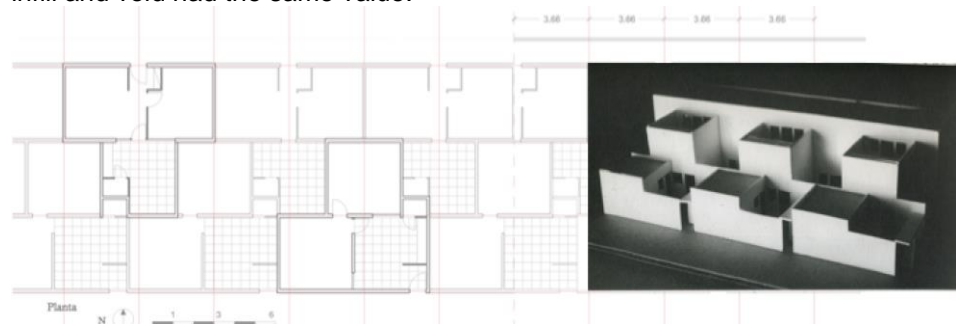


Figure 9. Row Patio-houses: Two-floor prototype. Candilis & Woods. Author's drawing, 2018.

The image of this facade was later developed in the five-storey building *Nid d'Abeille*. It was the maximum height allowed to develop an economical vertical structure according to the means of construction available. The regular arrangement of pillars allowed the alternation of infills and voids, as well as their displaced overlap, creating a 'checkerboard' facade of white volumes.¹¹

In contrast, the north facade featured a horizontal composition marked by the corridors. Inside, two-room houses had access to the courtyard, open at a double height but fenced by 1.80 m walls. The toilet and the kitchen in the courtyard were covered by the upper level, which ensured privacy while still affording ventilation and natural lighting.

¹¹ Multiple versions of this facade were developed, from similar compositions to those developed in France, to more abstract approaches that negated the window voids, as a reinterpretation of the indoor nature of the traditional Moroccan house.

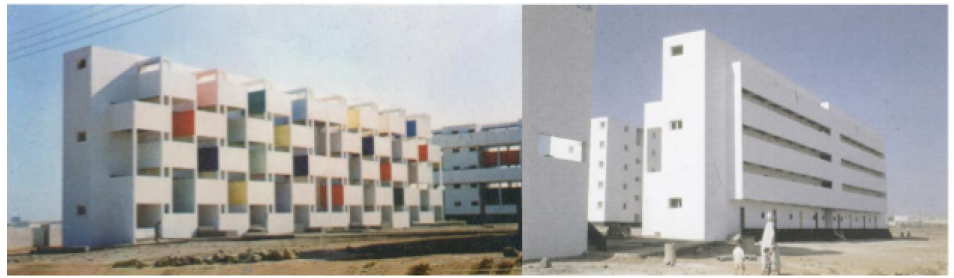


Figure 10. 'Nid d'Abeille': 'Checkerboard' south facade (left) and enclosed north facade (right). In: Risselada, M. & Van den Heuvel, D. 2005. *Team 10, 1953–81, in search of a Utopia of the present*. Rotterdam: Ed. Nai Publishers, pp. 29.

The proposal was published in the French magazine *l'architecture d'aujourd'hui*¹² but was not the one that was finally built. Indeed, a great many variations were considered in search of a more efficient and economical construction. The position of the vertical core was the most significant variation. The design originally called for a stairway at each end. However, only one in the middle of the floor was built, inducing a symmetry in the building and a disruption in the composition facade.

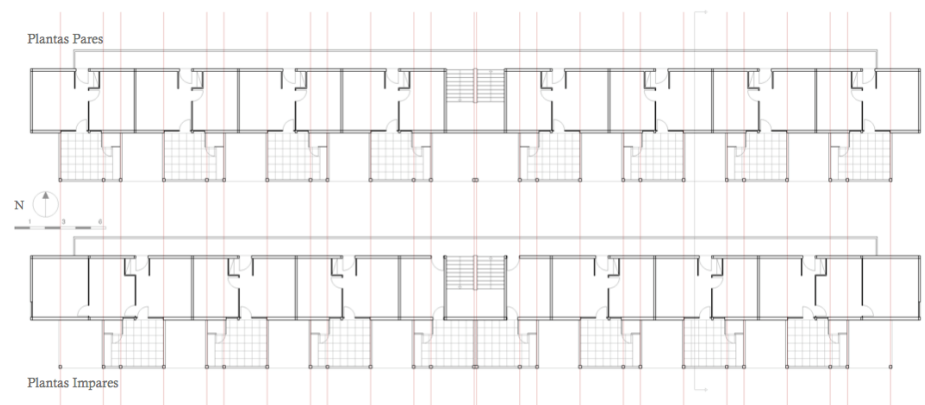


Figure 11. 'Nid d'Abeille': Second floor (above) and third floor (below). Author's drawing, 2018.

As a result, the basic housing type was modified, with three-room units at the ends and a one-room unit in the middle of the building. While these decisions distorted the formal purity of layout and composition, they also created a richer typology, open to multiple users with different needs and budgets.

Semiramis

The *Semiramis*, another five-storey building, was a linear block with an East-West orientation, grouping two-room units around patios through corridors in height.

Unlike the *Nid d'Abeille*, which clearly differentiated between its north and south facades, the *Semiramis* developed its east and west facades similarly because of the counterbalanced position of the linear corridors.

However, the shape also underwent changes regarding its original design. Initially, the rooms of the houses were arranged in a row, leaving a band of patios at the front and concluding the series with stairways at each end of the building. In this model, the kitchen and the bathroom, placed in the open courtyards, were unduly small and exposed to the weather.

¹² The 1954 cover of the French magazine 'l'architecture d'aujourd'hui' collected the primary coloured volumetry of *Nid d'Abeille*, as a symbol of modern developments in North Africa.

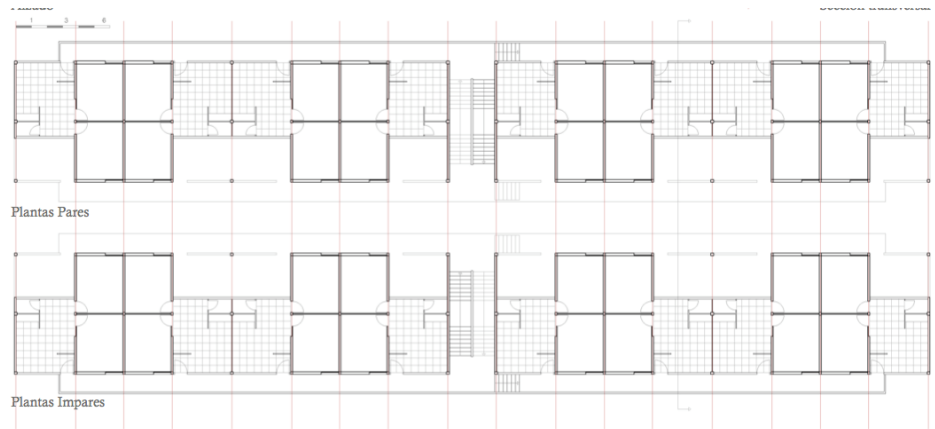


Figure 12. 'Semiramis': Second floor (above) and third floor (below). Author's drawing, 2018.

In order to save resources and promote functionality, the built project featured a single central communication core, which resolved accessibility on markedly sloping terrain. The corridors absorbed the height difference by incorporating stairs that determined the compositional character of the facades.

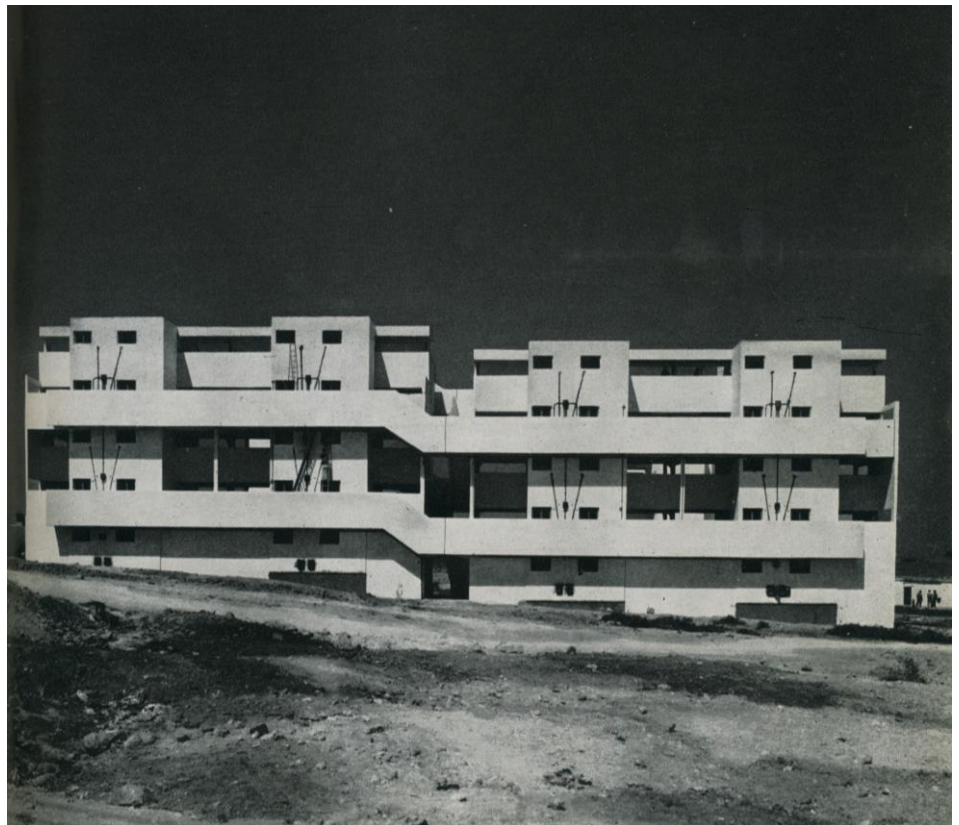


Figure 13. 'Semiramis' east facade: Candilis & Woods, 1954.

In the built design, the rooms of the houses were grouped into fours and alternated with patios in their symmetry, which configured two blocks of four rooms per floor, easily recognisable from the outside. Kitchens and toilets were on the same vertical and always covered by the counterbalance of the patios in height, making the system of facilities more efficient.

By contrasting infill and void, the *Semiramis* building sought an abstract volumetric composition, as did the *Nid d'Abeille*. But unlike the *Nid d'Abeille*, it did not shun having rooms with windows on the front facade, although it placed them high up to ensure privacy indoors.

The Tower

The third high-rise building was called the *Tower*, more for its centralised floor design than for its height, which was never more than five floors.

The ATBAT group's study proposed having six dwellings arranged around a vertical core. Each house had two rooms with access to an outdoor courtyard that alternated its position in height, recreating the composition of infill and void along the perimeter of the building. In this proposal, the toilets were located inside the dwellings rather than along with the kitchen in the outdoor courtyard, as in the *Nid d'Abeille* and *Semiramis* buildings.



Figure 14. The 'Tower': ATBAT Group theoretical design (left) Bodiansky built project (right). Author's drawing, 2018.

However, the engineer Bodiansky was in charge of the design that was finally built. His proposal was more compact, with identical layouts configured by four equal houses, which kept the toilets inside and the kitchens outside. But, unlike the Candilis and Woods proposal, the position of the courtyards did not vary in height, nor was their volumetry explicitly reflected on the outside, thus losing the characteristic 'checkerboard' composition of the facade.

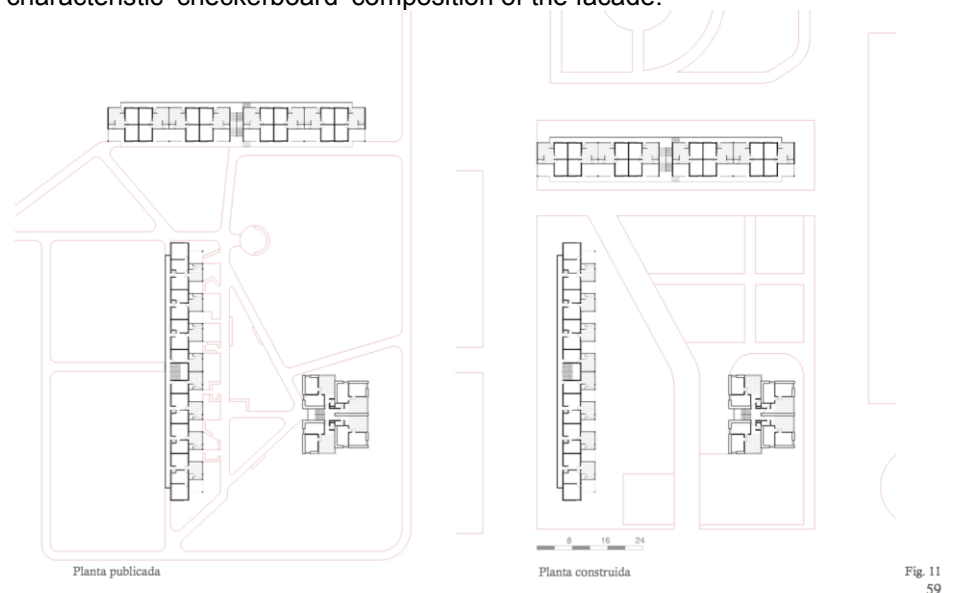


Figure 15. Free space: Theoretical design (left) and built project (right). Author's drawing, 2018.

In both the studio and the built block, the communications core was located on the north facade, facing the square with the *Nid d'Abeille* and the *Semiramis*. The position of the three buildings and the public space between them also varied from their original design: from a more organic composition with a decidedly pedestrian character to a more conventional planning based on road traffic access.

(E/In)volution analysis.

The changes in the urban fabric over the years are numerous and complex. Today, it is difficult to recognise the neighbourhood that was Carrières Centrales in 1953. Even its name has changed. It is now called 'Hay Mohammadi' for King Mohammed V, who returned from exile after Morocco's independence.¹³

Carrières Centrales (e/in)volution should not be analysed only in physical and quantitative terms. The complexity of its transformation requires a broader look that goes beyond the scope of architecture. Therefore, the method used is based on three analytical tools:

1. Fieldwork: data collection obtained on site during a trip to Casablanca between October 31 and November 2, 2018. Relevant data for the research were provided through interviews with the residents of Carrières Centrales and meetings with Lahbib El Moumni, professor at the Casablanca School of Architecture.



Figure 16. 'Inside the Semiramis building'. Comparison between photos of 1951 (left) and 2018 (right. Photo by the author). Left image in: Avermaete, T. & Casciato, M. 2014. *Casablanca Chandigarh. Bilans d'Une Modernisation*. Chicago: University of Chicago Press, pp. 291.

2. References in the literature: the relationship between vernacular architecture and the local way of life has social implications that go beyond the architectural discipline. The research is based on a recognised bibliography in order to understand these relationships and not to fall into social stereotypes.

3. Relation with other case studies: Carrières Centrales is just one example of the transformation of the Modern Movement heritage in developing countries. For this reason, it is linked to other interventions in North Africa, South America and India.¹⁴

The different areas addressed in the analysis are presented below: two of them carry out a physical study (construction and free space) and the other two (social and economic) look beyond the realm of architecture, although they are closely linked to it.

¹³ See Culley, B. 2011. *Claiming Space in Casablanca: Modernist Experiments and User-initiated Dwelling Transformations in Hay Mohammadi*. Utrecht: Utrecht University, pp. 52.

¹⁴ Similarities can be recognized in the evolution of the EWS Housing Colony, Sector 24. Gandhinagar, Gujarat (India. 1979-1999-2019) See Kalsariya, S. (2001). *Appropriating one's space: process and result in Indian context*. Ahmedabad: CEPT University.

Social

The metamorphosis of the neighbourhood has been closely linked to the social evolution of its inhabitants. Moroccan culture is based on a strong family base, where grandparents, parents and children live together in the same house. The house is the core of the family, and evolves according to its needs. As the family grows, the house grows.

It should be noted that in the Arab house, rooms do not have a specific function as in European homes, so their transformation capacity is greater. Their use changes over time according to the needs of the family.¹⁵

Aware of this cultural context, when young couples moved to the new quarter and had children, they needed more space in their homes. During their first years of life, the children slept in their parents' room, but as they grew up they demanded their own bedrooms. The most recurrent way of expanding the house was by closing in the courtyards, both in the horizontal fabric and in the high-rise buildings.

When the children became adults and started their own families, they did not move out. Some families adapted themselves to the layout of the house, with parents sleeping in one room and the children in another. But most of them expanded the house upwards, building an upper floor where the children lived with their families, reserving the ground floor for their parents and so on, turning the original patio-houses into a three- or four-storey block that reflected the growth of the family.¹⁶

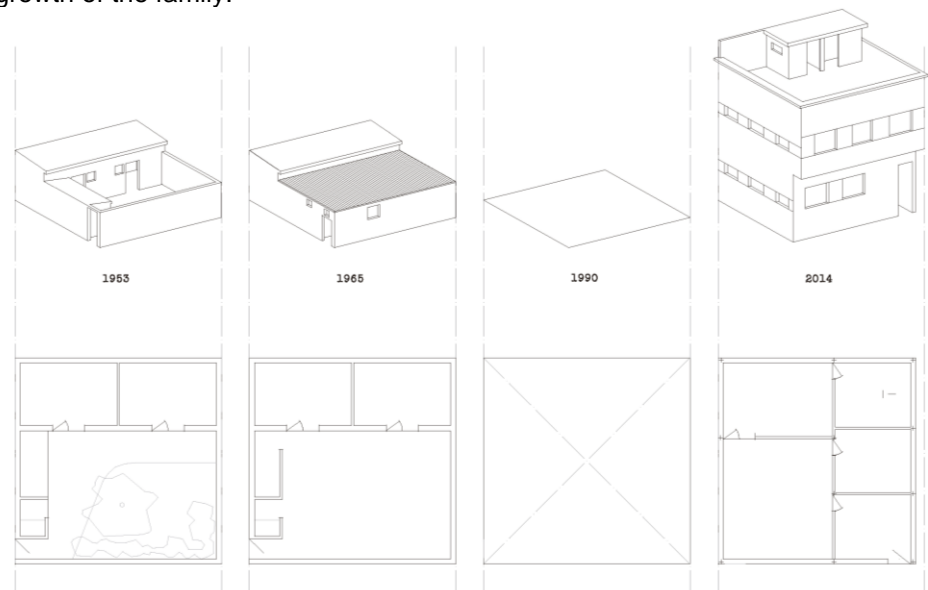


Figure 17. Écochard Patio-House (In)volution: Layout in 1953 (left), 1965, 1990 and 2014 (right). Drawing by: García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución.* Valencia: ETSAV (UPV), vol. B, 90.

However, this social evolution became an architectural involution of the *Nid d'Abeille* and *Semiramis* buildings. Their original volumetries were altered and their facades were degraded by closing up the courtyards, losing their climate control status, blocking cross-ventilation and nullifying the sun control in favor of expanding the dwellings' private space.¹⁷

¹⁵ See García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución.* Valencia: Universidad Politécnica de Valencia, Escuela Técnica Superior de Arquitectura.

¹⁶ The concept of 'growing-house', which arises spontaneously in Carrières Centrales, was planned and pre-designed in settlements such as PREVI in Lima (Peru, 1978) where the architects foresaw the possible floor and height extension from a 'seed-house'. See García-Huidobro, F., Torres Torriti, D., & Tugás, N. (2008). *¡El tiempo construye! Time builds!* Barcelona: Gustavo Gili.

¹⁷ Data collected through fieldwork on October 31, 2018.

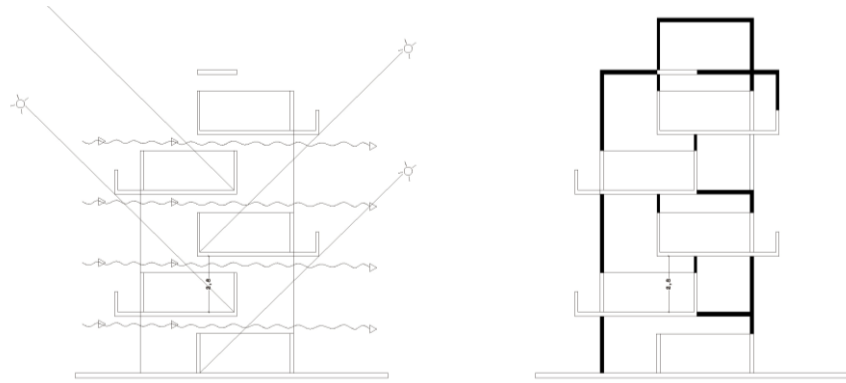


Figure 18. Semiramis (In)volution: Section in 1953 (left) and in 2017 (right). Drawing by: García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución.* Valencia: ETSAV (UPV), vol. B, 101.

Economic

The urban fabric was also altered when the neighbourhood's economy grew, shifting from its initial residential nature to a mixed use.

Originally, the horizontal fabric lacked commerce, except in places reserved for market space or equipment. However, the demand for more services caused the inhabitants to bring commerce into their homes. Therefore, the ground floors of the dwellings were gradually colonised with shops. This led to a change in the configuration of the houses, as the living rooms moved to the upper floors, leaving the ground floor for business activities.

In contrast, the original ground floor of the *Nid d'Abeille* building was reserved as a commercial area. Nevertheless, over the years, these premises did not work, possibly as they were not linked to any housing.

Moreover, in terms of the economic profitability of their property, the owners of the patio-houses built upper levels and rented them out to other families.¹⁸

The most invasive factor was the privatisation of communal spaces in the *Semiramis* and *Nid d'Abeille* buildings. As a result of the families' economic growth and their demand for more space in the homes, the owners not only expanded and enclosed the courtyards in height, but also privatised the common access corridors.

When a family bought all the dwellings on a floor, they closed and covered the entire corridor, modifying the overall volumetry of the building. On the ground floor, houses with direct access from the street also illegally colonised the sidewalk, thereby converting the original public space into private.¹⁹

Constructive

The social and economic changes were reflected in the metamorphoses of the original architecture. Different construction processes were used in the horizontal fabric and the high-rise buildings. Methods and techniques were adapted to the needs and the resources of their residents.

In the horizontal fabric, the need for growth was reflected in an evolution in the height of the patio-houses. At first, only the courtyards were covered up with a metal structure of beams resting directly on the walls, and a metallic slab on top. These actions occurred in 1954, shortly after the sale to their first tenants.

¹⁸ Data collected through an interview with a resident of the *Nid d'Abeille* building on November 2, 2018.

¹⁹ Data collected through fieldwork on October 31, 2018.



Figure 19. *Nid d'Abeille (In)volution*: Blocked 'chessboard' facade, 2018. Author's drawing.

The original walls of the patio-houses were designed to support the loads of a single-storied building, so a new structure was built for the growth of the house: a series of pillars around the perimeter of the building on which to support the new floor slabs. The staircase was located at the front of the entrance, within the courtyard, respecting the original rooms.

This led the authorities to debate the increased height of patio-houses. Écochard proposed to prevent it, as it affected the health of the neighbourhood, but Bennani, a representative of the Moroccan Local Interests Commission, managed to allow it, taking into account the preferences of the inhabitants.²⁰

Although the construction system was similar in all homes, each family adapted it to their needs. Consequently, they varied the heights of the floors, creating lines of discontinuous slabs and cornices. The placement and size of windows and doors, the colours of the facades and the type of roof were elements that each owner customised to suit his interests. The result was a heterogeneous urban fabric that reflected the character of its users.

If the horizontal fabric conditions allowed controlled heterogeneity, the high-rise buildings underwent an inverse homogenisation process. In an early phase of housing growth, high-rise residents enclosed the courtyards in height in similar fashion to the horizontal patio-houses: with metal beams and a cover slab.

To keep growing, since the structure was already designed for buildings with loads of various heights, the residents did not have to supplant it; they just had to embed the new slabs into the existing pillars.²¹ They placed their private stairs inside the courtyards and closed in the double height, thereby collapsing the 'chessboard' facade of the *Nid d'Abeille*, which is currently unrecognizable.

Free space

The evolution of the morphology of free space became especially noteworthy when the population in *Carrières Centrales* tripled. The original low-fabric density of the patio-houses increased to a three- or four-storey block fabric.

Originally, Écochard's urban model set aside free space for neighbourhood services, which have been built over time. The best example was the informally managed football field, which in 2010 became a covered sports centre, giving the entire neighbourhood a regulated service.

²⁰ *Ibid.*, pp. 318.

²¹ The outer walls were made with the traditional building block in Morocco, measures of 20x40x18 cm.

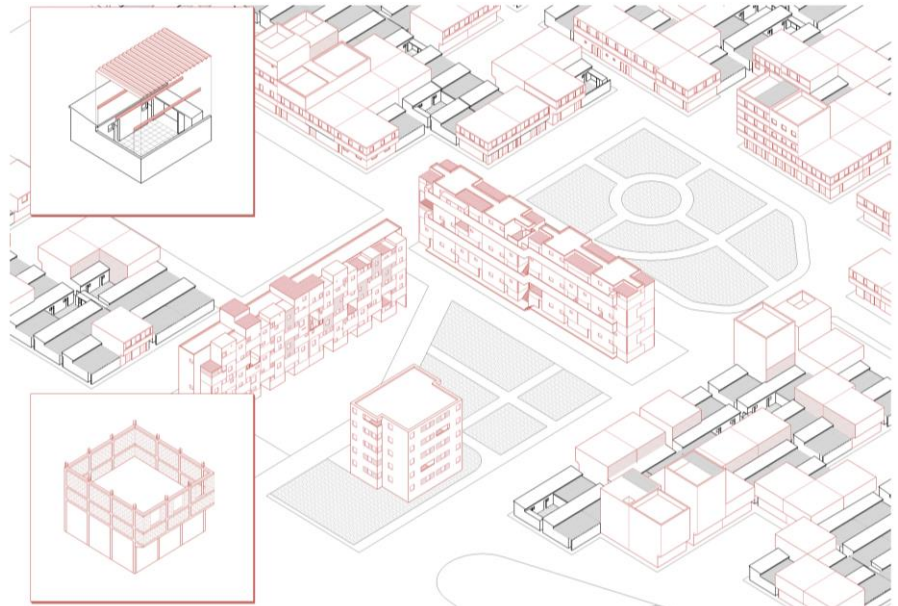


Figure 20. Écochard Grid (In)volution: Growing patio-houses. Construction system. Author's drawing, 2018.

However, public space has also been colonised with buildings outside the legal framework. For example, attached to the *Nid d'Abeille* building, an irregularly shaped mosque was erected using local materials and construction systems. The absence of facility mosque within the urban fabric of *Carrières Centrales* forced the inhabitants to build their own.

In 1993 a new religious centre was built within the established urban fabric. The *Al Mostaqbal Mosque*, financed by a benefactor, replaced a traditional vegetable market. This did not bring about the demolition of the old mosque; rather, both were preserved by the growing demand for an increasingly religious population.²²

The densification of the *Nid d'Abeille* and *Semiramis* buildings also entailed the colonisation of free space on the ground floor. That growth, however, was not for new neighbourhood facilities, but privatisation of public space for the exclusive use of the residents.

Private car ownership has damaged the quality of free space as well. Although Écochard intended the squares to be pedestrian spaces dedicated to coexistence and neighbourly relations, they have since been relegated to paved spaces where vehicles can be parked.²³

The main square, bounded by the *Nid d'Abeille*, the *Semiramis* and the *Tower*, was originally designed as the centre of the new neighbourhood. Today, however, it does not currently afford quality public space, nor does it encourage social life. Instead, it is simply relegated to being a wasteland for passing through or parking.

²² Data collected through interviews to Prof. Lahbib El Mounni at the Casablanca School of Architecture on November 1, 2018.

²³ Data collected through fieldwork on October 31, 2018.

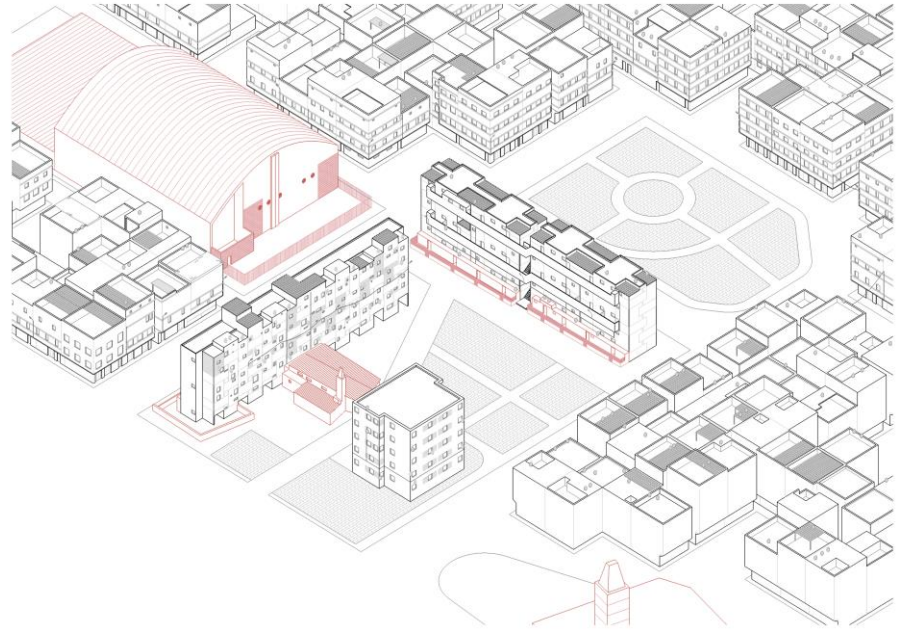


Figure 21. Free space (In)volution: Blocked public space, 2018. Author's drawing.

Critical review

The study of the *Carrières Centrales* in Casablanca allows us to understand the changes in the urban fabric over time and the main social and economic aspects that have led to modification of its architecture and free spaces.

From the information obtained through this fieldwork in 2018, it can be concluded that the evolution and adaptation of architecture to meet the needs of the population was inevitable. Therefore, the original plan, which did not explicitly incorporate time as a design parameter, has resulted in an altered city model, thus failing in many of its principles.

The conclusion is evidenced by comparing how the original urban model has developed over time into the current city. Analysis of the urban fabric clearly shows that the original plan brought health and hygiene to the city and significantly improved the living conditions of its inhabitants. However, time has shown that the plan did not completely satisfy its needs. As a result, the *Carrières Centrales* has changed drastically since its construction in 1953.

The present research has revealed one major difference: Écochard's urban fabric has evolved more appropriately than the high-rise buildings designed by Candilis, Woods and Bodiansky.

Écochard planned the fabric as a base frame in which the original patio-houses could be replaced by high-rise blocks in process of controlled densification in the future. The lack of strict building and zoning regulations allowed changes to be made by users themselves, filling the urban structure in terms of density, complexity, and mixture of uses. The 8x8 frame was densified to fit the needs of the inhabitants, but it has maintained the order of the neighbourhood's morphology and is both unitary and diverse.



Figure 22. Growing-House. Example of block elevation in the 8x8 original patio-house. 1991. Image in: Cohen, J. & Eleb, M. 2004. *Casablanca. Mythes et figures d'une aventure urbaine*. Nanterre: Ed. Haza, pp. 346.

In contrast, the *Nid d'Abeille*, the *Semiramis* and *the Tower* have undergone a process of filling their structures that has diminished their value and initial qualities. The pre-design vertical configuration became a closed system that has not adapted well to the changing needs of the Moroccan home. The type of high-rise building has not been suitable for an ever-growing population, as it did not foresee its densification over time.

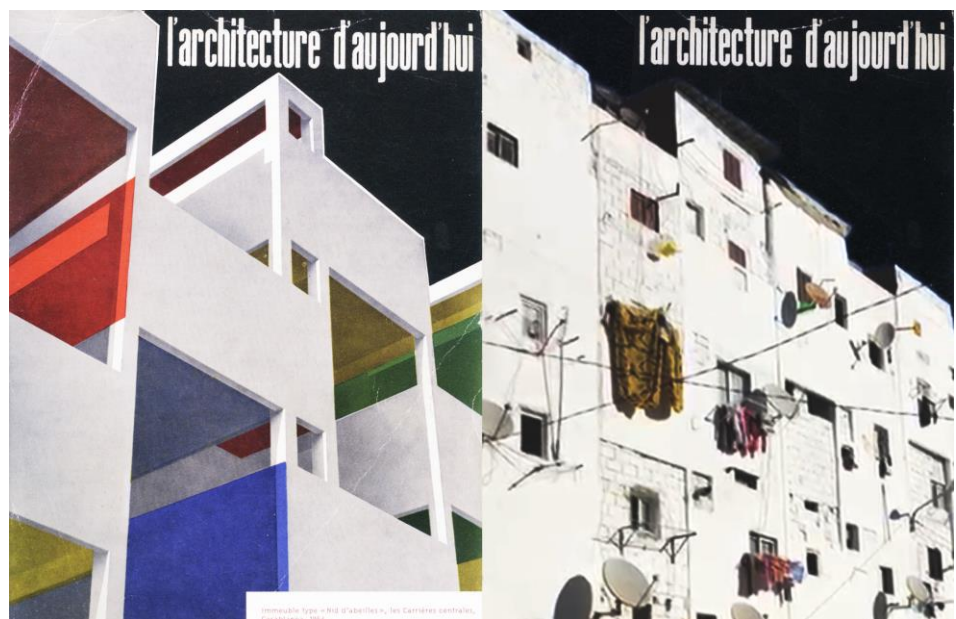


Figure 23. 'l'Architecture d'Aujourd'hui', 1954, magazine cover page: Nid d'Abeille as built, 1954 (left) Photomontage of the Nid d'Abeille today, 2018 (right). Author's image.

Despite the fact that none of the architects who designed *Carrières Centrales* sought the changes that have come about over time, the *Écochard* frame has been better adapted to the needs of its residents than the high-rise blocks planned by the ATBAT-Africa group.

Even so, the main problem is not about support, but about growth management, or, in this case, the lack thereof. Regulations on growth are minimal in *Carrières Centrales*, and guidelines have been in place for only a short time. A lack of

concern in controlling the evolution of the neighbourhood led to the dwellings growing according to the interests of their inhabitants. This situation can also be found in other areas in North Africa and necessitates that the heritage of the Modern Movement be reviewed. This factor also encourages future research to search for strategies for its management.²⁴

For this reason, this case study opens a debate on the future of cities, their adaptability and evolution over time, especially in developing countries. In the European model the changes in architecture are largely irrelevant, with only minimal changes visible from the outside. This is due to the strict regulation of heritage and efficiency in construction methods and technologies.

However, in emerging societies, the evolution of the city may be less scheduled, including unhealthy and inefficient conditions, worsened by the problems arising from pandemics, immigration, and climate change. It is therefore the responsibility of architects and urban planners to propose open systems that can adapt to the changing needs of society and define controlled growth management, with the view that the city is built more by time than by architects.

Acknowledgements & credit for illustrations

Figure 1. Drawing by: García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución.* Valencia: ETSAV (UPV), vol. B, 36.

Figure 2. Carrières Centrales' Bidonville. Casablanca South, 1950. Available through: Archnet website. https://archnet.org/sites/10130/media_contents/93707 [Accessed 26 August 2020].

Figure 3. Image in: Risselada, M. & Van den Heuvel, D. 2005. *Team 10, 1953–81, in search of a Utopia of the present.* Rotterdam: Ed. Nai Publishers, pp. 28.

Figure 4. Image in: Risselada, M. & Van den Heuvel, D. 2005. *Team 10, 1953–81, in search of a Utopia of the present.* Rotterdam: Ed. Nai Publishers, pp. 298.

Figure 5. Image in: MNAM-CCI, Dist. RMN-Grand Palais / Jean-Claude Planchet. *Habitat musulman, Types: Cellules.* Paris: Centre Pompidou, 1953, <https://www.photo.rmn.fr>.

Figure 6. Image in: García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución.* Valencia: ETSAV (UPV), vol. B, 55.

Figure 7. Author's drawing, 2018.

Figure 8. Author's drawing, 2018.

Figure 9. Author's drawing, 2018.

Figure 10. Image in: Risselada, M. & Van den Heuvel, D. 2005. *Team 10, 1953–81, in search of a Utopia of the present.* Rotterdam: Ed. Nai Publishers, pp. 29.

Figure 11. Author's drawing, 2018.

Figure 12. Author's drawing, 2018.

Figure 13. 'Semiramis' East façade. Candilis & Woods, 1954.

Figure 14. Author's drawing, 2018.

Figure 15. Free space. Author's drawing, 2018.

Figure 16. 'Inside Semiramis building' Comparison between photos of 1951 (left) and 2018 (right. Photo by the author). Left image in: Avermaete, T. & Casciato, M. 2014. *Casablanca Chandigarh. Bilans d'Une Modernisation.* Chicago: University of Chicago Press, pp. 291.

Figure 17. Drawing by: García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución.* Valencia: ETSAV

²⁴ Authors are involved in the content and teaching of the Seminar: *Time Builds! (E/In)volución de arquitecturas pasadas.* MPAA 2020/2021 (Máster en Proyectos Arquitectónicos Avanzados), ETSAM, Universidad Politécnica de Madrid.

(UPV), vol. B, 90.

Figure 18. Drawing by: García Dorce, C. 2017. *Un tiempo dilatado. Carrières-Centrales (Casablanca). Antecedentes, concepto y evolución.* Valencia: ETSAV (UPV), vol. B, 101.

Figure 19. Author's drawing, 2018.

Figure 20. Author's drawing, 2018.

Figure 21. Author's drawing, 2018.

Figure 22. Growing-House. Example of block elevation in the 8x8 original patio-house. 1991. Image in: Cohen, J. & Eleb, M. 2004. *Casablanca. Mythes et figures d'une aventure urbaine.* Nanterre: Ed. Haza, pp. 346.

Figure 23. Image in: Candilis, G. 1954. "L'esprit du plan de masse de l'habitat", *'l'Architecture d'Aujourd'hui'*, no. 57, December, cover page. Author's photomontage, 2018.

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