

Genesis and Composition of the Saharan Façade, from Tradition to Contemporary Forms: The Case of Individual Houses in the City of Béchar.

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Abstract

The city of Bechar offers a compelling case study of Saharan urban development. Its origins lie in the ksar, a traditional settlement that embodies a remarkable architectural and social legacy. From the colonial period to the present day, Bechar has experienced significant urban expansion, producing a layered and diverse urban fabric. Within it, three main entities can be identified: the traditional ksourian fabric, the colonial fabric, and the post-colonial urban fabric.

As the most visible dimension of any architectural expression, the façade plays a decisive role. Seen from the outside, it reflects the values and principles that informed the design of the built environment. At the same time, it conveys the functional logic and architectural essence of a building through its structure and constituent elements.

Analyzing façades in Becharian architecture allows us to retrace both its historical evolution and its defining characteristics. This trajectory can be understood through three principal modes: traditional, colonial, and contemporary architecture.

The traditional façade, typically marked by its austere and “blind” outward appearance, contrasts with the more ornate and expressive inner façades of ksourian houses—introverted designs that ensure both thermal comfort and the preservation of social privacy. Despite their apparent simplicity, these compositions testify to the ingenuity of Arab-Muslim builders. Colonial architecture introduced new stylistic currents shaped by modernist influences. In this context, architects sought to adapt design principles to the Saharan environment, often drawing inspiration from the introverted façades of ksourian tradition. Today’s façades reflect a hybrid language, combining elements of modern architecture with local cultural references and construction practices. The result is a composite and often eclectic architectural expression.

Keywords: Façade, traditional architecture, colonial architecture, architectural heritage, genesis, morphology, typology

1. INTRODUCTION

The study of historical human settlements reveals the complexity of architectural expressions that have shaped territories across civilizations and time. From ancient periods to the *medinas* of Arab-Muslim civilization [1], through colonial occupations and contemporary developments, each era has left its morphological and typological imprint on the urban fabric and its architecture. The result is architectural palimpsests of remarkable richness.

Built heritage, defined as the ensemble of assets inherited from previous generations and transmitted to future ones, constitutes a fundamental marker of societal identity [2]. This notion takes on particular significance in the Algerian context, where many urban centers are experiencing a progressive degradation of their architectural heritage, leading to the erosion of essential cultural references.

The city of Bechar, located in the Saharan region of western Algeria, provides a particularly relevant case study for analyzing morphological transformations of housing and the diversity of architectural typologies. Initially established around the traditional nucleus of the *ksar*, the city underwent significant expansion during the colonial and post-colonial periods, producing a superposition of fabrics with distinct architectural characteristics. This stratification allows us to observe the evolution of construction practices and architectural languages over more than a century.

Among the architectural elements most revealing of transformations in housing, the façade occupies a central place in expressing the aesthetic and technical codes of different periods. As the interface between public space and the private realm of the individual house, the façade materializes the cultural, climatic, and technological influences that guide architectural design [3].

In the Saharan context, this dimension takes on particular resonance, as environmental constraints impose specific architectural responses.

The analysis of house façades in Bechar reveals substantial changes in their formal composition and technical devices, reflecting the adaptation of construction practices to successive influences on the city. These transformations remain closely connected to the legacy of traditional *ksourian* architecture, characterized by the model of the introverted house, which continues to influence contemporary architectural production.

This research seeks to identify and analyze the key factors driving the evolution of house façades in Bechar and to assess their impact on contemporary Saharan architecture. Particular attention will be given to examining the persistence and transformation of *ksourian* architectural references in later residential production, with the aim of contributing to a deeper understanding of the processes underlying the morphological evolution of Saharan housing [4].

Glad that helps! Then the most accurate rendering in academic English would be to retain “**Oued**” exactly as you have it. It’s widely accepted in Saharan and Maghrebi studies and avoids the misleading connotation of a perennial *river*.

2- Case Study: The City of Bechar – Algeria

1. Presentation of the City of Bechar

Covering an area of 5,050 km² and home to approximately 200,000 inhabitants, the city of Bechar is located in the Saoura Valley, about 950 km southwest of Algiers, the capital (Figure 1).

Its position in the western Algerian Sahara—an area marked by significant geological phenomena and largely occupied by the Western Erg as well as the Hamadas of Ghir and Draâ—gives it particular geographical importance [5].

The city is traversed by Oued Bechar, which, together with its many tributaries, drains a basin of 1,500 km². To the north, two parallel (Bargas) outline a strip of land 1–2 km wide and 130 km long. On the northern horizon rise Djebel Horeit and Djebel Antar, reaching altitudes of 1,461 m and 1,960 m respectively (Figure 2).

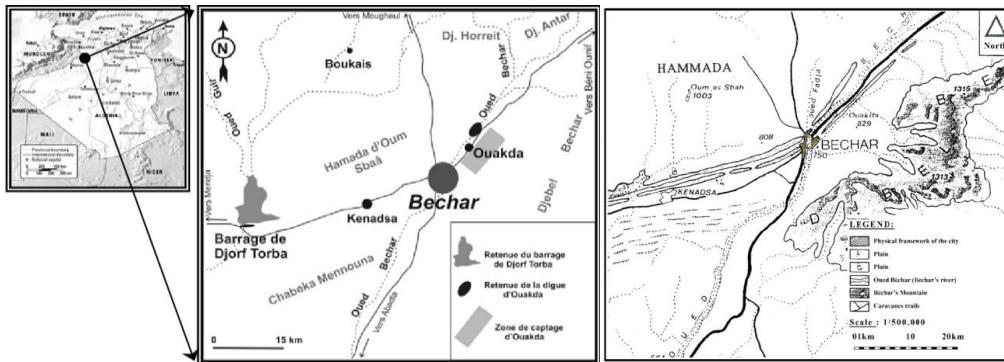


Figure 1: Position of Bechar Town [6]

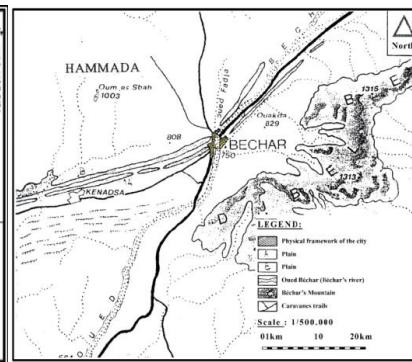


Figure 2: Geographic setting of the city of Bechar [7]

2- Methodology

To analyze and better understand the development of façades in the Saharan city of Bechar, this study adopts a typomorphological approach. This method provides a dual perspective: it makes it possible to trace the genesis and growth of urban fabrics (morphology), while also allowing for the identification and classification of façade types across different architectural periods (typology).

Such an approach is particularly relevant in the Saharan context, where architectural forms are not only shaped by cultural and social factors but also by demanding environmental conditions. By combining morphological and typological analysis, typomorphology offers a way to interpret how traditional design principles have been preserved, adapted, or transformed in response to colonial and contemporary influences [8].

• Typo-Morphology

Typomorphological analysis makes it possible to establish the relational processes between the city and its components. The city, as a “formal stock,” confers similarities and typological status upon its urban elements. The house, considered an “operative field,” in turn transmits to the city an awareness of void as an architectural space and a perception of totality. In this sense, the city becomes a project—utopian to some degree, yet existing as a global entity.

Of Italian origin, the typomorphological approach—whose founders include Muratori, Caniggia, Maffei, and Malfroy—seeks to clarify the structural components of the city and their development. It privileges the formula “formation, transformation,” in accordance with the historical trajectory of the city, from its creation to its present stage. Within this approach, history is the driving force of urban analysis, as confirmed by G. Caniggia’s assertion: *“History is recognized as a means for man to know himself.”* [9].

• Morphology

In biology, the term morphology denotes “the study of the formal constitution and transformations of living organisms, both plant and animal.” [10]. Borrowed as a metaphor, it allows us to conceive of the urban phenomenon as a living organism. In the work of various morphological schools, this notion implies that “the city is an organism that possesses a formal aspect related to its existence.” [11]. Such a perspective, however, often reduces the scope of analysis to the formal dimension alone, that is, the study of urban form.

The concept of morphology first appeared among German and French geographers between the two world wars, before being adopted by Italian historians and architects [12]. For the Italian school of typomorphology, it consists in describing and classifying the causes that contribute to the formation and transformation of the physical structure of a building, an urban fabric, or a city. Urban morphological studies are thus founded on analyzing the evolution of the urban fabric and the role of each of its components: site, street network, plot pattern, open space, and built space (Figure 3). Such analysis enables a better understanding of the challenges faced by historic neighborhoods. As Ch. Devillers observes: “Urban morphology is the study of built facts, considered from the point of view of their production and in their relation of part to whole within the urban ensemble.” [13].

In a complementary sense, the Duplays define morphology as the field in which architecture operates as a language, with architectural systems expressing synthetic meanings—such as the functions and qualities of spaces—through constructed elements characterized by their form [14].

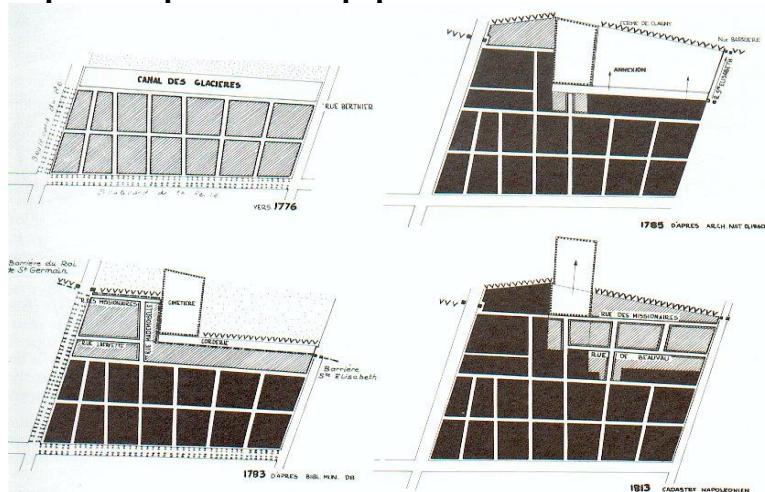


Figure 3: The formation of an urban heat in Versailles [10]

- **Typology**

Typology may be defined as “the science of developing types in order to facilitate the analysis and classification of a complex reality.”[15] Muratori’s method is described as typological because of the central importance it assigns to the notion of type. Typology isolates the particular features of objects in order to retain only their general traits, thereby allowing them to be classified and their evolutionary trajectories to be traced.

The word *typology* is a twentieth-century neologism. Etymologically, it signifies “the science of type,” originally designating “the mold or model determining the form of a series of objects derived from it. By extension, it came to signify any concrete being—real or imaginary—that represents a class of beings... and ultimately, a general structural scheme.”[16]. The term has been used in logic, in the natural sciences, and in the human sciences, initially in relation to the observation of human types. It also refers to any operation of classifying buildings, objects, or spaces on the basis of type, excluding variable elements deemed non-significant [17].

Typology also serves as a method for recognizing architectural phenomena. Today it constitutes a key tool in the design of buildings in their urban context. The renewed attention to typology reflects architects' effort to reinterpret modernist principles within the broader continuity of architectural history (Figure 4).

In practice, typology is the classification of data according to one or several significant criteria, whether independent or interdependent, ordered or unordered, quantifiable or not. Each phase of typomorphological analysis of an urban fabric concludes with multiple typologies: of construction systems, building units, plots, blocks, façades, streets, or individual elements. Each typology ultimately seeks to distinguish between what is similar and what is different within the morphological domain under study.

The use of an approach combining typology and morphology provides a comprehensive framework for understanding both the internal logic of architectural forms and their broader urban context. Morphology enables the identification of structural patterns and their transformations over time, while typology highlights the persistence of recurrent forms and their adaptive variations. Applied to the city of Bechar, this dual perspective makes it possible to situate façades not only as individual architectural elements, but also as components of a dynamic urban fabric shaped by history, geography, and socio-cultural practices. In this sense, the method offers a rigorous and nuanced tool for analyzing the specificities of Saharan urban landscapes and their architectural expression.

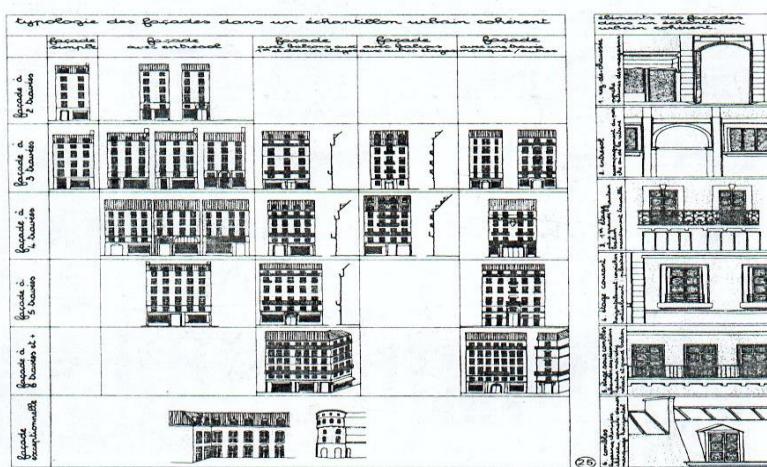


Figure 4: Façade typological reading in Versailles[10]

3-Morphological Reading of the Urban Fabric

- **Initial Nucleus of the City (Ksar)**

In the fifteenth century, international economic exchanges across the Sahara were hindered by the Portuguese colonization of maritime routes. This development prompted the Turks to invade the region, whether through consent or force, following new directives issued by Sultan Khalifa Abdelmalik. For instance, the Ouled-Abada tribe replaced the Ouled-Nasser, who had been driven out by a major climatic event: a devastating flood. The Berber tribe Ait-Atta, newly established and acknowledged as the first to plant palm trees, was in turn expelled by Sultan Lakhel. This sequence of events culminated in the centrality of Ksar-Tagda, built by a servant of the sharif Si M'hamed Ben Bouziane. He capitalized on lands destabilized by prior displacements, introducing an irrigation method based on water-retention systems and the so-called "*miracles of the Sagia*"[18]. From a purely morphological perspective, these successive displacements and hydraulic innovations not only shaped the founding of Ksar-Tagda but also laid the structural basis of Bechar's earliest urban fabric (Figure 5)

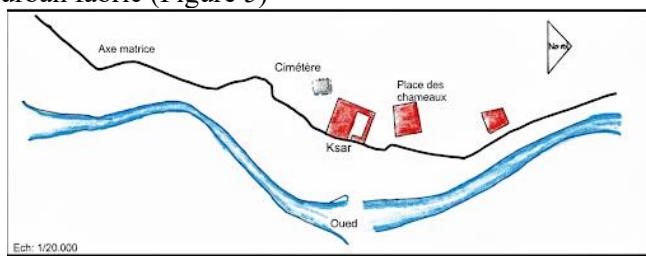


Figure 5: The Ksar Initial Nucleus, by Author

- **The Doubling of the City**

Following the colonial intervention in Bechar, the occupiers' primary concern was to secure control over the region, which led to the construction of redoubts and military barracks. Soon after, the city's periphery was occupied by what came to be known as the "European village," established in connection with the decision to construct the North-South axis, the National Road No. 6. This process of urban doubling produced two distinct entities: on the one hand, a vernacular fabric embodied by the Ksar; on the other, a colonial fabric, designed according to the principles of Western urbanism (Figure 6).

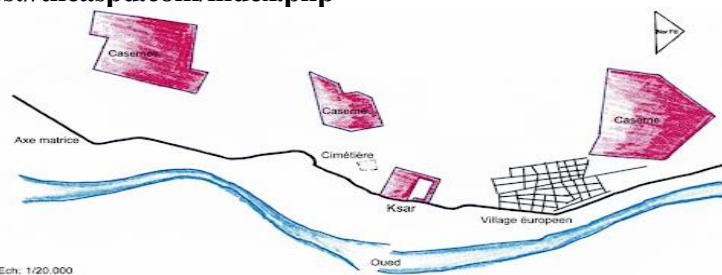


Figure 6: Phase 2 The European village, by Author

- **The Post-Independence City**

In the decades following independence, Bechar experienced rapid and significant urban expansion. Successive five-year development programs in architecture and planning gave rise to new urban fabrics, defined by the application of contemporary urban regulations and architectural styles. These postcolonial extensions layered modern morphologies onto the pre-existing dual fabric, reshaping the city's identity while maintaining traces of both vernacular and colonial inheritances (Figure 7).

Taken together, these phases reveal Bechar as a palimpsest city where each layer of urban form reflects a different mode of negotiation with context and power. The Ksar marks the vernacular adaptation to the oasis environment, the colonial period imposed a European planning logic that split the urban fabric in two, and the post-independence decades introduced modern planning frameworks and architectural typologies. Through this succession, Bechar's urban morphology emerges as the product of overlapping environmental, political, and cultural forces.

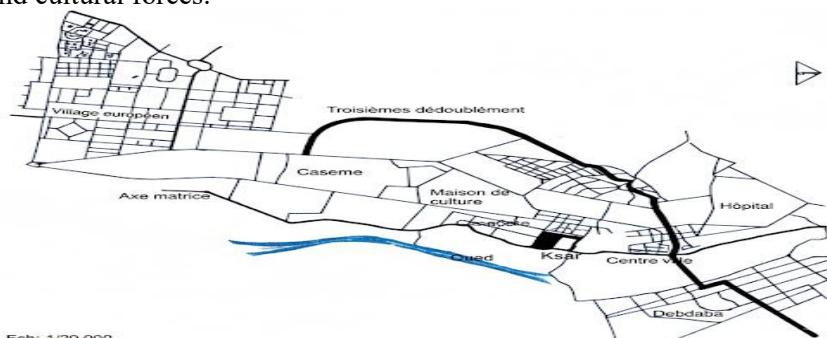


Figure 7: Phase 3 The postcolonial extensions, by Author

4-Typological Reading and the Composition of Façades

- **The Traditional Ksourian Façade**

The exterior façade of houses in the ksar of Bechar is often described as "blind," conferring a discreet character to both the structure and the composition of Saharan vernacular dwellings [7]. These façades range from single-story houses to those with two levels. Compact in form, the ksourian façade is organized according to an anthropomorphic concept, distinguishing a base, a body, and a summit (Figure 10 – 11).

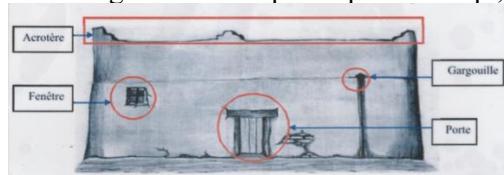


Figure 10: Anthropomorphic Notion –Façade with one Level-

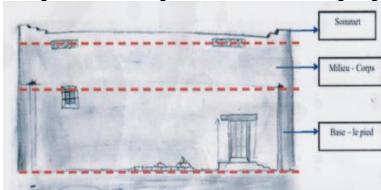


Figure 11: Anthropomorphic Notion –Façade with two Levels-

By contrast, the interior façade—introverted in nature—is organized around a central patio, which serves as the core volume of the dwelling and is usually attached to its largest room. The ground floor is lit by an opening placed at the center of the ceiling, sometimes covered by a fixed grille to prevent falls from the upper level[7]. Around this patio, arcades supported by pillars form a passage that articulates the various rooms of the house (Figure 12).

On the exterior, the ksar house presents a sober and almost austere composition, punctuated only by small openings for ventilation and light, as well as the entrance door, which mediates the threshold between interior and exterior [19]. Other characteristic façade elements include gargoyle (for draining rainwater from terraces) and acroteria, which frame the façade walls along the terraces (Figure 13).

Window geometry across the ksar is strikingly homogeneous. Openings are simple and primarily square, ranging in dimension from 0.50×0.50 m to 0.80×0.80 m. Very small mortar-type openings at ground level mark the façade's rhythm. During the winter, these are closed to shield against the cold. In multi-story houses, the upper-level openings are slightly larger than those on the ground floor, often fitted with wooden shutters (Figure 14). These typically correspond to male reception spaces or the upper sleeping room, known as the Mesria.

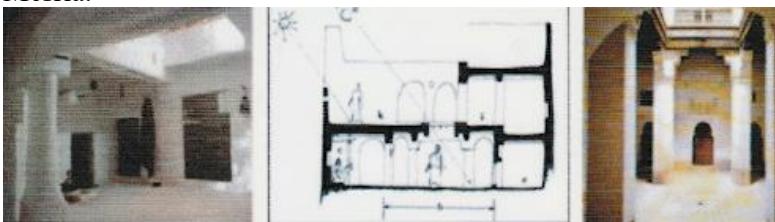


Figure 12: Introverted Façade [20]

The predominant building material in Bechar's ksar is *toub*, a mixture of wet clay and straw, kneaded and sun-dried in molds resembling concrete blocks. However, the material is not always visible on the façade, since it is often covered with plaster. The finishing layer is a hand-applied clay-sand coating, used mainly on surfaces exposed to outdoor contact or friction. Palm trunks are also widely employed, particularly in the fabrication of doors and shutters. At first glance, the ksourian façade of Bechar does not display any overt markers of aesthetic refinement, if aesthetics is understood in its classical sense as the science of beauty in natural and artistic productions—that is, something that inspires admiration [21]. Yet, from the perspective of Arab-Muslim society, which grounds itself in morality and equality, the notion of aesthetics shifts: it lies instead in these arch for balance, harmonizing individual needs with the traditions of the collective.

The advent of modern architecture and engineering, with its new techniques and varied materials, has led some advocates of contemporary design to view Saharan traditional architecture—and that of the ksour in particular—as obsolete. Others, however, recognize it as a wellspring of inspiration, echoing the words of Le Corbusier, one of the great architects of the twentieth century, who regarded the M'zab Valley, another Saharan settlement, as a true lesson in architecture [20].

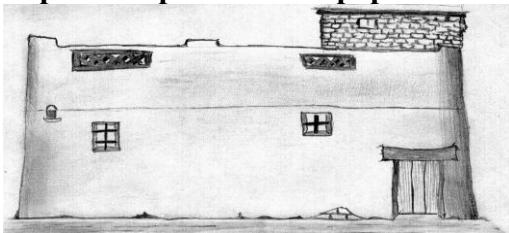


Figure 13: Exterior Façade by [20]



Figure 14: Traditional Façade by Author

- **The Colonial Façade**

The colonial-type houses are located in the old city center, the colonial core that has retained until today its function as the heart of Bechar.

The façade of colonial houses differs significantly from that of traditional ksourian architecture. However, it integrates into its exterior composition certain forms and elements recalling the local architectural language, such as small openings for ventilation and the use of the arcade, a common constructive feature in traditional Saharan architecture [21].

The first impression one has when observing this type of façade is that it does not conform to the notion of the blind façade characteristic of ksourian architecture. Instead, it privileges a façade rich in composition, form, and structure, while still respecting the principle of anthropomorphism in façade design.

The colonial façade presents a coherent structure, opting for a fixed single-story model (R+0), with an inaccessible terrace. The façade consists only of a body and a top, a structural criterion that distinguishes this architectural interpretation of the colonial house (Figure 15). The body of the house is marked by the main entrance, framed by one or more arcades, various openings, lintels, and window ledges. At the top lies the parapet, treated in various ways. In terms of composition, the colonial façade shows a certain richness, giving it a more expressive architectural appearance. This richness reflects the architectural interpretation introduced by the Western colonial presence, markedly different from ksourian dwellings.



Figure 15: Colonial Façade by Author

Additional constructive elements enrich the façade with an aesthetic appeal inspired by Western twentieth-century architectural notions: green tiles, window ledges, protruding jambs to highlight façade components, and decorative parapet elements (Figure 16).

Colonial houses thus present a compositional richness, particularly in their external form, which conveys colonial architectural harmony while remaining adapted to the Saharan environment. This adaptation results from the desert landscape and the reinterpretation of ksourian elements, such as the use of earth-based mortar, albeit with different functions. Despite the development of Western architecture and scientific progress in construction techniques (steel and concrete), colonial houses in Bechar were not fundamentally transformed

by these changes. They favored local materials—stone, *toub*-based mortar, and occasionally palm trunks—allowing the construction of load-bearing walls and palm-trunk slab roofing. Façade finishes consisted of *toub* mortar, applied with a trowel to create smooth surfaces that prevent water infiltration and mitigate solar heat during the summer, ensuring thermal comfort. Most houses were oriented north–south; load-bearing walls were 40–60 cm thick, and shutters offered protection against intense sunlight[23].



Figure 16: Colonial Façade Characteristics by Author

This system is comparable to that of ksourian houses, with differences in finishing quality, the extensive use of easily extracted stone, and a new reinterpretation of the façade and its components in individual colonial houses.

During the twentieth century, architectural currents and styles influenced domestic construction. Archaeological excavations of ancient cities also contributed models for reconstruction, sometimes even leading to imitation [24]. Colonial architecture in Bechar, and especially its façades, thus provides valuable information for its identification and situating within architectural and social contexts.

The reading of a modern architectural language in the colonial façade—its inspiration from ksourian designs elements and its adaptation to the Saharan environment—gave rise to a unique definition of harmony and beauty. This resulted from the synthesis of two concepts: the imitation of ksourian aesthetic principles and the formal composition of an imported architecture (Figure 17). Such a conceptual fusion generated a new interpretative model of the external image of Saharan houses, renewing both form and aesthetic, and producing a distinctive architectural expression adapted to arid regions



Figure 17: Colonial Façade Aesthetic by Author

- **The Contemporary Façade (Post-Colonial)**

Given the considerable complexity involved in providing an exhaustive analysis of the contemporary façade—a subject that could constitute a study in its own right—this section limits itself to examining certain aspects of façade composition and its constituent elements in current architecture [25]. The analysis focuses on the individual housing subdivisions that emerged immediately after independence and that continue to shape the urban fabric of Bechar. To understand the façades of modern houses, it is essential to break down the different elements that contribute to their formation, in order to identify the repertoires of this architectural and typological translation in the external image of the contemporary single-family dwelling. It should be noted that the orientation of houses does not always align with the north–south axis, which ensures optimal penetration of daylight and solar radiation without compromising the thermal comfort of the dwelling. The houses selected for our study are those most expressive in terms of façade composition. The various façades

analyzed (see table 1) present certain compositional elements derived from modern architecture, while others recall the characteristics of traditional façades. Current façades retain a structural aspect that echoes earlier forms (traditional and colonial). The two-story model with a terrace is predominant, and virtually all of the façades selected for the study reference the ksourian façade. The vertical frame varies between two elements and three bays, as in the colonial façade, while maintaining the anthropomorphic concept of the façade. Symmetry is also applied in the contemporary façade, reflecting a standard concept of modern architecture (Figure 18).

The compositional elements of the current façade inspired by modern architecture include:

- **The balcony:** A constitutive feature of the contemporary façade in Bechar, it often serves a more decorative than functional role. It may project outward from the surface of the façade or be recessed, extending across half or, in some cases, the entire length [26]. It is frequently adorned with screen walls and wrought iron (Figure 19).
- **Large openings:** Present on both the ground and upper floors, these openings are equipped with shutters and allow for significant penetration of sunlight (Figure 20).
- **Construction materials:** Visible on the façade are iron, concrete, brick, and concrete blocks.
- **Façade finishing:** Mainly in cement, treated in various ways (smooth or marbled).
- **Decorative elements:** Include lower sections in small bricks, latticework in exterior walls, as well as ground-level features in reinforced concrete.
- **Doors and windows:** Generally made of metal or manufactured wood.
- **Color:** The variety of façade colors does not always reflect the natural palette of the Saharan environment.

In sum, the contemporary façades of Bechar bear witness to a hybrid process of architectural translation in which traditional, colonial, and modern references intersect. While certain elements—such as the use of terraces, the vertical rhythm, and the anthropomorphic organization—recall pre-colonial and colonial models, the integration of balconies, large openings, and industrial construction materials reflects a modernist vocabulary often detached from the Saharan environment [26].



Figure 18: The Actual Façade by Author Figure 19: The Balcony Actual Façade by Author

This juxtaposition of repertoires produces façades that are at once continuous with local heritage and marked by a visible break, illustrating how post-independence architecture has negotiated between the memory of the ksour[27] , the imprint of colonial forms, and the aspirations of modern urbanity in an oasis city shaped by desert light and climate.



Figure 20: The Openings -Actual Façade- by Author

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5-Typological Table of Façades

Criteria	Traditional Façade (Ksourian)	Colonial Façade	Post-Independence Façade
General Form	Compact, massive wall surface, minimal articulation	Two-level model with terrace; framed bays	Two-level model with terrace, vertical alignment
Openings	Small, few, irregular; optimized for climate	Regular rhythm, vertical bays (2–3 spans)	Large openings with shutters; more light penetration
Symmetry	Absent; façades follow functional logic	Present; compositional order emphasized	Present butin consistently applied
Balcony	Absent	Introduced, oftenmodest	Widespread; decorative, in projection or recessed
Decorative Elements	Stucco, geometric patterns, local motifs	Cornices, pilasters, adapted neo-classical motifs	Ironwork, cement treatments, trellis walls, brick socles
Construction Materials	Adobe, stone, palmwood	Stone, lime, imported brick	Concrete, breeze blocks, iron, industrial brick
Surface Treatment	Earthen coating, natural stones	Lime plaster, ochrehues	Cement (smooth or marbled), varied colors
Relation to Environment	Oriented for solar protection and ventilation	Attempts at climatic adaptation + colonial order	Frequently neglected; random orientations, weak climatic adaptation
Symbolic Value	Reflects intimacy, protection, local identity	Hybrid identity; colonial layering	Ambiguous identity; between modernity and local references

6-Conclusion

The analysis and interpretation of the façades of individual houses have highlighted the multiple forms of the Saharan façade and its process of evolution. The examples studied clearly demonstrate that the traditional façade underwent a significant transition with the introduction of architectural rules imported from the West by the colonizers, while still preserving certain compositional features that in turn influenced colonial architecture.

Colonial architecture sought to develop a combinatory model between Bechar's former architectural identity and the new architectural models of the twentieth century. This approach aimed to formulate an ideal mode of expression for the Saharan environment, drawing on the traditional constructive culture of the ksour and the environmental characteristics of the region. It resulted in a satisfactory architectural outcome, as evidenced by the persistence of these houses to this day, now regarded as part of the city's architectural heritage.

After independence, with the implementation of various urban planning programs and the rise of modernist figures in architectural production, the façade of the house underwent a mutation that encouraged the

introduction of new elements of composition and interpretation. This evolution also reflected the enduring influence of local construction culture. While these elements appear in subtle ways on certain façades, others reveal a more chaotic application, making it difficult to discern a coherent architectural language. Moreover, environmental considerations are often neglected in these façades, with houses positioned randomly, without regard to the penetration of sunlight through large openings or the heat transfer of the materials employed.

The study of Bechar's façades highlights the progressive transformation of the Saharan house across three stages: traditional, colonial, and post-independence. Each period introduced new compositional principles while preserving, to varying degrees, earlier structural and symbolic references. The colonial model integrated local constructive culture with imported norms, while post-independence façades adopted modernist vocabulary, often with less regard for environmental orientation and coherence. Taken together, these façades illustrate the dynamic adaptation of architectural language in response to shifting socio-cultural and urban contexts. They remain valuable indicators of continuity and change in the built environment of the Saharan city.

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