

		<p>Science, Education and Innovations in the Context of Modern Problems</p> <p>Issue 2, Vol. 9, 2026</p> <p>RESEARCH ARTICLE </p> <h2 style="text-align: center;">Doors and Entrances to Dwellings in Traditional Desert Architecture</h2>
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Abstract		
<p>The choice of residential building doors and entrances in desert regions, particularly the Ziban region, for our study stems from their distinctive character in form and ornamentation. These doors are the most diverse and richest in decoration compared to doors in other architectural styles. While some similarities exist, these doors are currently among the most prominent architectural and decorative elements, reflecting the functional and architectural transformations the region is undergoing. This has impacted the doors, distorting their original character and leading to the complete loss of some. Every day, a door, part of a door, or even an entire dwelling disappears from the palace. This underscores the necessity of preserving them through study and documentation, especially considering that some doors represent unique examples of the traditional material culture of local craftsmen specializing in door making, decoration, and finishing. These crafts represent an important intellectual and artistic heritage that has not received the attention researchers deserve, commensurate with its cultural and civilizational value. We will attempt to highlight some aspects of this heritage. Furthermore, our interest in studying The concept of doors reflects the richness and diversity of the image of the door in our popular culture and the meanings it holds, as encapsulated in proverbs and sayings.</p>		
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Introduction

This research focuses on one of the products of traditional material culture: the doors and entrances of houses and dwellings that still stand today, preserving their original character in terms of materials, form, and decoration. The choice of the entrances and doors of traditional desert dwellings as the subject of study stems from their distinctive style and ornamentation, compared to other architectural styles in the Sahara region in general, and the Zab region in particular. However, this does not preclude some similarities between them. Currently, doors are among the most prominent architectural and decorative elements, reflecting the functional and architectural transformations the region has witnessed, as well as cultural influences, both local and external. These influences have affected these doors, leading to the distortion of their original character and the complete loss of some of them. Every day, a door, or part of one, or even an entire dwelling within the palace disappears. This underscores the necessity of preserving these structures through study and documentation, especially considering that some of these doors represent unique examples of the traditional material cultures of several local artisans. These artisans, skilled in crafts related to door making, decoration, and finishing, represent a significant body of knowledge and artistic heritage that has not received the attention researchers deserve, commensurate with its cultural and historical value.

Study Objectives

This study aims to understand the current state of desert palaces and their past functional status, as well as to develop a strategic framework to help preserve and protect the region's architectural heritage. This study also considers the current problems and issues facing the Khanga Sidi Naji Palace. Our interest in studying doors stems primarily from the richness and diversity of door imagery in our popular culture and the significance of doors as expressed in popular proverbs and sayings.

Study Significance:

The importance of this study lies in the following:

- ✓ Highlighting the status of the desert dwelling and house through historical and archaeological sources.
- ✓ The importance and status of traditional dwellings in desert palaces, specifically in the Ziban region.
- ✓ Identifying the techniques used in the manufacture, installation, and decoration of traditional house doors.
- ✓ The importance of establishing a strategic framework aimed at protecting and preserving the architectural heritage of the Ziban region.
- ✓ The lack of a specialized study that gives this area the attention it deserves and highlights the various characteristics of residential architectural doors in the Ziban region.

Based on their form and architecture, Ziban dwellings belong to the central courtyard style, the most common in the Sahara, particularly in the southeastern region. All the architectural elements of the dwelling are organized around this central courtyard. This architectural structure features inward-facing doors, and these dwellings are only visible to the outside through a single facade with only one entrance that does not lead directly to the center of the house. This traditional style relies on local materials, simple tools, and a balanced understanding of craftsmanship and skills.

This study examines the "shantytown door" by defining its concept through its dimensions, shape, and location within the dwelling. It also explores its types, material composition, surrounding features, and furnishings, as well as the decorative styles of the doors and their aesthetic and historical functions. One of the difficulties we faced in completing this research was the migration of the inhabitants of the desert palaces to new settlements, which negatively impacted their doors. This manifested in the damage of parts of the original door components, the partial erosion of some decorations, and the loss of others due to neglect. The spatial context of these doors necessitates a general introduction to the region, highlighting its historical and cultural characteristics and its most prominent landmarks.

Methodology:

This study is historical, archaeological, and analytical. It employs a descriptive field methodology to gather data from field observations, previous studies, and relevant scholarly references. The aim is to understand the current state of one of the desert palaces and to develop a strategic framework for preserving and protecting architectural heritage. To achieve this objective, the study will be conducted within the following theoretical framework:

- ✓ Identifying the desert dwelling through historical and archaeological sources.
- ✓ The components of the traditional house door in the desert palaces, specifically in the Zab region.
- ✓ Identifying the techniques and methods used in the construction of the traditional house door.
- ✓ Developing a strategic framework aimed at protecting and preserving the architectural heritage of the region.

1. Linguistic and Reformist Significance

The word "door" (بَاب) is derived from the root meaning "entrance" or "arch" through which one enters (Bouasbana, 1992). It also refers to what closes that entrance, such as a wooden shutter, whether in the walls of a palace, the entrance to a house, a mosque, or elsewhere (Waziri, 1999, p. 11). This is the meaning the word appears in the Holy Quran. Thus, "door" (بَاب) means "entrance" or "facade," as in the verse: "And he said, 'O my sons, do not enter from one gate, but enter from separate gates'" (Qur'an, Yusuf 12:67).

As for the technical meaning, Al-Farsati states: "If a palace has only one door and its owners want to add two, is that permissible? He said: No, unless it is for a select few who agree on it. Similarly, if it has two doors and they want to reduce it to one, this applies if they are commoners. As for the select few, they can do whatever they agree upon. Some say that

the common people can do whatever they agree upon, as long as it is more suitable." This refers to a main door consisting of ordinary openings made of iron and wood, distributed on all sides at the end of the palace.

The Importance of Doors

Historical sources have praised Geography highlights the importance of gates, as Al-Qazwini (d. 682 AH) stated in his description of city and palace gates. He advocated for multiple gates to avoid overcrowding at a single entrance and exit. Instead, one should enter through the nearest gate (Al-Farsati, p. 206). A gate is the entrance leading into the interior and overlooking the surrounding area, serving as a gateway to the palace and a link between the inside and outside.

1.1 The Function of Gates

The connection between a gate and its surrounding environment is evident. From this, gates can be studied in terms of their location, names, architectural style, and forms. The palace represents an urban unit containing diverse architectural styles according to its residential, economic, social, and religious functions. The Grand Mosque occupies the center and is considered a landmark and symbol of the palace. It contains important architectural heritage, including its main entrance gates and the gates of its courtyard. These are straight gates of varying heights, topped with ornate wooden arches. Their lintels feature stone carvings dating back to the 17th century CE, and their shutters are individual decorative units belonging to various floral motifs. Its decorative and geometric designs, particularly the wood carvings, represent unique examples of the Eastern Zab region and testify to the skill and mastery achieved in wood carving during that period. The palace is structured around two main axes:

The market quarter, whose importance stems from the economic activity of the former palace (Figure 2). Numerous gates open onto this street, mostly leading to shops and service establishments, as well as mosques. Residential quarters surround the mosque and the market, extending along a network of parallel or intersecting streets with no clear boundaries. This division is explained by the logic of blood relations, with sons inheriting their fathers' houses across successive generations. These quarters have their own facilities and amenities.



of blood relations, with sons inheriting their fathers' houses across successive generations. These quarters have their own facilities and amenities.

Image (1): Shops located on streets far from residences

The houses of the palaces are similar in that they have a single entrance leading to the saqifa, an intermediate space that prevents visual contact between the inside and outside. The saqifa may be curved in most house entrances and is limited in size, characterized by its modest architectural and decorative elements. It leads to the sahn, an open courtyard that serves as a source of light and ventilation for the entire dwelling. It is often designed in a square shape, with care taken to make it as regular as possible, as it acts as the axis determining the balance of the surrounding spaces. The western facades extend from it, and the interior spaces are relatively compact. In some houses, the sahn is rectangular, primarily due to considerations dictated by the size of the dwelling. The sahn is at the center of the entire building, thus forming a shared space that brings together all members of the extended family. It is therefore the central space in the traditional Zab house due to its multiple natural, architectural, functional, and social functions.

2. Door placement within the traditional house plan.

Examining the division of spaces in a traditional dwelling, starting with the door, reveals the

connection between door placement and the distribution of elements within this architectural style. It consists of a central courtyard surrounded by living quarters, service areas, winding entrances, and a single facade, leading to:

- ✓ **Exterior doors:** These are located on the facade facing directly onto the street, as well as the cellar doors (Figure 2).

✓ **Interior doors:** These refer to all openings in the desert dwelling that face inwards. They include doors to household facilities and the doors separating the two courtyards from the courtyard (Tayeb Karim, 2018, p. 275). The courtyard represents the center of the dwelling, around which all openings of the surrounding architectural spaces are located. These are the doors to the rooms situated in the center of three facades overlooking the courtyard. Symmetrical windows with iron grilles flank these openings. The entrance door to a single-courtyard house is located in one corner of the outer wall of the courtyard. There is no door separating the shed from the living space. In the curved entrances, the house door opens onto the first shed, which represents the outer part of the entrance. The person entering it faces a solid wall that forces him to turn around until he enters the second shed. There is a third door that connects the shed to the living space inside, and thus the privacy from the eyes of passersby is maintained.



Image (2): An archway adorning the entrance of a house in a palace.

The dividing doors that connect the exterior and interior of the dwelling are of paramount importance, serving as the sole gateway to the outside world and simultaneously as entry points. The intermediate door, leading directly into the interior space after passing through the central porch or the curved entrance, is the true entrance to the dwelling. Therefore, it is positioned above the main room to allow the family to observe the entrances and exits.

We conclude that limiting the entrances of the palace houses to a single door aligns with the conservative logic of maintaining the dwelling's enclosure from the outside. It is a single opening that leads to the dwelling only after a transitional passage from the public to the private space (Karim, 2018, p. 275). The architect of the palace ensured that the entrance doors of the houses on the main facades were not adjacent. Each door leads to a house on the opposite side of the house, ensuring that these doors do not face each other.

3. Door Styles: Images (4, 6, 5)

The doors of palace houses can be classified as follows:

3.1 Straight Doors

The lintel is straight and horizontal, resting on the two jambs of the stone door. The straight door represents a classic and simple style, whose origins, according to Rufus, trace back to Greco-Roman roots (Revault, 1980,

p. 14).

✓ **Straight Doors with Arches:** These are arches located at the top of the door. This style is characteristic of a few entrance doors in the palace, especially in the Saraya (a type of main house). These arches add an aesthetic touch to the door and the entire exterior facade of the house, such as the Saraya door.

✓ **Straight Doors with Twin Windows:** Twin windows are located in the center of the wall above the straight door. A small cornice of crenellated stone crowns each window. The shape of these windows adds an aesthetic touch, reducing the monotony of the plain facade. They are also found inside the house above the doors of rooms overlooking the

✓ courtyard, as well as at the top of the facades of arcades overlooking the courtyard (Saraya), and in the palace mosques.

- Straight doors topped with a sunshade:

We find them in the doors of the living rooms overlooking the inner courtyard of the dwelling (Al-Shamsa, n.d.).



Image (3, 5, 4): Door Styles in a Palace in the Eastern Zab

The Khoukha Door: (Image 5)

The doors separating the two porticoes are characterized by their wooden construction, featuring a single large leaf with a smaller, straight door above it, called the pocket door. Located in the portico, which serves as an intermediate space leading from the outside to the inside, the large door remains closed and is only fully opened on religious occasions and celebrations (Ghalib, 1988, p. 90). Only its smaller door, which allows only one person to pass through at a time, is opened. This small door, due to its low profile, ensures maximum privacy. This style is found in the door of the Sidi Mubarak Mosque and many houses in the Khanga region. It is a single- or double-leaf door with a pocket in the center. It consists of wooden slats held together by internal and external wooden ribs and large, domed iron nails. The door has an iron lock that operates horizontally and an iron hammer shaped like a hand, called the "five-hand hammer," which is fixed at approximately half the height of the door. This combination of decoration and function gave the door a special charm. The craftsman skillfully arranged the nails in various geometric patterns to adorn the door's facade. The door is equipped with a small alcove, a niche within the larger door, used for people to enter and exit. The larger door is only opened for special occasions such as weddings and funerals, or for the entry of animals and large agricultural machinery.

The alcove also serves to ventilate and allow light into the house.



Image (6): Khoukha Gate

3.2 Arched Doors

These are found only on exterior doors and are the entrance doors of houses such as palaces and cloaks. They also give the Sidi Mubarak Mosque its distinctive arch style (Ghalib, 1988, p. 90). This style of arch is primarily due to Eastern influences, and its use stems from its functional and aesthetic advantages.

3.3 Doors with Semicircular Arches

These are few in number at the Sidi Naji Palace. Above these openings are iron windows called "qanra." These arched doors lend a distinctive aesthetic character, reflecting colonial influences (as the palaces were used by the colonizers as seats of government in the region during the 19th century).

4. Door Components and Materials

The doors of the traditional Khnaq dwelling are composed of wood, stone, and iron (Karim, 2018, p. 234). Specific types of each material are used, chosen to suit the specific location of the doors within the palace, their functional role, and their intended use. The door leaflets are made of wood, while the frames are made of stone. Hinges, locks, and knockers are made of iron. These materials combine to form an architectural and decorative element (Ben Mohammed Ashour, 1914, p. 10).

4.1 Stone Frames: (Figures 7 and 8)

Materials such as sandstone were used in the doors of the desert palaces, along with imported Italian marble (called white marble). This marble,

known for its hardness, was used to surround the door leaflets, framing and securing them to the building after being cut, polished, and shaped into regular stone blocks.



Image (8): A door in the center of the northern wall of the prayer hall.

Image (9): The lintel of the western door of the Sidi Mubarak Mosque.

4.2 Wooden Door Panels

Wood is used in specific parts of the doors, such as a wooden beam extending horizontally along the bottom of the lintel on the inside, and in some locks, like the wooden latch. Olive wood is also used, but only in certain parts of the door, such as the locks and the lintel. The lintel acts as a load-bearing element, supporting the weight of the wall along the opening of the two door panels. It consists of closely spaced, successive pieces of wood at the top of the lintel on the inside, not protruding from view.

5. Door Construction:

The construction includes three types of fasteners: locking mechanisms, closing mechanisms, and hammers. Iron and wood are used to make the hinges and locks, while hammers are made exclusively of iron and copper. They vary in shape, size, and design depending on their position within the door. Each door is equipped with hinges that secure it to the structural frame. Iron hinges connect the two wooden panels to the surrounding jambs or to the wooden door frame.

5.1 Locks: (Figures 12, 11, 10)

Locks are a component of door hardware, serving as locking and opening devices. They are almost uniform in their iron construction, and each lock is associated with a specific location corresponding to its function and role in firmly closing and securing the door. Their shapes, sizes, and dimensions vary, and are related to the dimensions and thickness of the door leaves. The presence of different types of locks on the doors of traditional houses is primarily related to the function of the space they enclose. The locks on the main entrance door differ from those on the rooms in terms of their number, variety, and density, and are more robust than the locks on other doors because they completely separate the inside from the outside. Consequently, all types of locks are employed to secure this main entrance. Locks on rooms, however, are merely part of the overall interior space of the house. Doors to public facilities require less secure locking due to their functional nature, which aligns with the family's daily routine. The exception is the pantry door, which requires secure locks to protect its contents.

5.2 Door knockers

These are characterized by their diverse designs and varying positions. Made of iron, they consist of rings and hammers. They are called rings because of their round shape and hammers because of their function: to knock on the door. They are located halfway up the door leaf. All entrance doors vary in number. Doors are equipped with two symmetrical hammers, identical in design and dimensions, especially those with decorations and inscriptions. Plain doors have a single hammer, which is in the form of a ring or a semi-circular cylindrical iron shape. In some other doors, a flat iron plate extends from the bottom of the hammer, which is stretched upwards and has a protruding base against which it is struck.



Image (10, 11, 12): Locks and Hammers Used in the Doors of the Khanqah

6. Door Decoration in the Khanqah

Through direct field observation of the doors of palace houses, we noted the diversity of decorations and inscriptions adorning them. Most of the entrances to houses with shutters decorated with wooden carvings or cuneiform motifs were surrounded by frames carved with stone inscriptions, such as those found in the Saraya and the Sidi Mubarak Mosque. The methods and techniques for decorating wood varied, including painting, applying resins, turning round wood, hollowing out, and carving various shapes into the wood, as well as decorating its surface with convex iron nail heads. These doors, with their cuneiform decorations or wooden carvings, are surrounded by stone frames bearing inscriptions carved within parallel bands of geometric, floral, foliate, and calligraphic patterns surrounding both the door jambs and the lintel in a semi-regular manner. The stone band directly surrounding the lintel is carved in relief. (Image 12) These floral and foliate designs are attributed to Turkish influences (Mahfoudh, 1988, p. 2). The calligraphic stone inscriptions also represent key decorative motifs that characterize several door frames in the Sidi Nadji Khanga architecture. These inscriptions, carved from limestone, are typically a single horizontal line, often consisting of successive rows or a single line filling the entire stone surface (Image 14). They include the Basmala (the opening phrase "In the name of God, the Most Gracious, the Most Merciful"), Alhamdulillah (Praise be to God), or a Quranic or foundational verse, executed in thick letters using the Kufic script in relief. However, geometric patterns are the most common, reflecting the significant Andalusian influences. Floral motifs confirm the presence of Turkish traditions, but the combination of these influences does not negate the local character that defines these inscriptions.



Image (13, 14): Examples of decorative motifs on the doors of the palaces of Zab

6.1 Cuneiform decorations

These represent a style of decorating some entrance doors in palace houses, and are prominent on a number of doors in religious buildings such as zawiya and mosques (Revault, 1980, p. 85). This style of door decoration dates back to an

Andalusian custom where doors are decorated with domed iron nail heads after the door has been painted. The task of hammering these nails into the doors is undertaken by carpenters who also work on wood carving, turning, or painting. These are called decorative nails. The cuneiform drawings and designs vary in form and are divided into horizontal rows. These forms vary to form a continuous symmetry between the right and left leaves of the door. Most are geometric, consisting of triangles with their acute angles pointing upwards. Circles, star motifs, crescents, and arches are also used, forming mihrab shapes, as well as octagonal or hexagonal star shapes and crescent images.



Image (15): Door decoration with domed iron nail heads

6.2 Wooden Carvings

Doors of houses with wooden carvings are distinguished by the diversity of their unit designs, the variety of their individual forms, and the density of their geometric, symbolic, and foliate motifs. These units are rectangular, elliptical, or diamond-shaped, varying in number, dimensions, and size from one door to another.

7. Functions and Significance of Doors

The aesthetic aspects of doors in traditional houses and dwellings are numerous, reflecting the prevailing perceptions of the time in which they appeared. The doors of the Khanga Sidi Naji Palace are one of the architectural elements that reflect the social and economic status of the palace (Karim, 2018, p. 300).

7.1 Aesthetic Function

The entrance door is the most prominent element on the exterior of the dwelling. Thus, the door becomes the object that stands out from the whole, representing the "face of the house," which encapsulates all its elements and aesthetic values. The beauty of the palace doors stems from their straight lines, adorned with arches, twin windows, or vaulted designs, as well as the dense, successive stone bands surrounding their frames and the harmonious blend of stone, wood, and nail decorations, despite their diverse designs and varied motifs. This harmony between these decorative styles is one of the most prominent elements of the doors' aesthetic appeal.

7.2 Historical Function

These doors bear witness to the past, and their referential function lies in their connection between past and present, conveying knowledge with both technical and aesthetic dimensions. They offer a glimpse into the past through one of its enduring monuments, bearing inscribed dates on their lintels. While these dates also possess a decorative dimension, they thus acquire a historical and referential function for the entire architecture of the palace or town.

7.3 Social Significance

The use of stone or ornamentation on doors carries significant social significance in terms of financial means, especially since desert palaces enjoyed considerable prosperity, which positively impacted the living standards of the local community, particularly during the 17th and 18th centuries. A portion of the financial income was invested in these decorations. Doors devoid of ornamentation, on the other hand, indicate the modest status of their inhabitants.

7.4 Symbolic Significance

Radiant designs are considered fundamental elements in the decoration of palace doors. These include eight-pointed stars, intersecting and curved lines, and calligraphic motifs. The effectiveness of praising God and invoking His name is believed to be a means of controlling supernatural forces that threaten the dwelling and its inhabitants. This practice has a religious dimension and is prevalent in the Islamic world (Shafii Farid, 1982, p. 342). Similarly, circular shapes, in their various forms, such as the sun or moon, derive their symbolism from their names, as they evoke the two celestial bodies.

8. Door Craft

One of the weaknesses of the residential architecture in the Khanga Palace is the lack of wooden frames for most interior doors. Carpentry is almost exclusively limited to the entrances of a few rooms due to the scarcity of external access points to the dwelling.

The use of wood in Islamic civilization has been common since ancient times. Ibn Khaldun states in this regard, "This craft, namely carpentry, is essential for urban development, and its material is wood (Ibn Khaldun, 2005, Vol. 2, p. 299). The primary use of wood is as fuel for fires in their daily lives, as support for support and defense, and for other necessities, and as supports for the heavy loads they carry at night. Then there are other uses for both nomadic and settled people. The nomads use it for poles and pegs for their tents, litters for their saddles, and spears, bows, and arrows for their weapons. As for the settled people, it is used for the roofs of their houses, the locks for their doors, and the chairs for sitting; each for its purpose. Wood is the material for all of these, and it only acquires its specific form through craftsmanship. The craft that undertakes this task... is carpentry, in all its various forms." Among the most important woods

used in traditional architecture are cypress, for its hardness, and olive wood, which was used for roofing, lintels, and short supporting structures to reinforce walls. Palm wood was used for columns and other structural elements. These local, simple, and functional woods all rely on the same methods of manufacture and installation. They reflect the considerable effort made by the inhabitants of this town to ensure protection and privacy. Every room is equipped with doors, and despite the passage of many years since their creation and lack of maintenance, many of these doors still retain their strength and integrity, demonstrating both the quality of the wood and the craftsmanship.

These simple and functional doors guarantee the privacy of the dwelling. This simplicity stems from the fibrous nature of palm wood, which cannot be decorated. However, this simplicity in form presents a challenge for carpenters in shaping this type of wood. After the tree trunk is cut into four sections lengthwise and dried, it is carefully sanded to obtain smooth surfaces called "leaves." Then, using iron plates and wooden nails, these sections are joined to posts made of olive wood or other fruit trees, called "braces" or "pillars," which are placed perpendicular to the leaves. These braces form the door leaf, which is attached to a support fixed at one end of the door. This support has a projection at the top and bottom to facilitate the door's opening and closing. Thus, this support acts as the vertical axis of the door. The lintels of these doors are made of palm, olive, or other woods.

A distinction can be made between simple, functional doors and decorative doors, particularly those found in residential buildings, which reflect the social status of the building's owner. We will attempt to provide an overview of the most common models available in the studied area by classifying them as interior or exterior doors.

9. Door Characteristics

9.1 Exterior Doors

One of the most important elements of a door is its facade. The shape of the door is closely linked to its surrounding frame, as the shape is dictated by the facade. If the facade is arched, the door will be arched; if it is rectangular, the door will be rectangular. It is worth noting that arched and rectangular facades were adopted in all traditional buildings in southeastern Algeria, from public to residential to religious, as well as for simple, classic, rectangular entrances. This model saw extensive use throughout North Africa, primarily due to its simplicity and ease of construction. Arched doors, on the other hand, are a later and more recent development compared to rectangular doors. In addition to their aesthetic value, these arches above the doorways also serve a structural purpose: they act as light-lifting vaults, reducing the weight of the walls above the doorway. The facades of these structures varied, ranging from simple and devoid of any ornamentation to highly decorated. The door frames were constructed either from "shakhsh" stone, a local stone found in most southeastern cities, which is porous and easily carved limestone, or from "kadhal" stone, a flat-faced limestone.

Most of these doors consisted of two leaves. A single-leaf door was a rare occurrence, and when found, it was usually equipped with a "khokha," a small opening within a larger door that allowed light into the house. This type of door is particularly common in residential buildings. The central alcove, or entrance door, is located in the middle of the main entrance. Besides providing light, the alcove also serves to maintain the privacy of the home. Exterior doors are typically large, and fully opening them could compromise the privacy of the residents. Therefore, they are only opened on special occasions or to bring in livestock and agricultural tools after work.

The door is secured to its wooden frame; which consists of four wooden panels attached to the wall of the structure to facilitate the door's rotation in both directions, either by iron hinges or by a cylindrical wooden bar that fits into a hole in a wooden piece fixed to the top of the door frame, called the latch. The protrusion of this bar then fits into a hole in the door's base, making it easy to open and close the door. Door knockers played a crucial role in residential architecture. These knockers are usually located halfway up the door and can be found on either the right or both leaves symmetrically. They are made of iron or brass and are either a full ring or a semicircle. Beneath them is an iron plate that produces a sound or a decorative effect. The hand-held knockers, also known as the five knockers, typically have iron protrusions beneath them to produce the knocking sound.

These knockers in residential architecture hold significant meaning in maintaining the sanctity of the home and reflect the importance of the concept of seeking permission before entering in Islamic societies. The knockers in the residential buildings of Tozeur in southwestern Tunisia further illustrate this point, as their doors featured three knockers at three different levels: one for children, one for women, and one for men. This allowed the residents to identify the visitor as soon as they knocked. Locks also played a crucial role in protecting homes and residences in the region. Among the most important locks employed were:

- ✓ **The bolt:** Located on one of the door leaves, approximately halfway up its height, it operated horizontally to fasten the two leaves together. This bolt could be found on either the inside or outside of the door.
- ✓ **The lock:** This device, used to secure the door, employed a large key, approximately 20 cm long, which was fixed to one of the door leaves, either inside or outside, to tighten the two leaves together.
- ✓ **The bolt:** The bolt is used to secure one of the door leaves to the surrounding frame from above or below, and it closes from the inside.
- ✓ **The arm:** The arm is an iron bar used to secure the door leaves to the inner wall.

As for the colors used to paint the exterior doors of traditional monuments in the Khanga Sidi Naji Palace in particular, and the Ziban region in general, they vary according to the function of the space they open into. These colors can be summarized as follows: The doors of religious monuments, such as mosques, zawiya (Sufi lodges), and shrines, are

painted dark green. Most shop and storeroom doors are painted light green. It is worth noting that houses, most of whose doors are made of palm trunks, were rarely painted, and when they were, the green color symbolizing the oasis was used. As for door decorations, we cannot pass by without mentioning the distinctive door, the nail door, in which domed nails were used to fix the wooden beams to decorate the door. The diameter of the nail head ranges between 6 cm and 7 cm. This method of decoration is of Andalusian origin and has spread throughout the country, especially in the eighteenth century and the centuries that followed. In addition to the aesthetic quality that these nails give, they represented an effective way to overcome the problem of the lack of wide boards that enable the making of a complete door. So, these giant nails were used to assemble the boards together. But this does not negate its existence in the rest of the cities of Zab, where simple doors were widespread.

9.2 Interior Doors

Interior doors are mostly simple in design and found in all types of buildings, from mosques and zawiyas (Sufi lodges) to neighborhoods. These doors face inwards, facilitating internal communication among the users of these buildings. They are either rectangular or arched, similar to exterior doors, and typically have two leaves. Single-leaf doors are almost entirely absent from interior doors, unlike the common practice in modern homes (Revault, 1980, p. 89). The prevalence of double-leaf doors stems from their ability to increase light and ventilation within these buildings, which often feature an open courtyard design. These doors are equipped with knockers and locks similar to those used for exterior doors, and most are painted brown.

Conclusion

The layout of the doors in the desert palaces is characterized by a single external entrance, intermediate doors between the interior and exterior, and internal doors leading to the central courtyard. This arrangement is a defining feature of this architectural style. The internal doors are typically straight and topped with a sunshade, while the entrance doors vary in style, ranging from simple doors to straight doors topped with arches or twin windows, and horseshoe-shaped or semicircular arched doors. This diversity lends a distinct aesthetic to the morphology of the town of Khanga Sidi Naji, reflecting a range of architectural and artistic influences. These influences indicate the palace's connection to the Maghrebi architectural style, particularly evident in the use of arched doors and various arched openings, including the horseshoe arch. These doors, in all their variations, are framed with limestone, while the door shutters are brought from outside the town, demonstrating the care the inhabitants took in the design of their doors. Traditional doors are distinctive aesthetic elements of house facades, distinguished by their color, material, shape, and ornamentation. Their value lies in their role in enriching the aesthetic of the traditional architecture, characterized by its simplicity and uniformity. They preserve their architectural, historical, aesthetic, artistic, and cultural significance, thus underscoring their importance and the necessity of their preservation, especially within the context of the town's current state, marked by successive architectural and functional transformations. Architectural heritage, therefore, represents a primary tool for transmitting shared values and norms, bridging the past and present, and reinforcing national identity. This is particularly true of desert palaces, which help foster a strong sense of belonging and connection in contemporary urban life within a rapidly urbanizing world dominated by the principles and values of globalization. Architectural heritage is now increasingly viewed not only as important memories of the past that help shape our sense of identity and place, but also as an economic factor that can enhance our quality of life through tourism. Preserving and developing historical assets and heritage sites is gaining priority in the policies of the international community and local governments today, due to the key role they can play in promoting tourism and increasing economic opportunities, as well as long-term sustainable development.

Ethical Considerations

This study is based on architectural field observations, photographic documentation, and historical-cultural analysis of traditional dwellings in desert regions. The research did not involve human participants, personal data collection, or experimental procedures requiring ethical committee approval. All visual and documentary materials were collected and used in accordance with academic integrity standards and applicable heritage documentation practices. The authors ensured proper attribution of all sources and respected local cultural values during fieldwork and documentation.

Author Contributions

Tayeb Krim: Conceptualization, research design, field investigation, data collection, analysis, and manuscript drafting. Sana Nouidji: Literature review, heritage and legal contextualization, data interpretation, and manuscript revision. Mehani Madjid: Methodological support, historical analysis, validation of findings, and final editing of the manuscript. All authors have read and approved the final version of the manuscript.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

1. Abu Mustafa, K. (1997). *Jawanib min hadarat al-Maghrib al-Islami: Min khilal nawazil al-Wansharisi*. Alexandria: Maktabat Shabab al-Jami'a.
2. Abu Qasim, R. T. (2002). *Tadat tanniyat al-mudun al-sahrawiyya al-qadima: Al-tumuhat wa al-waqi'*. Riyadh, Saudi Arabia.
3. Abdel Aziz, C. (1984). *Masajid al-Zab wa Wadi Righ: Dirasa athariya mi'mariya* (Doctoral dissertation, University of Algiers).
4. Abdel Rahim, G. (1988). *Mawsu'at al-imara al-Islamiyya*. Beirut: Dar Sader.
5. Al-Firuzabadi, M. (1996). *Al-Qamus al-muhit*. Beirut: Mu'assasat al-Risala.
6. Al-Farsati, A. A. A. (n.d.). *Al-qisma wa usul al-ardiyin*.
7. Al-Hassani, B. (1999). *Mawsu'at al-imara wa al-athar wa al-funun al-Islamiyya* (Vol. 1). Beirut: Dar Awraq Sharqiya.
8. Al-Maktab al-Dirasi al-Mi'mari wa al-Omrani. (1996). *Al-mabadi' al-'amma li-'amaliyat i'adat al-i'tibar li-nawat al-qadima li-baladiyat Khenguet Sidi Naghi*. Biskra: Directorate of Tourism and Traditional Industry.
9. Bouasbana, O. L. B. H. S. (1992). *Ma'alim al-hadara al-Islamiyya bi-Wajlan 296H/626H-909M/1229M* (Master's thesis, Algeria).
10. Bouruiba, R. (1981). *L'art religieux musulman en Algérie* (2nd ed.). Algiers: SNED.
11. Bouruiba, R., et al. (1984). *Algeria fi al-tarikh: Al-'ahd al-Islami min al-fath ila bidayat al-'ahd al-Uthmani*. Algiers: Al-Mu'assasa al-Wataniya lil-Kitab.
12. Bouruiba, R. (1986). *Apport de l'Algérie à l'architecture religieuse arabo-islamique*. Algiers: OPU.
13. Karim, T. (2009). *Al-ma'alim al-athariya al-Islamiyya fi mintaqat al-Zab al-Sharqi: Dirasa tarikhia wa athariya* (Master's thesis, University of Mohamed Khider, Biskra).
14. Karim, T. (2018). *Tatawwur al-imaran al-Islami bi-wilaya Biskra: Khenguet Sidi Naghi namudhajan* (Doctoral dissertation, Institute of Archaeology, Algiers).
15. Mahfoudh, F. (1988). *La ville de Slax: Recherches d'archéologie monumentale et évolution urbaine* (Doctoral dissertation, Université de la Sorbonne, Paris).
16. Marçais, G. (1981). *L'art musulman*. Paris: Presses Universitaires de France.
17. Mercier, G. (1915). Khanguet Sidi Nadji: Quelques inscriptions arabes inédites. *Recueil des notices et mémoires de la Société Archéologique de Constantine*.
18. Mohammed Tayeb, A. (1990). *Lamhat 'an al-imara wa al-funun al-Islamiyya fi al-Jazair*. Algiers: Diwan al-Matbou'at al-Jami'iyya.
19. Mohammed Tayeb, A. (1999). *Qusur madinat Algiers: Awakhir al-'ahd al-Uthmani*. Algiers: Dar al-Hikma.
20. Ibn Khaldun. (2005). *Al-Muqaddima* (A. S. al-Shaddadi, Ed., Vol. 2). Casablanca: Dar.
21. Saad Allah, A. Q. (1980). Ziyara ila Khenguet Sidi Naghi. *Sirta*, (3), 116.
22. Saad Allah, A. Q. (1985). *Tarikh al-Jazair al-thaqafi min al-qarn al-'ashir ila al-qarn al-rabi' 'ashar hijri (16-20M)* (Vols. 1-2, 2nd ed.). Algiers: Al-Mu'assasa al-Wataniya lil-Kitab.
23. Shafii, F. (1970). *Al-imara al-'Arabiyya fi Misr al-Islamiyya* (Vol. 1). Cairo: Al-Hay'a al-Misriya lil-Ta'lif wa al-Nashr.
24. Shafii, F. (1982). *Al-imara al-'Arabiyya al-Islamiyya: Madiha, hadiruha, mustaqbaluha*. Riyadh: King Saud University.
25. UNESCO. (n.d.). *Études et documents sur le patrimoine culturel*.