



Laksour Region (Algeria) Architecture And Urbanism:

An Insight Into A Valorization Model

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Abstract ;

Through this paper, we aim to shed light on the complex and disastrous situation of laksour region Ksours in the Saharan Atlas due to the profound changes that affected their architectural elements and original urban patterns, so they no longer appropriately reflect the region's identity. This situation led to the isolation of the desert native people from their environment, which is the basis of their original urban thought. Therefore, correcting the situation by searching for effective, objective, and practical mechanisms that accept projection on the ground has become necessary.

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1. Introduction

The Atlas Mountains region consists of a considerable number of valuable Ksour. However, these Ksour are in a very complex situation due to the distortion of their architectural identity and the advanced demolitions of most buildings. In addition to that, the situation becomes critical because of the hands-off policy applied by the concerned managers of this important cultural heritage rather than taking responsibility and intervening to avoid the worst.

This scientific article highlights effective, objective, and practical mechanisms that can improve the reality of these Ksour. This problem leads us to develop the following question: Are restoration and rehabilitation of the Ksour's architectural elements enough to improve their situation and spare them the danger of extinction? Or are there other, more effective, and realistic solutions? To be able to answer this question, we studied three cases of study that were deliberately picked according to their conservation conditions; restored or not, good or deteriorated.

2. architecture and urbanism of the Saharan Atlas Ksour.

2.1 Compact planning

This kind of planning is a prominent feature of arid areas architecture; in these areas, adjusting the temperature of houses requires narrowing alleys by creating outer close-spaced walls. They can be twisted to provide as much as possible of

shade (Tacherift. A, Nouibat. B, 2007, p. 50) and spares an essential part of the external facades and roofs from sunlight. Also, it limits the energy leaking into buildings, helps control air movement, and protects from hot and dusty winds (abderrahmane, 2019, p. 1643).

2.2 Courtyard

The courtyard is one of the architectural elements that meets the climatic environment needs. It is an open or semi-open space like an upper opening (Mried Abdelkader, 2011, p. 103) from which chambers consume hot air drawn out during the daytime. During the night, the opposite happens; cold air is introduced to the chambers through the courtyard according to the physical principle that cold air is heavier and thus descends to the lower layers while hot air rises to the top ones (Mohamed akil fouzi, 2019, p. 457), The courtyard is also a suitable space for all kind of domestic activities. It provides an open space for the family members to be gathered (bachikh, 2021, p. 28)

2.3 Reducing external openings

windows and doors are few. They are seen as weaknesses according to thermal performance as they raise the conductivity coefficient through the facades, mostly exposed to sunlight. Therefore, openings are small and often directed toward the courtyard (Mohamed akil fouzi, 2019, p. 457).

2.4 Public spaces

In many desert areas, the public spaces are locally called "Al-Rahba." This term means vast land, given to unconstructed spaces (Ibrahim ben youcef, 1992, p. 85),

Al Rahba is where the Ksour people gather daily or celebrate events. That's why this place is otherwise called the gunpowder space. The same place is also used as a market, and by that, it combines the economic and social role within the desert Ksar (rabea souiket, 2020, p. 787)

2.5 Storage places

The storage spaces differ from one case to another. However, the main objective of founding Ksours, in the first instance, was to store agricultural products and foodstuffs for the surrounding tribes and nomads." (Ali hamlaoui, 2006, p. 20).

2.6 Spatial hierarchy

The various spaces, places, and streets were organized according to a classification in a precise manner. For example, the main streets lead to the secondary ones, narrow passages, and private ones. This organization reflects that privacy is essential in a Ksar (Mrieded Abdelkader, 2011, p. 164).

2.7 Fortifications

The Ksours fortifications consist of an external high wall surrounding the whole Ksar. Also, it can be a set of the house's outer walls often supported by towers (Khadidja boukhilal, 2011, p. 15)

2.8 Building materials

all the Ksours building materials come from the surrounding sites of the Ksar environment. The latter is considered the primary source of construction materials that are easily obtained and suitable for the savage desert climate. These materials are known for improving thermal performance inside the Ksours constructions. Amongst others, we can cite stones of all kinds, bricks, and mud, as well as palm trunks (Houda moubarek, 2016, p. 82)

3. The current general reality of the the Saharan Atlas Ksours.

The Saharan Atlas region did not witness a significant expansion of the French colonizer, but that did not prevent the arrival of his influences from northern Algeria to its south. That can be seen in the expansions close to the Ksar (Haidar chahid ali, 2019, p. 37).

Some residents added some extraneous spaces to the original buildings of the Ksar instead of protecting the traditional forms, which led to:

- A significant rift in the construction patterns occurred between the original center of the Ksours and their expansions.
- The spaces at the level of the residential expansions near the Ksours are done according to the Hippodamian urban.
- The disappearance of the courtyard after the whole covering of the old roofs to use this space.

4. The Ksour architecture and urbanism Rehabilitation mechanisms

The rehabilitation process is a difficult and complex challenge for current or future generations. The situation of these Ksour is deteriorating over the years to the point where it has become difficult, if not impossible, to save some endangered ones. Despite this, at least we must recover their immaterial heritage represented in their urban thought. Therefore, we should adopt a realistic and responsible attitude before taking any position.

4.1 Understanding the urban fabric

This step consists of analyzing all the data of the Ksour urban fabric. This principle depends on considering the Ksar as a living urban fabric as it can be considered an open-air museum. Hence, details are essential for choosing the nature of solutions. In this framework, treating a ksar in good condition differs from another in an advanced state of deterioration. Hence, reading urban fabric is based mainly on a typo-morphological analysis of dividing the urban fabric into elements to show the differences associated with the relationship between spatial organization and social practices. (Philippe Panerai et autre, 1978, p. 91)

4.2 Recovering the Identity

Before delving into the details of this exciting concept, we must point out that anthropologists such as Taylor and Morgan assert that human thoughts are similar in all places and that everyone thinks similarly and develops his culture

along similar lines. Therefore, everyone has the same intelligence, but the environment makes a difference. (machari, 2013, p. 13).

Indeed, recovering identity means returning to the human thought that made "coexistence with the environment and respect for religion and traditions a basic criterion for shaping its architectural identity. That was part of any community cultural identity, and its production can only occur through a community historical interaction with a strong sense of

In this framework, William Orielle pointed out that universal values are not necessarily valid for all communities. For this author, particular cultures have special architectural needs subject to regional and local privacy (Mohammed al alaphi, 2009, p. 129).

Recovering and stressing architectural identity is a legitimate right for the Ksour community continuously resisting the globalization endangering the Saharan Atlas region in the form of an ill-considered imitation of Western architecture without taking into account the traditional rules serving as a link between the old traditional planning and the new modern requirements (Khalf Allah boudjemaa, 2003, p. 100).

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Nowadays, thinking about stimulating and successful models using original architectural elements in line with modern-day's requirements has become necessary. That would be a catalyst and

motivation to change the negative perception of the Ksours community toward their original identity.

4.3 Law applicability

It has become necessary to focus on the mechanisms of applying laws. This section addresses the primary law protecting tangible cultural heritage (Law 04/98) and the executive Decree 19/15. Although not applicable in the archaeological field, these laws can be an effective means against the damages that affected the traditional buildings, especially with the emergence of new expansions as a preferred destination for people to live in. They were built innovatively and with exogenous architectural elements in contrast with the traditional aspect of Ksours. The contents of these two laws are as follows:

4.3.1 Law No. 98-04

This law, adopted on June 15, 1998, aims at protecting cultural heritage (98-04, 1998, p. 02). In this law, most of its articles deal with the desired goals concerning the preservation and the revalorization of the Saharan atlas Ksours:

- Article 23 stipulates that any building or construction permit in an archaeological area shall not be delivered without the approval of the departments in charge of culture.
- Article 30 sets out the general requirements for planning and constructing, whether in protected archaeological areas or expansion areas

(98-04, 1998, p. 08).

- Article 41 emphasizes the unity and homogeneity of buildings technically, aesthetically, and architecturally.

- Articles 45, 44, and 43 stipulate the need to provide archaeological areas such as Ksours with a permanent plan for protection and repair that replaces land occupation plans (98-04, 1998, p. 10).

-Articles 82, 84, and 87 are devoted to conducting periodic maintenance operations for tangible heritage (98-04, 1998, p. 16) And particularly for Ksours.

4.3.2 Executive Decree 15/19

This decree related to preparing and delivering construction contracts was enacted on January 25, 2015 (19/15, 2015, p. 02). In this law, the most interesting and in line with the objectives of our study are the second related to fragmentation certificates and the third article concerning construction permits. (19/15, 2015, p. 13).

Legally, the building permission or construction permit means "taking preventive measures to determine the nature of the authorized building, its specifications, and its purpose, residential, functional, or commercial. The construction permit is used by the authorities to protect the state and its individuals from damages that may result from the practices of individual freedoms and rights and to protect public and private interests" (Sayed ahmed elmordjan, 2002, p. 89)

Therefore, employing this executive decree is of service to us to impose a

certain unity of architectural elements and urban regulations that are compatible with the original style, as follows:

- Requiring courtyard

The imposition of the courtyard as a main traditional house element during the design of buildings before delivering any construction permits for either new buildings or old constructions (regulation) inside the Ksours. That by applying Article 43 stipulating "the necessity of respecting the method of building walls and ceilings in a way that is commensurate with the architectural plan while respecting the privacy of the site" (19/15, 2015, p. 13)

- Determination of building materials

The materials bill of quantity documents accompanying the construction drawings must contain local building materials, especially stones and bricks and local wood for roofing.

- Façades

The facades offered for modification or reconstruction must respect the same style as the facades of traditional original buildings by preventing the use of cement coatings or designing large openings in the modification plans. That can be supported by article No. 41, which states that "any changes in the facade or structure of the building require Obtaining a construction permit following the requirements in Articles 49, 50 and 55 of Law No. 90-29 of December 01, 1990. (19/15, 2015, p. 13)

- Absence of compact planning in new urban extensions.

This problem is addressed through the application of the fragmentation certificate second chapter articles, especially Article No. 09, which specifies the location and nature of the planned buildings and their urban form (19/15, 2015, p. 7), and Article No. 11, which stipulates the need of respecting the land occupation plan in the construction areas (19/15, 2015, pp. 7-8).

- Harmony of buildings

It is possible to impose a certain visual homogeneity that unifies the general aspect of the urban fabric inside the Ksours or in the urban extensions. That can be possible by applying the previous article (No. 11), Which also highlights the need to respect natural and cultural landscapes and the character of neighboring places (19/15, 2015, p. 08)

- Under-construction buildings with an unoriginal architectural aspect

This law enables the cancellation of new construction permits issued with modern plans and their review by applying Article No. 21. The latter states that "the land occupation or the conservation and valorization plans can modify the nature of programmed buildings even if that conflict with the requirements of their construction or modification permits. That ensures preserving and controlling the original urban and architectural aspect (19/15, 2015, pp. 9-10).

4.3.3 15/19 Law application agencies

A representative of one of the bodies concerned with the protection of tangible heritage is keen to apply this law when examining the technical file related to building permits or modifications, as stipulated in Article 47 (19/15, 2015, p. 16); as for the implementation phase, a special committee for construction contracts is appointed to ensure that works are matched with licenses issued, and it has the power to issue reports against unlicensed works to stop them and take deterrent measures against their owners, according to Article No. 90 (19/15, 2015, p. 23).

4.4 The use of Geographic Information Systems " SIG "

The procedure consists of collecting maps, aerial photos, and satellite images and using Global Positioning System (GPS) (Houcine bellahrech, 2018, pp. 104-105).

Hence, archaeological, geographic, and spatial data are complex but arranged in layers according to topics (Barge Olivier et d'autre, 2004, p. 20). therefore, these systems can provide effective solutions that change the complex reality of Ksour through spatial data analysis "SDA," by defining the study area and identifying its most essential uses (housing, livestock breeding, abandoned ... etc.) and highlighting the impact of natural and human factors, while subjecting it to a topographical study to identify its different regions (Michael Gooldchild, 1992, p. 409).

5. Study cases

To achieve our study, we have chosen three Ksour in the Laksour Mountains region extending from the Moroccan city of Fakik to the Algerian city of El-Beidh, constituting a barrier between the Great Desert and the Lesser Desert.

5.1 Mughar Tahtani Ksar (Sheikh Bouamama Castle)

Mughar Tahtani Ksar is bordered to the north by the region of Tiout and Maghar Al-Fawqani Ksour, which is 10 km away from it, and to the south by Al-Bunda, Oued Al-Jadida, Loulidat, and Bilad Al-Bard, and to the west by the borders of the Kingdom of Morocco (Abdelmadjid mebarki, 2001, p. 05).

The ancient mosque is considered the most essential component of the Ksour, located in the center next to the market. However, its location has become in front of one of the main entrances to the Al-Sharafah Ksar demolished by the French authorities in April 1847 (Abdelmadjid Mebarki, 2001, p. 34). In this case of study, four entrances are directly connected to the courtyard of the Ksar through alleys.

The phenomenon of mausoleums abounds in Mughar al-Tahtani. They were built on the western side of the Ksar in addition to many towers. Unfortunately, several old houses collapsed. They were primarily upper-floor houses.

Clay is considered the primary construction material. Local clay is used in addition to "flat stone or Madoun stone used in building stairs, niches, and lintels

locally called El Menar " (Abdelmadjid mebaraki, 2001, p. 65)

Mughar Tahtani Ksar currently

The function of the Ksar has radically changed and become more related to livestock and cattle raising than housing. That has dramatically affected the architectural aspect of the Ksar, as some of its walls were demolished to create more adequate spaces.

However, the level of modernization was consistently low for one reason: the Ksar is abandoned, and no one was considering returning to the Ksar's houses while roofs were collapsing.

5.2 Arbaut al-Foukani Ksar

This Ksar of 2 Hectares is considered one of the two residential complexes that make up the municipality of Arbaut, along with Arbaut al-Tahtani, the headquarters of this municipality. This Ksar is only 03 km from the municipality headquarters but 100 km from El Biath city and 20 km to the West of Lobyed Sid El Ceikh locality (Abdelhalim yahiaoui, 2016, p. 13).

As in other cases, the Ksar is also formed by the mosque and the market at the center of the Casbah. It is composed of cohesive houses and crooked alleys.

It is characterized by a single entrance on the western side bordered by orchards, unlike the other two Ksours, with several entrances heading toward the center. It is surrounded by shrines on three sides, except for the entrance side. This Ksar is

surrounded by walls and defensive towers on its four sides.

The Ksar inhabitants resorted to building underground warehouses so that they could lay the foundations at the level of good soil due to "the fragility of the muddy hill on which the Ksar was built." (Abdelhalim yahiaoui, 2016, p. 52)

The Arbaut al-Foukani currently

Mughar Tahtani Ksar is in a very advanced state of demolition; most of its walls collapsed, and its foundations were eroded.

5.3 The Tiout ksar

The Tiout Ksar is located about 17 km west of Ain al-Safra locality, on the banks of Wadi Teut, branching from Wadi Namus. (Nedjia ibn chenhou, 2004, p. 86).

The paths of the Tiout ksar are distinguished by their wideness compared to the previous cases of study. This feature raises the thermal conductivity coefficient through the external facades, so we discovered that some houses are roofed to protect their inhabitants from the sun's rays. In the case of Ksours, four entrances all go towards the mosque in the middle. It is not devoid of shrines, even though we found some of them are inside the houses.

Most of the Ksar buildings were constructed of red clay, trimmed stones, palm leaves, and some types of wood for roofing.

The Tiout Ksar currently

The situation of this Ksar is considered more or less complicated than the precedent cases of study, not because of the destruction's extent but because of the mutilation affecting its components.

Although the Tiout Ksar was the object of several preservation operations carried out by some contractors, they were not done correctly, as they were restricted to a limited number of buildings and because of the random construction operations realized by the Ksar inhabitants. (Photos No. 03.04)

5.4 Suggested solutions

The applied mechanisms in the three cases of Ksours differ in priority and order, and this is to comply with the data of each one of the cases. We summarize the suggested solutions as follows:

5.4.1 Intervene in the case of Moghrar Tahtani Ksar

Authorities should intervene in this Ksar by ending the phenomenon of livestock breeding as a first step while providing arranged spaces outside the Ksar as an alternative. Simultaneously, authorities should be aware of applying strict laws.

Then comes the second step consisting of rehabilitating the Ksar buildings following general requirements. (Aerial Photo No. 02)

5.4.2 intervene in the case of Tiout Ksar

Random renovation and lacking restoration operations seems to be a

crucial issue that should be solved. Hence, there is no way to do that except by applying the requirements of Law No. 04/98. In addition, studied modification permits must be required according to Executive Decree (15/19).

After eliminating the architectural mutilations, the stage of functional reuse follows, as we suggested in the previous cases of study (Aerial Photo No. 01).

5.4.3 Intervene in the case of Arbouet Al Foukani

The general situation of this Ksar calls for a different kind of intervention, given that all its parts are collapsing. Therefore, the appropriate reuse scheme for deteriorating buildings must be followed (details in the following title).

5.5 reuse scheme

According to this scheme, we try to develop objective plans and practical proposals that are adequate with the state of conservation of each Ksar' building. The scheme principle is to retrieve or preserve the most significant number of elements and spaces in each Ksar, even if it will be necessary to abandon some of them or change their functions. That should be done following a particular priority based on scientific criteria and the ability to recover them decided by us as experts in the field. For more illustration, we give the following details:

5.5.1 Dilapidated buildings

This case of buildings is proposed to be restored adequately and reused as artisans' workshops. They can be linked to the main streets to form a commercial artery fed by the products of these workshops (3D image 01 and 02), primarily because the Ksar is known for some similar activities well received by visitors (Photo No. 06).

5.5.2 Endangered Buildings

The endangered buildings are considered the most challenging part of the proposal. Hence, the proposal bears two attitudes, either restoring the collapsed parts according to the original style and encouraging the residents to go back to these buildings, which means preserving the immaterial side with the need to leave the original features visible after restoration (preserving the material side), or avoiding to rebuild and only restoring the rest of the walls without touching the structure while preparing this area to be used as an open-air museum. In this case, the surrounding buildings should not be used for housing to avoid urban rupture within the ksour's urban fabric (3D pics 01 and 02).

6. CONCLUSION

After we developed the main features of the ksar architecture and urban planning, going through the damages and mutilations affecting it, we can conclude by saying that changing this reality for a better state has become the responsibility of everyone. So, one of two, either saving the remaining Ksour buildings or losing the last symbols testifying to the original

identity of this region based on an architectural thought sanctifying the relationship between the Ksar inhabitants and their environment.

To save the Ksar's architectural and traditional urban features, we must be convinced that restoring the Ksar buildings would not be meaningful without proper reuse after that.

From the proposed mechanisms discussed above, we conclude that recovering the architectural thought establishing this tangible heritage depends on presenting new models on the same sites or nearly combining the original architectural elements and the required modern comfort imposed by contemporary life.

We also hope to direct architects and urbanists to focus more during the design of their project and to adopt the principles of the original architecture and urban style of the Ksar to make it more attractive and to avoid expelling the inhabitants from the Saharan Atlas region Ksour, as it is the case currently.

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8. Appendices



Photo.1 Side view of Mughar al-Tahtan Ksar.



Photo.2. Side view of Arbaut al-Foukani Ksar.



Photo.3. Side view of Tiout Ksar



Photo.4. Renovation operations at the Tiout ksar



Photo.5. Breeding cows at Ksar Tiout



Photo.6. Exploitation the Tafelt site in Tiout Ksar as a national art exhibition place on 05-28-2023.



Aerial Photo No. 01: Scheme of reutilization of Tiout Ksar – modified by the author



Aerial Photo No. 02: Scheme of reutilization of Mughar al-Tahtani Ksar – modified by the author



3D Image No. 01: Showing the reuse of the Ksar buildings - a general model of the author's work.



3D Image No. 02: Showing the mobility oriented towards the ksar - a general model of the author's

