

The Saharan Hotel Architecture of Fernand Pouillon in Algeria: Creation of a Contemporary Architecture Adapted to the Climatic Context

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Abstract

Talking about the Sahara leads us to think directly about the climatic context. But it is also a question of invoking the spatial and environmental quality that characterizes the urban and architectural heritage of the Sahara. In Algeria, the Saharan architectural heritage is a heritage of great value and which deserves recognition, from which one can draw inspiration from the lessons and design techniques, where it represents an example of its kind by its adaptation to the climate. This heritage inspired several architects during the 20th century. Among these architects, Fernand Pouillon stands out for the number of architectural projects he carried out in Algeria and would stand out for taking into account climate elements in his conceptual approach.

As part of this research, the study was carried out with a view to highlighting the specific contribution due to it in terms of promoting this local architectural legacy in itself as well as in its relationship to the environmental context. Consequently, the objective of this work is to better understand the typological, conceptual and conceptual characteristics of Fernand Pouillon's hotels, and his cooling techniques used, to have a suitable thermal environment. To do this, three Algerian Saharan hotels that were designed by Pouillon were chosen as case studies. These are: i) Rustumide (Ghardaïa), ii) Gourara (Timimoune), and iii) Mehri (Ouargla).

On the other hand, the method adopted for this study is essentially based on the observation and visual analysis of architectural and urban devices. It is a question of identifying and classifying categories of spatial devices according to dominant role. Finally, the study shows that: i) an architectural vocabulary which refers to the local heritage, ii) the architectural devices at the origin of the creation of comfort in various places of the hotels studied.

Key words: environmental quality, patrimony, device, hotel, Saharan architecture.

INTRODUCTION

Well-being in the architectural space is an intention that pushes researchers to create a pleasant atmosphere guaranteeing the smooth running of user activities (Zineddine, Belakehal, 2018). The regions of southern Algeria, have specific climatic characteristics that require protection against its constraints. Therefore, it is interesting to seek to refresh and increase the humidity level in the air of interior spaces and which have often been linked, in the first place, to a thermal appreciation (Zeroual 2006) (Kamaragi, 2014). To do this, the architecture of Fernand Pouillon, which is considered a contemporary heritage, can include adequate architectural solutions that can meet climatic needs such as. Fernand Pouillon has made more than forty hotels throughout the Algerian territory, especially the Saharan cities. He has deployed a whole globalizing approach, ranging from contextual, ambient, historical reports, to the mastery of immense simplicity. Close to man and nature, with the inspiration of local traditional architecture (Deluz, 1988), and an oriental influence (Pouillon and Marrey, 2011). As he said: «I wanted to create sunny spaces protected from the wind, where the old people would come and dodging in the winter, the women would sew or knit while the children would play: on the south side, the shade, the water and the 'air ; north side, shelter and sun". (Pouillon, 1968, p 369).

Finally, we were interested in identifying the different cooling techniques created by Pouillon to ensure a suitable thermal environment in its hotel architecture.

MATERIALS AND METHODS

Methodology

The identification of cooling techniques would amount to characterizing the interior thermal environments in a given place. To do this, this study will be carried out on a corpus of three hotels located in a hot and arid climate. To do this, it was a question of conducting an analysis of the architectural elements that can be a source of thermal comfort (Normandeau, 2008). The method adopted for this analysis will be applied at two levels, the first level devoted to the inventorying of the various architectural devices considered as a cooling technique (Belakehal, farhi, undated). The second level is a description of order (Chelkoff, 2001) (Lamunière, 1988): i) topographic (spatial relations), ii) environmental (solar orientation, exposure, etc.), iii) constructive (materials), geometric (volume, etc.), and iv) typological (dimensional, functional.).

Finally, this work was carried out by collecting the archives at the National Archives Center of Birkhadem-Algiers, the Library of the City of Architecture and Heritage-Paris, the archives of the commune of Ouargla, Biskra.

MATERILES AND METHODES

Case of Study

The choice of the works of Fernand Pouillon in Algeria as a case study is motivated by many aspects, these works have been for a long time, and still today, the central artery of the capital and gives an excellent representation of the architectural production. Algerian (Fratini, and Pittaluga, 2019), so we chose. Three Saharan hotels of Fernand Pouillon: i) Rustumide (Ghardaïa), ii) Gourara (Timimoune), and iii) Mehri (Ouargla) (Figure 1). These three hotels are the most famous in the Algerian Sahara. They have been characterized by a slight modification in terms of design and the general shape of the building. Therefore, the choice of the hotels studied was made according to: i) the availability of graphic documents, ii) minor modifications to the level of the general shape of the building, and iii) the date of completion. They were built during the same period between 1968 and 1972 under the supervision of the Algerian Ministry of Tourism.

Hotel Rustumides was built in 1971 under the direction of the Ministry of Tourism. It gives mainly on the cemetery and the stadium, and on the other hand, on the street which leads to the communication station. It is located near the city of Ghardaïa. It lies on the mountains of Mzab. In addition, the site and the orientation of the hotel favor good exposure to the prevailing wind in the city of Ghardaïa. The latter is characterized by winds that blow from the northeast (cold) and from the southwest.

The Gourara hotel is considered a jewel of national heritage. It was built in the 1970s on a projection overlooking a large Timimoune palm grove in the wilaya of Adrar and built in a "horse-shoe" configuration (Maiza, 2008). The building is a true example of adapting a building to its environment. The framework of the building is ensured by shuttered, lightly reinforced concrete walls.

The Mehri hotel was designed for the Algerian businessman Maheri in 1968 on a total area of 25,189 m². It is located in the heart of the city of Ouargla on the road to the Saharan oases, and neighbor to the north of the El Manar hotel, and limited to the south and west by dwellings. To the east by the municipal stadium.



Figure1. The chosen study corpus: i) Rustumides hotel, ii) Mehri hotel, and iii) Gourara hotel

RESULTS AND DISCUSSIONS

In the three hotels chosen, the on-site observation made it possible to identify three several devices which consider as passive, sustainable solutions for the hotels of Fernand Pouillon: i) the interior gardens, ii) the cheese, iii) the patios, vi) the thick wall, v) the openings, vi) the terrace, and vii) swimming pool. In what follows, these various devices will be described according to their role.

Indoor Garden

This device is widely applied in Saharan architecture. The architect has created a sort of palm groves inside the space which allows users to feel the area, and create a thermal atmosphere for the semi-open space of the “micro climate” hotels (Figure 2)

Vegetation in interior gardens provides shade and cools the atmosphere through evapotranspiration to increase air humidity (De Herde, and Liébard, 2005) (Hamel. 2005). For example the Gourara hotel is characterized by gardens that represent a source of refreshment in the heart of Sahara, enhanced by the roar of seguia water for humidification.

The luxuriant garden and the swimming pool of the Mehri hotel, in bring calm and freshness to the place in an architectural setting made of shady arcades with a large garden. In addition, the hotel is well exposed to the prevailing wind in the city of Ouargla. The latter notices that the breaths that come from the north and north-east, predominating both in winter and in summer.

In the Rustumides hotel, the presence of a large number of interior and exterior gardens managing a certain harmony with the palm grove that exists behind the hotel. The environmental role of the gardens is similar to other hotels where it promotes refreshment.



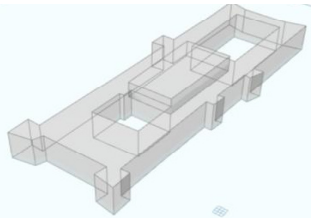
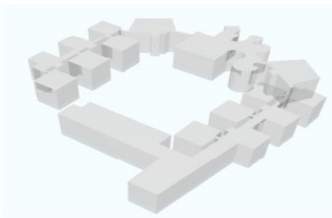
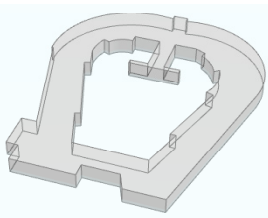
Figure 2. View of the exterior gardens of selected corpuses

Form

A form will be more easily perceived (visually) if it is “closed” than if it is “open” (Chelkoff, 2012). The climate of the Saharan region requires planning and an architectural form that is well suited to an ambient environment. Fernand Pouillon thought of a compact architectural form of high density to minimize heat penetration inside hotels (Catalina, and al 2008).

Furthermore, the three hotels are characterized by compact shapes which minimize exposure to the sun (Table.1). The volumes appeared as a single entity with small openings. He always opted for introverted forms on: i) garden, ii) patio, iii) courtyard ...etc.

Table 1. The different typologies of forms in the Saharan hotels of Fernand Pouillon


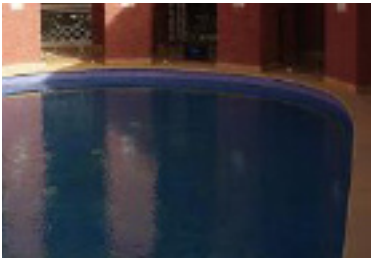

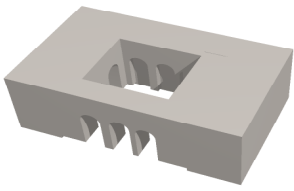

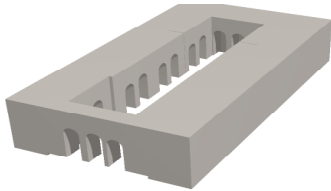
Rustumides hotel	Mehri hotel	Gourara hotel
		
Introvert shape on a yard and patio	Introvert form on indoor garden and patio	Introvert shape on indoor garden

Patio

In the chosen corpus, the introverted form of the three hotels on empty spaces: courtyard, patio, garden refers to the patio house of local architecture (the house in the house). The patio is an architectural device that is not limited to the notion of open central space (Reynolds, 2002). It is considered a key element of climate adaptation. This device is inserted in different places of the five hotels. From the thermal point of view, the patio functions as a surface to accumulate cold air during the night by radiation (Bisam and Ahafiz, 2010). In the afternoon, the patio temperature increases which allows convection and the exchange thermal with cool indoor air until nightfall. For ventilation, the patio works like a chimney where the interior facades are pierced by small and rare openings to have a suitable freshness with the use of a fountain case of the El Mehri hotel (Haj Hussein, 2012) (Picarda and Aleth, 1994) (De Herde, and Liébard, 2005). In the case of the Mehri hotel, the rooms open onto a patio equipped with a water fountain forming passageways that protect the interior walls from the sun's rays and allow ventilation that softens the very hot climate (Belkhiri, 2017). While the Rustumides hotel and the Gourara hotel open onto a large courtyard where the swimming pool is located, which allowed the cooling of the interior spaces by humidification.

The patio presents a typology consisting of three situations i) semi-open integrated patio (Mehri hotel), iii) linear patio with a gallery (Rustumides hotel), iv) semi-open patio, organic shape (Gourara hotel). (Table .2).

Table 2. The typology of patios in the architecture of Fernand Pouillon

Maherihotel	Gourarahotel	Rustumideshotel
		
		

Massive Walls

In the outer envelope, the material, the thickness and the color, are the three elements that define the role of a wall, where a large part of heat exchange occurs.

The thick walls constituted the most recurring character of the envelopes of the three hotels. This device, varying from 0.40 m to 1 m, provides hyper insulation of interior spaces (Pauly, 2008). It has thermo-physical properties which give them a significant modification of external climatic conditions (Hamel.2005). This contributes enormously to the creation of very appropriate thermal environments.

In the case of the Gourarahotel and the Mehri hotel, the thick east wall highlights the contrast between the wall surface and the openings and also illustrates visual stability. The massiveness of the building of the Rustumides hotel is manifested through its general volume resembling a heavy cube sculpted by small openings as well as by the separation of loggias and terraces (Figure3).

The effect of massiveness translated by: i) thick walls, ii) introversion recalls the thermal inertia of traditional architecture, and iii) the defensive character. Generally, the reduced number of openings in the exterior walls creates an impression of massiveness for a building, “a facade wall with small windows placed inside will evoke fortress and security” (Von Meiss, 1993, p199)



Figure 3. View of the massive walls of Fernand Pouillon hotels

Piercings

The thermal recommendation in the Saharan hotels of Fernand Pouillon has largely appeared, especially in the type, shape, and size of the openings used which serve both for natural lighting, the view to the outside, and ventilation. Most hotel openings are oriented towards interior hotel patios. The majority of openings have various dimensions but generally small, square in shape with a small number having an arc termination

In the Maheri hotel and the Rustumides hotel, the openings present a mix between high and low openings, simple without frames. They are concealed by a screen wall, promoting a shadow effect and minimizing the direct access of sunlight to the interior spaces (Figure 4).

The shapes of the openings have their origins in local heritage, such as the arched window of Moorish-style houses, the small openings of Kabyle houses, and the Egyptian moucharabieh.



Figure 4. Views of the different openings used in the hotel architecture of Fernand Pouillon

Terrace

For the 'terrace's theme, Pouillon thought of this aspect of the degraded silhouette and direct visual contact with the outside. In hot regions, people come to get cool in the evening and sleep there. Pouillon has designed works adapted to the climate and to the different types of region. He tried to create a link between his works and the local architecture of the region.

For hotels in the Sahara, the presence of this element is rare because of the very high temperature of the climate. But, it remains an architectural element that promotes a very appropriate thermal atmosphere in some hotels in the Sahara, such as the Rustumide hotel. Through the reception hall terrace and the terraces of the rooms in the form of a loggia. At the Gourara hotel, the terraces are like platforms that follow the shape of the sloping ground (10 meters drop) in Timimoune (Figure 5). Fernand Pouillon creates a game of platforms (Three for Gourara and which facilitate direct contact with the palm grove)

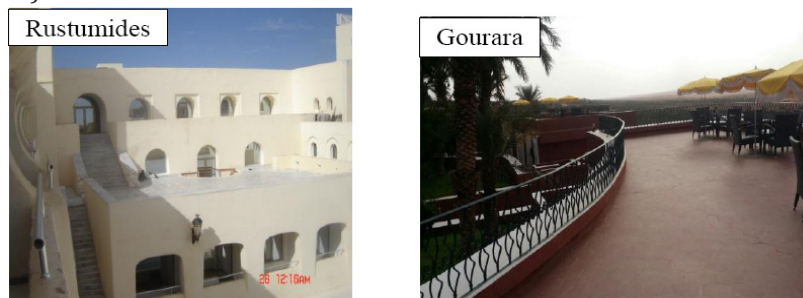
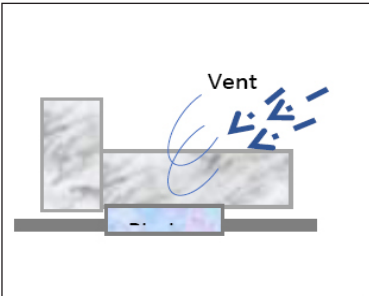
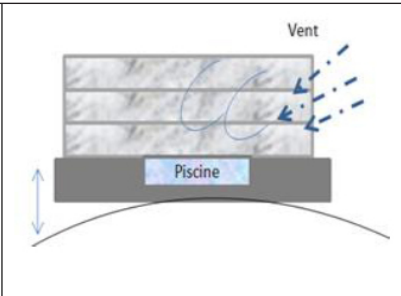
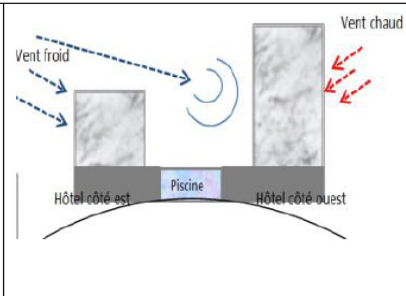


Figure 5. Example of terraces in the architecture of Fernand Pouillon. Case of the Gourara hotel and Rustumides hotel

Swimming Pool

It is clear that the majority of hotels are equipped with swimming pools which are used for the relaxation of users. But in Fernand Pouillon’s architecture, the swimming pool plays an important role in refreshing the space. It appeared that the swimming pools of the Saharan hotels are installed facing the directions of the prevailing winds. This made it possible to create a suitable microclimate in the building through the humidification of warm air by evaporation (table 3).

		
Maherihotel	Gourarahotel	Rustumides hotel

Summary

The study of the chosen study corpus has made it possible to understand the approach proposed by Fernand Pouillon to create an appropriate environment for hotel users focuses on the principle of designing elements such as Pouillon always opted for: i) introverted volumes, and compact shapes, ii) the void ratio in Fernand Pouillon’s façade is very limited compared to the full one. It is massive and little pierced. iii) The majority of hotels are exposed to the prevailing winds of each region, especially for cold winds.

On the other hand, several devices were drawn from this study such as: i) the interior gardens, ii) the cheese, iii) the patios, vi) the thick wall, v) the openings, vi) the terrace, and vii) swimming pool, These devices have a key role in creating a comfortable environment in these tourist places of historical and architectural value.

CONCLUSION

This research took a new look at the hotel architecture that Pouillon built in the Algerian Sahara. Indeed, it has made it possible to identify several construction techniques which have been used to meet climatic constraints, and the needs of human beings from the thermal point of view to ensure their comfort throughout the day in these tourist places of historical and architectural values.

However, the variety of devices from traditional local architecture, their varied reinterpretation as well as the multiple atmospheres that emerge from them testify for the genius of Pouillon in terms of hotel architectural creation.

In the end the hotel architecture of Fernand Pouillon is a real laboratory in terms of comfort of great importance that should be carefully analyzed and understood in its own historical and physical context for rehabilitation in contemporary architecture.

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