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TRADITIONAL BUILDING MATERIALS: CASE STUDY OF ROBUA & TUNIS VILLAGES IN FAYOUM EGYPT

Meral ALILATIF

Master's Thesis

Supervisor

Asst. Prof. Dr. Merih KASAP

İstanbul, 2025

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This thesis titled RADITIONAL BUILDING MATERIALS: CASE STUDY OF ROBUA & TUNIS VILLAGES IN FAYOUM EGYPT prepared by MERAL ALİLATİF and submitted on 11/12/2025 has been **accepted unanimously** for the degree of Master of Science in Architecture Engineering.

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I hereby declare that this thesis meets all format and submission requirements of a Master's thesis.

I hereby declare that all information/data presented in this graduation project has been obtained in full accordance with academic rules and ethical conduct. I also declare all unoriginal materials and conclusions have been cited in the text and all references mentioned in the Reference List have been cited in the text, and vice versa as required by the abovementioned rules and conduct.

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ABSTRACT

TRADITIONAL BUILDING MATERIALS: CASE STUDY OF ROBUA & TUNIS VILLAGES IN FAYOUM EGYPT

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The ancient Egyptian history and culture of the country are manifested in its ancient architecture that truly represents the originality, creativity, and depth of the Egyptian people. This thesis focuses on the analysis of building materials of seven villas in Robua village in the vicinity of Tunis Village in Fayoum Oasis, as an example of the fabric of the traditional Egyptian architecture. With a focused investigation on the application of conventional construction materials at Robua & Tunis Villages as a way of identifying the inherent cultural, environmental, and functional values that withhold within locality building practices. Famous for its distinctive ceramics and classic architecture, provides a unique lens for how local resources, such as mudbrick, claybrick, stone, and natural wood, can lead to sustainable building practices. Through field observations, interviews and material analysis, this study exemplifies the climatic benefits of conventional materials, such as durability, minimal environmental impact, and heat regulation. It also addresses the difficulties of keeping traditional practices alive under the pressure of modernization, which means to integrate traditional materials with modern ones. The thesis presents the claim that traditional materials are a means of maintaining airs of culture and transferring sustainability, by offering an approach to revive vernacular architecture.

Keywords: Building Materials, Vernacular Arch., Sustainability, Fayoum, Egypt.

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1. INTRODUCTION

"Green building" and "Sustainable building" are beginning to be of interest to academics and practitioners in the field of buildings, as the energy crisis continues, urbanisation is on the rise, and pollution levels are at an all-time high. In a practical sense, there is very little change in construction towards sustainability apart from a few isolated endeavors which are the outcome of individual grass-root-changers professionals and practitioners. Energy efficient technology to reduce water and power use, passive design, and the choice of suitable materials and techniques of building are among the many aspects of sustainable construction.

Induction to new building materials such as alternatives and green building materials are beginning to rise interest, particularly among scientific researchers. Many different kinds of alternative building materials and components have been found suitable. The real problem is getting the construction industry to use sustainable building materials, to help in the affordability of housing (El-Kabbany, 2013).

Due to the rapid modernisation and urbanisation of society, traditional building materials can sometimes face the danger of being neglected or destroyed.

I selected the topic of "Traditional Building Materials: Case study of Robua & Tunis Villages in Fayoum Egypt" due to multiple factors, such as my own interests and intellectual impulse and the topic relevance.

In contrast to the material configurations and layouts of western building design, Robua & Tunis Villages architecture is based on the rural architectural style of architect Hassan Fathy (1900–1989), which uses traditional mud construction, domes, and vault ceilings that are suitable for hot weather.

Traditional architecture is able to provide an insight into a society's cultural history. Examining a specific aspect of Egyptian culture, I focus on Robua & Tunis Villages in Fayoum and examine the extent to which the architecture represents regionally specific historical, social and environmental variables.

My work builds on the existing literature in architecture, cultural studies and perhaps anthropology, or history. Through the deep dives present in my case study on Robua &

Tunis Villages, I elucidate the history of traditional Egyptian architecture, its role today in culture, and the possibilities therein for sustainable development.

My research requires me to interview the people of Robua & Tunis Villages, architectural and historic preservationist experts. Through working with stakeholders, I want to bring the community together to help them enjoy their built environment and educate them about the values held in traditional architecture.

My thesis may be relevant to Egypt's historical preservation efforts, urban planning projects, and policies. By emphasizing the construction and financial value of the old architecture. This might not be the best I can do.

I believe that my motivations to choose this topic for my thesis revolve around not only my passion for traditional architecture but also my need to make a positive impact on academia and society and my commitment to preserving and honouring the rich cultural heritage of the people of Egypt.

1.1 PROBLEM STATEMENT

The Egyptian architectural legacy exhibits its captivating and varied history, which is a result of thousands of years of archaeological events and cultural importance. Inherent in the traditional architecture of Egypt, which came together into a unique identifiable form despite the massive monuments of earlier civilisations, is the culture, value system, lifestyle and environmental sensibilities of the inhabitants who had settled on its soil through millennia of time. However, the fast pace of urbanisation, modernisation, and socioeconomic changes has put a serious challenge on the understanding and preservation of ancient architectural forms and processes. The villages of Robua and Tunis in Fayoum represent an excellent case study exploring the challenges and possibilities of preserving and restoring traditional architecture in the modern era. Robua and Tunis villages, in Fayoum Oasis, are model of the rural architecture in Egypt. Public buildings, narrow streets and clay brick buildings blend with the heritage and culture of the region.

The objectives of this research is to understand, record and preserve the architectural heritage in the villages of Robua and Tunis in Fayoum and similar villages in Egypt because they are facing the threat of modernization, urban development, and industrialisation. The

architectural heritage in these areas is at risk of disappearing. Traditional construction techniques, materials, and architectural ideas can be irretrievably lost without appropriate documentation and conservation measures.

Preserving architectural heritage in these rural areas is related to social and material factors such as economic growth and rural-urban migration. A deeper understanding of these issues will help identify solutions for preserving architectural heritage in these areas.

Traditional architecture of Robua & Tunis Villages combines principles to ensure environmental sustainability through the utilization of passive design strategies and locally available materials to deal with the climatic challenges of the region. However modernisation also brings practices which undercut them, lead to a higher energy use, greater environmental recession, and greater sensitivity to climate change.

The importance of traditional architecture in relation to the prospect of historical tourism and the preservation of cultural identity. As Robua & Tunis Villages and similar communities become incorporated into tighter knots in global tourism circuits, development efforts should safeguard and enhance the unique qualities that make up the built environment or risk reducing, or commodifying them.

Effective preservation projects should actively involve the local community to ensure that interventions are socially inclusive, contextually relevant, and sustainable, increase local capacity, occupancy, and care of Robua & Tunis Villages architectural heritage will require the encouragement of local stakeholders.

This thesis can directly respond to the larger discussion in Egypt and overseas around cultural resilience, sustainable development and heritage, it aims to find ideas, techniques, and references that can shape and inform planning, policy, and practice aimed at preserving and retrieve traditional architecture in the context of modern needs and realities, through a close reading of Robua & Tunis Villages as a case study.

1.2 OBJECTIVES

Materials characteristics of Robua & Tunis Villages, Fayoum, Egypt. Which comprise the structural elements, building appellation, ornamental motifs and spatial arrangement of traditional Egyptian architecture.

To explore the architectural heritage of the villages of Robua and Tunis in Fayoum, this study will clarify the architectural and cultural history of buildings of this region and its position in relation to other regions in Egypt, this means illustrate the history of architectural heritage and its development over the ages, as well as studying the social aspects that influence architectural heritage, it will also study building materials and their resistance to highly hot climate and sandstroms in this region.

Realizing the importance of preserving cultural heritage, this study objective is to provide practical restoration and conservation solutions for the traditional architecture of Robua & Tunis Villages, this involves identifying the factors, such as modernisation and urbanisation, that menace the conservation of historic structures and suggesting measures to ensure that these architectural treasures are preserved for future generations.

The research is willful to promote community empowerment and involvement through including individuals and stakeholders in the documentation, preservation and marketing of the traditional architecture of the Robua & Tunis Villages, community participation to replace structures with traditional squares, and working with all community members is essential in raising public consciousness of the cultural significance of traditional structures.

1.3 RESEARCH QUESTION

How can the protection of traditional building materials in Robua & Tunis Villages, in Fayoum, help to maintain the villages architectural heritage, and what are the main suggestions, applications, and obstacles of doing so?

To understand better how local identity, heritage, and craftsmanship are deep rooted in architectural traditions, that is why, I chose this question. Well known for its artisanal pottery, rich history, and traditional building methods, Robua & Tunis Villages are presently facing difficulties from modernisation, lack of documentations, and modifications of building materials and methods, by posing this question, i wanted to explore about the larger socio-cultural and environmental framework that facilitates the preservation of traditional architecture, in addition to its technical and material components.
I used qualitative and quantitative case study approach with a focus on Robua & Tunis Villages in Fayoum, to answer this research question, an overall context-specific investigation of traditional building materials and conservation concerns was made possible

by this method, the process included, literature review which was a thorough check of scholarly publications on local building methods, conservation theories, and traditional egyptian architecture gave rise to a fundamental knowledge of the topic. Also fieldwork and Visual documentation photographs, sketches, and notes were taken during on-site visits to document existing structures, materials, and techniques, this made it easier to determine the materials and physical features of traditional buildings in addition to interviews and comparative analysis, to distinguish characteristics and shared difficulties in preserving traditional materials.

Robua & Tunis villages, traditional building materials are a core part of architectural heritage, not only aesthetically, but also technically and culturally, protecting these materials helps maintain the village's authentic identity, craftsmanship, and climate-responsive construction character, while reducing the risk of gradual heritage loss through incompatible modern replacements. Including "suggestions, applications, and obstacles" ensures the thesis is pratical: it moves beyond describing heritage to proposing implementable actions and identifying the real challenges that affect material preservation in living villages, such as cost, availability, skills, regulations, and development pressures.

2. TRADITIONAL BUILDING MATERIALS ACROSS CIVILIZATIONS IN EGYPT

In this chapter I explain historical and cultural framework for understanding the use of traditional building materials in Robua and Tunis Villages; by tracing how materials such as mudbrick, stone, and natural wood were employed across successive Egyptian civilizations: Pharaonic, Greco-Roman, Islamic, Ottoman, and modern, it demonstrates that these materials are not incidental or outdated choices, but rather the result of accumulated local knowledge, environmental adaptation, and cultural continuity; this background allows the case study villages to be read as part of a long architectural lineage, where contemporary vernacular practices are rooted in centuries of material experimentation and climate-responsive construction, which strengthen the academic justification for studying and preserving traditional materials as sustainable and culturally meaningful elements of Egyptian architecture.

Egypt was earth central ingredient for all buildings throughout centuries, a muscle available to all people to construct their very own shelter. Fragments of ancient mud buildings are still evident as proof of the earth's good qualities as a building material.

The industrial revolution; the introduction of industrial building materials & technologies; the aspiration for modernisation as a result of every socioeconomic shifts taking place in the community during the second half of the 20th century, have all brought about rapid changes that could not be sustained by indigenous building materials. As a consequence, local, indigenous materials were slowly and sharply supplanted by industrialised substances. For formal and informal developments in towns and villages, burned clay bricks and reinforced concrete are the most employed building materials in Egypt at the current time (El-Kabbany, 2013).

The villagers previously were used to the traditional way of making mud bricks, and building itself was a joint community exercise where all collaborated towards building their own and their neighbours' houses. Today, this is no longer true with a fast-paced lifestyle and extensively available industrialised building supplies that can easily access construction sites even in the most remote regions. The building materials industry is largely owned by the private sector and the monopolisation of the market affects prices, particularly for essential building materials such as steel (El-Kabbany, 2013).

The history and development of clay brick industry:

The industry of mud brick casting started during the Pharaonic era (Figure 2.1), (Figure 2.2), and inscriptions showing the process of mud brick casting indicate the importance of this industry.

Figure 2.1: Queen Hatshepsut Casting Mud Bricks (El-Kabanny, 2013).

Mud brick casting was a common traditional process, whether in the Delta, where mud from the Nile sedimentation was used, or in the desert agglomerations, where desert clay was the main raw material.

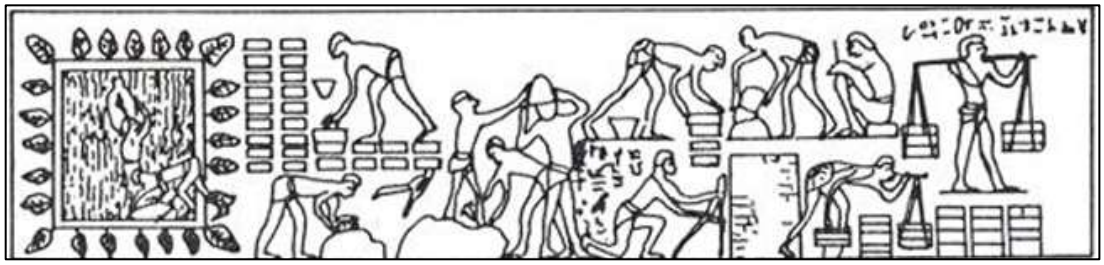


Figure 2.2: Brick Industry in the Pharaonic Age (El-Kabbany, 2013).

Later, when the technology of burning bricks for improving their specification was developed, a great number of clay brick factories were constructed on the Nile banks (Figure 2.3), in the Delta cities, making use of the raw material (mud) from the Nile valley.

Figure 2.3: Old Traditional Clay Brick Factories on the Nile Banks (El-Kabbany, 2013).

The 1980s saw the outlawing of the use of mud from fertile agricultural land. This resulted from the high dam constructed in the 1960s, which stopped the accumulation of river sediments that once fed the agricultural areas annually during the flood season, causing a rapid loss of fertile land. The companies that made clay bricks were relocated to the outskirts of the cities, and they started using desert clay that was taken from nearby government quarries as their raw material (El-Kabbany, 2013).

2.1 GENERAL PERSPECTIVE ABOUT EGYPT

Egypt's (Figure 2.4) extensive history, rich cultural heritage, and persisting customs are all reflected in its architectural surroundings. From the towering majesty of the pyramids to the intricate patterns of mosques and temples, the traditional Egyptian homes and towns are architectural wonders that serve as concrete manifestations of Egypt's rich cultural heritage and the ingenuity of its people (El Melegy, 2019).

Architecture is more than just building construction; it is the cultural, social, and historical centre of a civilisation. The architectural elements that are positioned against each other reflect the intricate web of human experiences and objectives.

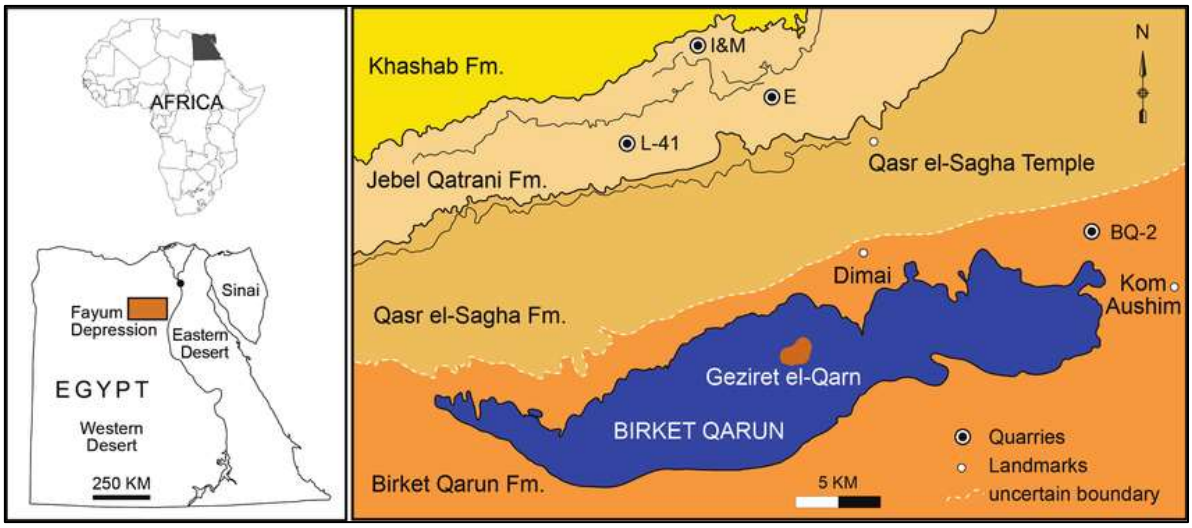


Figure 2.4: Geographical Location of Egypt and Fayoum on Map (Hana & Radi, 2024).

In this thesis, we will explore the fields of history, culture, vernacular architecture in order to comprehend the timeless appeal of traditional architecture in Egypt, as demonstrated by the genuine neighbourhood of Robua & Tunis Villages in Fayoum. As we walk in its narrow streets, look at its courtyard homes, let's try to discover the secrets of the past, find the solutions for the present, and set out on a path towards a future where tradition and modernity coexist harmoniously, egypt has a rich architectural history from thousands of years, with famous constructions like tombs, temples, and pyramids that captivate people all over the world.

Pharonic era: The pyramids of Giza (Figure 2.5), arguably the most recognisable example of ancient Egyptian construction, served as pharaohs' and nobility's tombs. The greatest and most well-known of these are the Great Pyramids of Giza, built for Pharaoh Khufu. Egyptian engineering and construction skills are on display in these colossal constructions, the pyramids of Giza were built primarily from locally sourced limestone, with higher-quality casing limestone and granite (Azad & Barua, 2017).

Figure 2.5: Pyramids of Giza (Alilatif, 2024).

Egyptian temples (Figures 2.6), functioned as centres of worship, administrative buildings, and ceremonial settings for a variety of gods. Two of the best examples of opulent temple complexes with ornate colonnades, courtyards, and hypostyle rooms decorated with fine hieroglyphics and reliefs the Temple of Karnak, Luxor (Azad & Barua, 2017).

Figure 2.6: Karnak Temple, Luxor (Alilatif, 2024).

Egyptian architecture was greatly influenced by Hellenistic and subsequently Roman architectural forms when Alexander the Great conquered Egypt in 332 BCE.

Greco-Roman era: Egyptian and classical Greek architectural features were combined to create temples (Figure 2.7), palaces, and towns. Alexander created the city of Alexandria, which rose to prominence as a hub of Hellenistic culture and was home to buildings like the Great Library and the Pharos Lighthouse (Hameed et al., 2020).

Figure 2.7: Greco-Roman Dendera Temple in Egypt (Alilatif, 2024).

Islamic architecture: developed and flourished after Islam arrived in Egypt in the seventh century CE, having a long-lasting effect on the nation's physical environment.

Mosques (Figure 2.8), madrasas (Islamic schools), and mausoleums were built with characteristic architectural elements such minarets, domes, and elaborate geometric designs. One of the oldest and most notable examples of Islamic architecture in Egypt is the Mosque of Al-Azhar, located in Cairo (Abouseif, 1992).

Figure 2.8: AL-Azhar Mosque, Islamic Architecture in Egypt (Alilatif, 2024).

Mamluk and Ottoman periods: (the13th and 19th centuries), a profusion of mosques, palaces, and public buildings with elaborate embellishments, courtyards, and domes were built throughout this era. During this period, Cairo, the capital of several Islamic dynasties, developed into a centre for architectural innovation. Notable structures in the area include the Sultan Hassan Mosque and the Citadel of Salah al-Din (Figure 2.9), (Abouseif & Fernandes, 1984).

Figure 2.9: Salah Al-din Citadel in Cairo, Ottoman Architecture (Alilatif, 2024).

Modern architectural styles: influenced by global and European tendencies in the 20th and 21st centuries, example the library of Alexandria, designed by Snohetta, a norwegian architectural Office, who won an architectural design competition organized by the UNESCO in 1988 (Figure 2.10), (Salama, 1999).

Figure 2.10: Alexandria Library, Modern Architecture in Egypt (Alilatif, 2024).

As shown in the photo, the design of the library of Alexandria is a distinctive and unique modern design.

2.2 GENERAL PERSPECTIVE ABOUT FAYOUM

Rich cultural heritage and exceptional natural beauty coexist in Fayoum (Figure 2.4) a region with a unique identity shaped by its geography, history, and customs, a cultural centre and agricultural heartland, Fayoum is well-known for its fertile fields, historic sites, and beautiful spectacle, its communities continue to place a balance between heritage preservation and slow modern development, and its concourse of historical landmarks, traditional crafts, and

natural attractions makes it a location of great historical significance and tourism potential (Hewison & Neil, 2008).

Pharonic era: Fayoum is famous for its Pharonic buildings, including:

Hawara Pyramid: Constructed by Amenemhat III, the pharaoh of the 12th Dynasty, this pyramid formerly had a maze-like construction that Herodotus claimed was more magnificent than the pyramids.

Lahun Pyramid**:** Senusret II built this important pyramid, which illustrates the development of pyramid building methods.

Medinet Madi: A well-preserved temple from Middle Kingdom, later expanded in the Ptolemaic and Roman periods, dedicated to the crocodile god Sobek.

Fayoum Mummy Portraits: These Roman-era burial portraits were discovered in a number of necropolises in the Fayoum region, including Hawara. Their realistic portrayal of people, which combines Greco-Roman and Egyptian artistic traditions, makes them noteworthy (Mazzone, 2017).

Karanis (Kom Oshim): A major Greco-Roman town, Karanis boasts well-preserved houses, temples, and baths. The ruins include the remains of a large granary, illustrating the agricultural prosperity of the region.

Qasr Qarun: Located on the edge of Lake Qarun, this site includes a well-preserved temple dedicated to Sobek, from the Ptolematic period. The architecture here illustrates the integration of Greek and Egyptian styles (Figure 2.11) (Abdelaal et al., 2014).

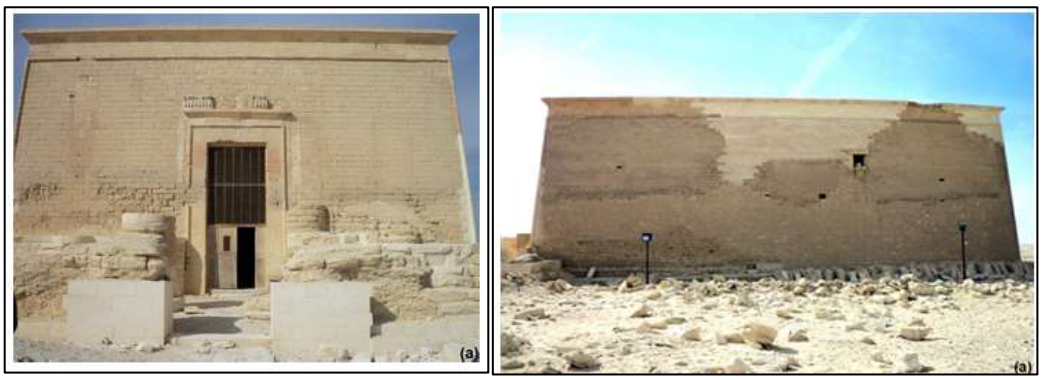


Figure 2.11: Qasr Qarun Temple in Fayoum (Abdelaal et al.,2014).

Islamic architecture: The mosques with its detailed stone carvings and geometric patterns, the Qaitbay Mosque in Fayoum City, which dates to the Mamluk period, is a prime example of the Islamic architectural style of the era (Figure 2.12). Located in the city of Fayoum on the northwest bank of Bahr Yusuf. The Qaitbay Mosque is a remarkable Mamluk-era monument from the 15th century that bears witness to Egypt's rich Islamic history. The mosque mirror the special Mamluk architectural style, characterized by elegant stonework, pointed arches, and finely detailed minaret, the mosque served as both a religious and community center for the fayoum city, emphasizing the cultural and spiritual vitality of Fayoum during the Mamluk era, its design harmonizes simplicity and refined ornamentation, making it an important islamic heritage of the area (Hewison & Neil, 2008).

Figure 2.12: Qaitbay Mosque in Fayoum (Alilatif, 2024).

Fayoum is also a home to a number of Ottoman-era buildings, including mosques and homes that exhibit the characteristic wooden mashrabiyas and ornate tile work of Ottoman architecture (Hewison & Neil, 2008).

Vernacular Architecture: Mudbrick construction, a technique that stretches back thousands of years, is a common characteristic of Fayoum rural architecture. Because of their climate-responsive design, these homes offer cool interiors despite the harsh desert temperature (Figure 2.13). The use of natural materials, climate-responsive design, and local customs are all deeply ingrained in Fayoum, Egypt's vernacular architecture. These desert-adapted structures, which are distinguished by their adobe bricks, stone, and palm wood, provide sustainability and thermal comfort. Fayoum's vernacular heritage is a timeless example of environmentally conscious and culturally rooted architecture because of its straightforward forms, earthy colours, and harmonious integration with the landscape, all of which preserve cultural identity while satisfying functional needs.

Figure 2.13: Vernacular Architecture from Tunis Village in Fayoum (Alilatif, 2024).

Fayoum has experienced sophisticated urban constructions recently that combine traditional and contemporary architectural forms. This includes public and residential complexes that are built to accommodate increasing population numbers while maintaining the historical context of the area. It also, has seen a slow change in building materials and architectural techniques in recent years, fusing contemporary innovations with traditional sensibilities, evolution attempts to maintain the local culture within the parameters of contemporary architecture (El Khoreby et al., 2021).

Modern developments: in Fayoum, reflects a move towards modern building methods (Figure 2.14) and materials, frequently fusing modern functionality with traditional aesthetics, these advancements enhance accessibility, comfort, and infrastructure, they occasionally run the risk of overshadowing the area's rich architectural legacy. Maintaining Fayoum's distinct cultural and historical identity requires remarkable a balance between modernisation and preservation.

Figure 2.14: Exterior & Interior of a Modern House in Tunis Village Fayoum (Alilatif, 2024).

The contemporary modern houses built in Fayoum, represent a careful negotiation between tradition and change, while many adopt modern layouts, larger openings, and updated services to meet today's lifestyle requirements, their success depends on how sensitively they respond to the established architectural identity, its human scale, climate-adapted forms, and material character. Contemporary houses respect local proportions, maintain cohesive Street and courtyard relationships, and integrate compatible natural or earth-based finishes, they strengthen the visual continuity of the settlement and support its cultural and touristic value, when modern construction is introduced without regard to material authenticity, rooflines, facade rhythms, and thermal performance, it risks fragmenting the village's heritage image and increasing environmental burdens. The most sustainable path is contemporary housing that modernizes living standards while remaining rooted in the local architectural language and landscape.

3. CASE STUDY OF ROBUA & TUNIS VILLAGES IN FAYOUM EGYPT

Robua & Tunis Villages are about 90 km southwest of Cairo, in the Fayoum Governorate of Egypt. Robua village is located in the same area of Tunis village at 500 meters from it, and has same architectural style. The villages are well known for their beautiful surroundings, diverse culture, and active artisan community (Figure 3.1).

I selected Robua and Tunis Villages because they offer a rare example of contemporary settlements that still preserve traditional Egyptian building materials: mudbrick, clay brick, mountain stone, natural wood, and stone marble; while also experiencing pressures from modernisation. The two villages have a very strong vernacular identity, yet this identity is increasingly at risk due to new construction practices; their architecture, community lifestyle, local craftsmanship, and eco-tourism emphasis make them ideal for studying how traditional materials function environmentally, culturally, and socially.

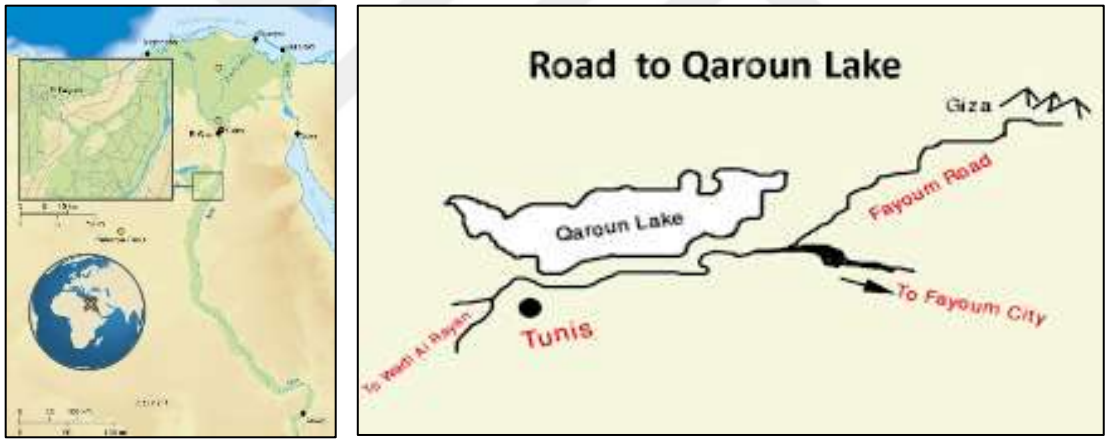


Figure 3.1: Location of Tunis Village on Map (Hana & Radi,2024).

Robua & Tunis Villages sit along the western edge of Lake Qarun, one of Egypt's largest natural lakes. Its proximity to Cairo via a picturesque drive makes it popular among both residents and visitors seeking an escape from the city. It is located in a typical Fayoum area featuring splendid vegetation and fertile soil. The area is surrounded by palm groves and olive trees and the placid waters of Lake Qarun creating an atmosphere of calm and tranquillity.

a. Robua village

Robua village (Figure 6.1) is like a small compound wich only has 36 residential houses, and about 140 people living there, without any amenities facilities, built in 1991. The first owner of Robua Village was Mr. Mohsen El Abd. Then he sold the village to Orascom Company, owned by Sawiras Family in 1998. The Architecture Office who designed all houses in Robua Village, is the Office of Architect Dr. Mamdouh Sabri. All houses were built between 1991 and 1997. The average cost to rent a house in Robua Village is about 80$ per night in 2024 (Hana & Radi, 2024).

Robua village is a rural settlement, shaped by its agricultural landscape and desert-edge setting, it is characterized by compact building clusters and strong relationship between homes, streets, and Daily community life. Architecturally, it is typically associated with vernacular construction that relies on locally available materials, most notably earthen elements such as stone and clay brick renders, chosen for affordability and thermal comfort in the hot, dry climate, its built environment reflects practical, climate-responsive design.

b. Tunis Village

Tunis village is a well known bigger village and has all amenities facilities. The demographics of Tunis Village in Fayoum in 2024 has around 4500 inhabitants (Hana & Radi, 2024). The Tunis Village was established in 1960's by the Egyptian Poet Sayed Hegab and his Swiss wife Evelyn Porret (Figure 3.2), who were fond of the beauty of nature. The Fayoum Pottery School, renowned across the country, was established in the 1980s by Swiss Potter Evelyn Porret and has made the village a centre for artists, predominantly potters. The credit for reviving and maintaining traditional pottery skills largely goes to the efforts of this institution. The Village is famous for its fine hand painted pottery which is famous for its unique patterns. Visitors can visit the ceramic workshops and studios, which makes it possible to observe, and hopefully even participate in the creative process.

Figure 3.2: Evelyn Porret (Hana & Radi, 2024).

There are several ceramics studios and workshops open to the public. A comprehensive education in traditional Egyptian pottery is provided by the many workshops and demonstrations offered by the craftspeople.

The community is home to a variety of handicrafts (Figure 3.3), besides pottery, such as weaving, painting, and jewellery manufacturing. These handcrafted goods are sold in neighbourhood markets and stores, assisting in the village's economic development and cultural preservation.

Figure 3.3: Handmade Carpet in Tunis Village (Alilatif, 2024).

There are chances for bird watching, fishing, and leisurely walks along the lakefront due to the vicinity to Lake Qarun (Figure 3.4). Many different bird species can be found around the lake, particularly in the migratory season.

Figure 3.4: Qarun Lake View in Robua Village (Alilatif, 2024).

Lodging and Cuisine: There are several places to stay in Tunis Village, ranging from quaint guesthouses to opulent eco-lodges. Traditional Egyptian cuisines, like Meshaltet pie (Figure 3.5), and organic ducks, are served in the area, and they are frequently made with ingredients that are obtained locally and freshly.

Figure 3.5: Preparing Meshaltet Pie in the Oven (Alilatif, 2024).

Festivals and events: The annual Fayoum Pottery Festival, which draws travellers and artists from all over the world, is one of Tunis Village's major events. The event features workshops, exhibitions, and cultural performances in addition to showcasing the best of the village's ceramics and crafts (Figure 3.6). Throughout the year, the town hosts a variety of cultural activities that highlight the area’s rich history, including, art exhibitions, and traditional festivities.

Figure 3.6: Evelyn Porret Exhibition shop in Tunis Village (Alilatif, 2024).

A significant segment of Tunis Village population is committed to sustainable lifestyles. It means promoting organic farming and local food production, constant recycling and the use of sustainable materials in everyday life and housing.

There is a tight knit community in The Village and people help each other and work together. A strong sense of community is clearly visible in how locals work together to protect the cultural and environmental integrity of the village (Mohmed et al., 2021).

Tourism Impact: Most of the village's economy is tourism based, supporting businesses, service providers, and artists. While tourism aids the local economy, it also brings disadvantages, including a careful consideration between maintaining the village's natural environment and traditional way of life and the influx of tourists.

Tunis Village in Fayoum combines natural beauty, ethnic diversity and artistic tradition. Egypt's model of community-based tourism. One of Egypt's few examples of successful community-based tourism, it even encourages the local community to practice and preserve traditional crafts and promote a sustainable tourism model (Mohmed et al., 2021).

Social Life: Tunis Village is famous for its ceramic workshops. The hamlet was first blessed as a ceramics destination when the Swiss potter Evelyne Porret opened her pottery school there in the 1980s. This college created a fiefdom based around this time-honored trade, by raking in both domestic and foreign students.

Every year, the hamlet opens its doors to tourists from around the world for its annual ceramic festival to showcase the works of local artisans. It is an important social event that combines visitors, locals and artists.

Agriculture is woven into the daily fabric of life in Tunis Village. The villagers all farm the surrounding verdant farmland, growing wheat and maize, and a host of other fruits and vegetables, farming is a communal attempt and there are regularly families working on farms together, for the reinforcement of the community.

This region has been home to many traditional farming methods, benefiting the local economy and preserving the region's cultural history.

The village's several eco-lodges and guesthouses offer a genuine rural experience. Usually family-owned, these lodgings provide guests with a glimpse into the day-to-day experiences of the peasants.

With many guesthouses in Tunis Village serving meals that are fresh and made from locally sourced ingredients, dining in those parts can often be a communal affair. Grilled ducks & Meshaltet pie (Figure 3.5) the origin of meshaltet pie, goes back to the time of ancient Egyptians, where it was called "maltoot" pie. Maltoot is a pharaonic Word meaning "layered" because it is made of many layers of dough, and later became "meshaltet" pie (Hana & Radi, 2024).

In addition to pottery, the town provides workshops for other crafts, such as weaving and embroidery. These sessions are popular with visitors, encouraging cross-cultural interaction.

Music and dance are at the heart of the village's social life. For tourists, offered regularly performances of traditional Egyptian music and dance (especially on holidays and other important dates).

In the social structure of the village of Tunis, there are close relationships between neighbours. People typically live right next to each other and share resources and support in the community.

The souks, or weekly markets, are the centre of social life in the community, beyond their role in commerce, these marketplaces act as social center, where villagers meet to share news and confirm bonds of togetherness (Mohmed et al., 2021).

Education is at a premium, and the village's schools are a fixture in the community. Domestic and overseas NGOs (Nongovernmental organizations) have also contributed to the improvement of educational facilities.

Religious and cultural festivals in many rural areas of Egypt are at the heart of communal life. Mulled with group prayers, meals and a variety of other social gatherings are part of celebrations such as Eid, Ramadan and the feast days of regional saints.

These celebrations may feature dancing, music, and communal feasts to conclude this harvest season. These celebrations allow the community to unite in celebration of each others work, and the fruits of their labour.

Tunis Village, Fayoum is home to a lovely social life woven from farms, handicrafts, traditions and a deep sense of community. All the while, retaining its cultural identity and welcoming visitors from near and far, complemented by a unusual and colourful social scene, is the recipe behind its appeal.

Types of Roads**:** Main Roads, the Fayoum-Cairo Desert Road serves as the main access point to Tunis Village. This main, paved road runs from Fayoum to Cairo and splits off into smaller roads that lead to Tunis Village.

Secondary Roads, usually, the roads that go straight to Tunis Village are smaller and poorly maintained. Although they are often paved, they occasionally feature potholes and uneven surfaces.

Village Roads (Figure 3.7), within the village, the roads can be dusty, fairly small, and frequently unpaved. They work better for strolling and small cars.

Figure 3.7: Examples of Village Roads in Tunis Village (Alilatif, 2024).

With routine maintenance, the major roadways are in typically good condition.

Village and secondary roads may be unmaintained and have uneven surfaces. Road quality may be impacted by debris, dust, and sporadic flooding during wet seasons.

There is enough illumination and signs on major routes. Village and secondary roads may have inadequate lighting at night and insufficient signs, making them difficult to navigate, particularly after dark.

The amount of traffic does not currently present a significant problem, but careful planning is necessary to maintain the village's charm and make sure that any future growth or increased tourism does not have a reverse effect on the local environment or transportation system.

Public Transport**:** To get to the village, most tourists and locals drive their own cars or charter one, there are shared taxis and minibuses that run between Tunis Village and Fayoum City, but the schedules are subject to change. As a result of the village's rural setting and basic infrastructure, public transport to and within Tunis Village in Fayoum, is still scarce and underdeveloped, with no direct rail or extensive bus services, the village is mainly accessible by microbuses or private vehicles from neighbouring cities like Fayoum or Cairo. There aren't many transport options inside the village; most locals and tourists rely on walking or small tuk-tuks, access to services, daily commuting, and tourism development are all obstructed by the ineffective public transport system.

4. ARCHITECTURE IN ROBUA & TUNIS VILLAGES

The architecture philosophy of Robua and Tunis Villages is grounded in vernacular wisdom, environmental adaptation, and cultural continuity; their design intentionally relies on local materials, passive climate strategies, and simple forms inspired by traditional Egyptian and Hassan Fathy (1900-1989)(Figure: 4.5) influenced architecture, rather than pursuing modern visual expression, the villages prioritize human comfort, sustainability, and harmony with the landscape, using thick earthen walls, courtyards, domes, and natural ventilation to respond effectively to the hot Fayoum climate. This approach treats architecture as a social and environmental practice, one that preserves local identity, supports community life, and demonstrates that tradition can remain relevant and functional in contemporary contexts.

Mud & Claybrick Constructions: the typical Mud & claybrick buildings in the village define it. With its inherent insulating properties, this material is a good fit for the area's environment, keeping buildings warm in the winter and cool in the summer (Figure 4.1) & (Figure 4.2).

Figure 4.1: Pottery Shop in Tunis Village (Alilatif, 2024).

Mud and clay-brick construction reinforces the village's vernacular identity while providing a low-cost, locally sourced, and climaticallyresponsive system, when maintained properly (especially against moisture), these materials support comfort, sustainability, and continuity of traditional craftsmanship within contemporary development.

Figure 4.2: House in Tunis Village (Alilatif, 2024).

Domes and Vaults are common architectural features, it improve air circulation, these components not only enhance visual attractiveness but also aid in the interiors natural cooling process. Most residences have central courtyards, they function as private outdoor areas that let natural light and ventilation into the rooms around them, while also offering cool, shaded places suitable for family games. We can notice the natural tones of the surrounding desert region which are reflected in the earthy colour palette of all buildings, the village is able to merge in harmony with its surroundings because to this integration (Figure 4.3).

Figure 4.3: Evelyn Porret Exhibition Shop Frontal View in Tunis Village (Alilatif, 2024).

Arches With Triangular Holes: the peculiar usage of arches with triangular perforations (Figure 4.4), characterises the vernacular architecture of Robua & Tunis Villages, Fayoum. This architectural feature, which reflects the regional environment, cultural influences, and conventional building methods, is both aesthetically pleasing and useful.

Figure 4.4: Arches with Triangular Holes in Robua Village (Alilatif, 2024).

These types of arches usually have a curve on top and triangle cutouts holes within the arch. The size and shape of the triangle holes can vary widely, much of the time resulting in a unique and decorative appearance. Most of the time these buildings use local resources, as stone or mud brick, which are available regionally. Beyond ventilation, the triangular openings filter light. They promote the natural cooling of the interior rooms by enabling air flow throughout the building. Moreover the perforation lets: The walls: gradually soak up heat during the day, preventing the inside from becoming too hot, and the heat that has been absorbed is released at night, holding the house warmer on cold evenings.

Natural Ventilation: Some of the Traditional Building designed with courtyards, terraces, windows placed in such a way it light enter, dispersed, which reduces glare and produces an almost meditative atmosphere inside the building.

Robua & Tunis Villages architectural design is influenced by both Islamic and ancient Egyptian architectural traditions. Arches are common in Islamic architecture, signifying beauty and strength. Triangular holes, possibly inspired by ancient Egyptian designs, provide a variation on the local vernacular.

The building techniques are necessarily a manifestation of skills and information passed down through generations. Working entirely independently of one another to produce what is often considered "high crafted goods" and focusing heavily on small-scale outputs, local craftspeople around the world are rediscovering the significance of manual skill and

craftsmanship, casting aside machine-made production for a approach rooted in traditional methods.

Consistent usage of arches and triangle perforations makes the facade beautiful. The interplay between light and shadow that adds depth and texture to surfaces endows the buildings with a dynamic, lively presence that changes throughout the day.

The construction fits seamlessly with Fayoum's natural environment. The perforations mimic nature’s inkblots of vegetation and rock formations, and the earth-toned materials blend seamlessly into the surroundings.

Sustainable building techniques include passive cooling and the use of locally sourced materials. This is all the more relevant in today's world of environmental awareness and aspirations for sustainable construction practices.

The use of these architectural elements must be preserved and promoted if Robua & Tunis Villages are to protect their cultural heritage. It serves as a tangible connection to the past, mirroring the community's identity and history.

The unique architectural style could attract tourists and architecture enthusiasts, thereby boosting the local economy. Promoting vernacular architecture of this kind can heighten appreciation and consciousness of local building methods.

In the traditional architecture of Robua & Tunis Villages in Fayoum, the triangle-holed arches are a beautiful and functional blend of beauty, sustainability, and cultural heritage. They’re a defining feature of the community and a monument to the ingenuity of the local builders.

Robua & Tunis Villages houses: Large mud, claybrick, and stone houses which provide better thermal insulation. The thick walls also help keep the interior temperature steady, encourages cross ventilation the openings are strategically placed to encourage cool breezes to circulate through the house, particularly on cooler evenings. As a result, the interior can cool down naturally, which in turn, brings them relief from heat without employing any conditioning machines (Mohamed, 2010).

High Ceilings: Vaults and Domes: Homes in Robua & Tunis Villages feature vaulted ceilings, domes or both. Trapped air rises with gravity, the larger volume of space keeps lower levels cooler. This will allow the interior regions to remain cooler in the hottest times.

Shaded indoors: Most homes with shaded terraces or courtyards are adorned with wooden screens or pergolas or vines. Units find themselves in cooler, shaded locations, so that residents can spend more time outside during the day and need less to stay home.

Wall Whitewashed: At Robua &Tunis Villages, some of the products are treated with white paint. The walls should be painted white or painted with a light color as it reflects sunlight much more and prevents the ability of the whole building for the sunlight absorption heating. This helps to maintain a cool interior.

General Roof Insulation and Materials: There are many insulator types on the roof of many homes, such as clay tiles, palm leaves, etc.) that also have less absorption of heat. It protects the living accommodation below from the blistering midday sun which would otherwise raise the internal temperature.

Adaptation into Local Climate: The usage of clay, mud, and stone which are mostly used in the construction adds to the structure topological adaptation into local climate and makes it easier to integrate into the surroundings (Mohamed, 2010).

As these materials have inherent heat regulation, they are well suited to the hot and dry environment of Fayoum. These methods that mix centuries-old experience and so-called sustainable design enable Robua & Tunis Villages inhabitants to survive the scorching desert weather whilst remaining comfortable.

4.1 INSPIRATION OF HASSAN FATHY ARCHITECTURE IN ROBUA & TUNIS VILLAGES

Renowned for his inventive approach to vernacular architecture, Hassan Fathy (1900–1989), (Figure 4.5) was a prominent Egyptian architect. His work addressed social, economic, and environmental issues by fusing traditional building methods with contemporary ideas, especially in developing nations (Nassab, 2019).

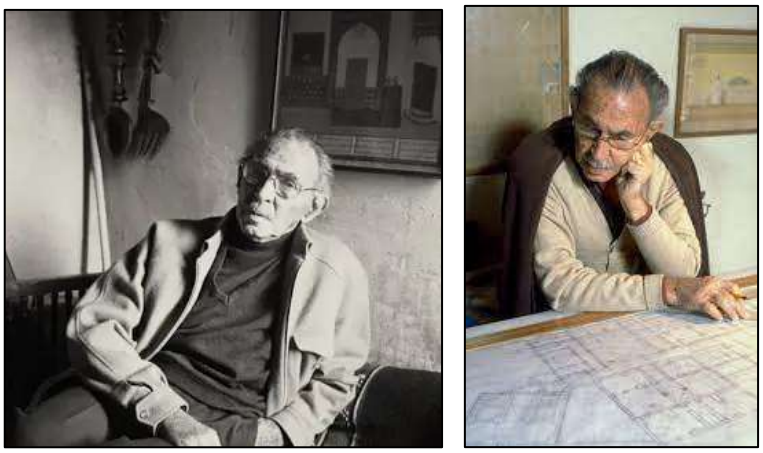


Figure 4.5: Hassan Fathy (Hana & Radi, 2024).

Use of traditional materials: such as mud brick building and local resources. Fathy's support for mud brick construction is apparent in Robua & Tunis Villages. Several buildings utilize this technology, renowned for its sustainability and thermal properties, which have contributed to the remarkable aesthetics and geographical balance of the villages. Fathy's emphasis on local resources is in alignment with his environmental impact reduction and self-sufficiency promoting ethos.

Climate Responsive Design: Thick walls, passive cooling methods. Hassan Fathy's designs typically feature high ceilings for natural ventilation and cooling, wind catchers, and courtyards, these elements are suitable for Robua & Tunis Villages climate, adding comfort while reducing the need for artificial cooling. Several of the town's buildings employ the thick earthen walls characteristic of Fathy's constructions, which serve as natural insulation that maintains warmth in winter and cool in the summer (Nassab, 2019).

Community Centric Development: Such as Vernacular Style and Collaborative Building Methods, Fathy's approach to architecture emphasizes the cultural and social context of the community. In Robua & Tunis Villages, this translates into structures that reflect local traditions and lifestyles, showing a strong sense of place and identity. Fathy encouraged the involvement of local artisans and skilled labor for construction buildings, this practice is seen in Robua & Tunis Villages, where local potters and craftsmen participate in building and maintaining structures, affirming community engagement and economic opportunity.

The aesthetic integration of organic forms with decorative elements Fathy's designs feature domes and organic, curving forms (Figure 4.6), as a result, these artistic elements are

inserted into the buildings of Robua & Tunis Villages, which harmoniously blend with their aesthetic surroundings. The Villages achieve this significantly by incorporating cultural elements that are strongly incorporated with the architectural style in accordance with Fathy vision and philosophy of using ornamental themes and patterns in architecture representing visual and cultural context for the design.

- Location: New Gurna, Luxor, Egypt
- Date: Built 1945 – 1952
- Designer: Arch. Hassan Fathy
- Typology: Residential
- Primary materials: Mudbrick
- Key features: Courtyards, domes / vaults, passive ventilation

Figure 4.6: Example of Hassan Fathy Architecture in New Gurna, Luxor (Alilatif, 2024).

Adopting Fathy's principles reduces energy consumption. Sustainable living practices are incorporated into the buildings of Robua & Tunis Villages, which rely on natural lighting, passive solar heating, and cooling techniques. Fathy's focus on minimal waste and resource efficiency informs the form of construction used within the villages, often recycling materials or incorporating practices to minimize environmental impact in the building process. The influence of Hassan Fathy is seen in the many mud brick houses built in Robua & Tunis Villages, such buildings often have high ceilings for ventilation and temperature control and courtyards. Community centres and pottery studios are built based on local materials and traditions, creating a connection for the villagers between their past and present, Eco-lodges and guesthouses, which use sustainable materials and design elements in order to attract tourists looking for authentic and environmentally nice accommodations. Sustainable Practices, like Energy Efficiency and Waste Reduction, the use of Hassan Fathy

principles participates in reducing energy consumption, the use of natural lighting, passive solar heating, and cooling techniques in Robua & Tunis Villages buildings supports sustainable living practices. He assure on using minimal waste and resources efficiency is seen in the villages construction practices, where materials are often repurposed and building processes are optimized for minimal environmental impact. Hassan Fathy's architectural legacy in Robua & Tunis Villages, Fayoum, represents the successful combination of traditional building techniques with modern sustainability principles, his influence is noticed in the villages construction practices and aesthetic choices.

5. METHODOLOGY

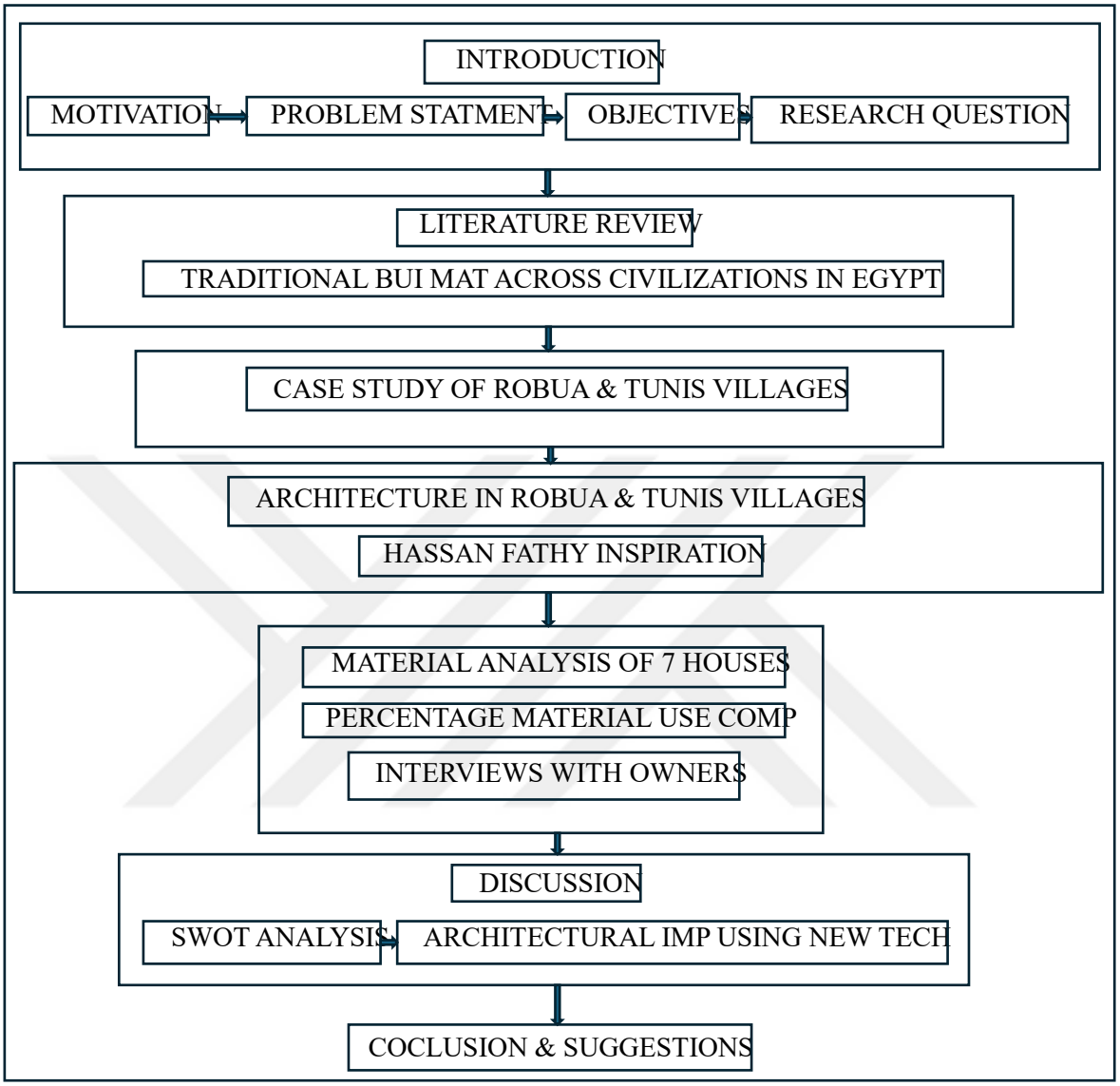


Figure 5.1: Methodology Diagram

a. Qualitative and Quantitative Research

In order to study the social, cultural, and architectural dimensions of traditional architecture in Robua & Tunis Villages, I gathered qualitative and quantitative research methods (Creswell, 2014). These approaches is particularly suited to exploring the meanings, interpretations and lives related to the villages architectural heritage.

Exploit literature and explore on site to study the socio-cultural context of traditional architecture of Robua & Tunis Villages. Describe common architectural styles and

construction methods and how they change over time. Focus on how residents perceive and interact with their historic buildings. Calculated the percentages of each building material in all 7 houses used as an example of Robua & Tunis villages buildings and analyzed them using numerical values.

b. Site Visits

These site visits are important for seeing and documenting the architecture details of Robua & Tunis Villages. While there were limitations in the existing data set, my direct observation led to the collection of rich details of the physical context and its spatial nature.

I also noted and documented architectural features such as particular conditions of buildings, design components, construction materials and spatial arrangement.

To visually confirm my findings, I took photos of important buildings, architectural elements and the environment.

Since there were no ready made drawings of the houses in the village administration or with the owners I took the measurments of the houses and drew floor plans initially freehand sketches then on AutoCAD and Photoshop, with also important architectural details, gather at details that can get lost in photos

While there I kept careful notes of what I saw, the weather, my interactions with the locals, and any new thoughts that crossed my mind.

c. Interviews

Interviewing houses owners, gave us further insight into Robua & Tunis Villages traditional architectural methods and the cultural relevance of its buildings.

d. Archival Sources

Archival research, historical records, maps, photos, and papers were examined in order to comprehend the evolution and changes of Robua & Tunis Villages architectural style over time, I looked through historical documents about Robua & Tunis Villages and its architecture in libraries, and cultural institutions, by examining academic publications,

books, and earlier studies on Robua & Tunis Villages and traditional Egyptian architecture.

e. Ethical Considerations

Ethical issues are important for my research to be considered with respect and responsibility, the participants and interviewers has been informed by describing the aims, methods, and important uses of the study, by maintaining participants confidentiality, sensitive and personal data. I learned about the customs, traditions, and practices of the locals during site visits and contacts with the community, thus I was able to respect their traditions and practices. Data was carefully original and accurate, and sources were properly referenced, I reduced disruption wherever possible and knew how my site visits could affect the surrounding environment.

6. BUILDING MATERIALS ANALYSIS OF 7 HOUSES IN ROBUA VILLAGE IN THE VICINITY OF TUNIS VILLAGE

The following seven houses in Robua Village in the vicinity of Tunis Village have been selected for architectural analysis in order to provide a better knowledge of the house construction process in this village. I have selected this number of houses, to be enough for the analysis and comparision process.

You can see on the sketch (Figure 6.1), the location of selected villas: (A), (B), (C), (D), (E), (F), and (G), as shown by the beige color. As you can see the villas gardens with the green color and the swimming pool is shown with the blue color. Robua Village, overlooks Lake Qarun as seen from the sketch.

Figure 6.1: Sketch of Robua Village and its Location in the Vicinity of Tunis Village (Alilatif, 2024).

As shown in the photo, Robua village is located in the vicinity of Tunis village, and both villages are characterized by the same vernacular architectural style.

6.1 VILLA (A) ROBUA VILLAGE

Villa (A), (Figure: 6.2) is relatively the smallest example which is suitable for a small family. It has two bedrooms a small living area, pergola and garden. It is my family house. As shown from the drawing, I have used different colours to clarify each building material.

Total area of Villa (A): 465 m2. Built area of Villa (A): 158 m2.

Figure 6.2: Plan and Material Analysis of Villa (A) Robua Village (Alilatif, 2024).

As you can see from the plan, each material is colored with a specific color: the cutted mountain stone walls in black color, the elevation of mountain stone walls in brown color, the internal thermal brick floor in yellow color, the external egyptian stone floor in orange

color, and the grass floor in the garden with green color, to clarify the surface of each material. I chose those specific colours because it is almost similar to the real color.

As you can see from the table (Table 6.1), all materials used comes from Nature. The internal floor material is Thermal brick, represents 36% of the total area, the external floor material is Egyptian Stone, represents 24% of the total area, The garden floor from grass, represent 40% from the total area. All walls are made from Mountain stone, represent 100% of the walls. Red Brick is used for the roofing of 70% of the built area, and Swedish wood are used for the roofing of 30% of the built area.

Table 6.1: Areas and Materials Villa (A).

Place	Area	Floor Material	Wall Material	Roof Material
Living Room	30 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bedroom1	20 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bedroom2	16 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Dining Room	24 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Kitchen	6.90 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Bathroom	9 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
W.C.	5.4 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Internal Corridors	10.5 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Terrace (Pergola)	38.2 m2	Egyptian Stone 	Mountain Stone 	----
External Corridors	96.9 m2	Egyptian Stone 	Mountain Stone 	----
Garden (grass)	134 m2	Grass 	Mountain Stone 	----

As you can see from table (Table 6.2), chimney and grill exist, but swimming pools does not exist.

Table 6.2: Items in Villa (A).

Item	Exists	Does Not Exist
Swimming pool		✓
Chimney	✓	
Grill	✓	

As you can see from the photos (Figure 6.3), for external and internal architecture, all materials used are from nature: Stones (mountain stones for walls), Bricks (Red bricks for domed roofs, thermal brick for internal floors), Wood (Muski for Windows and doors), even internal items, like pictures on walls, furniture and Fabrics, are made from wood (Muski), and cotton, there are handmade woolen colored carpets and the lighting units are made of black wrought iron. The house is furnished in a primitive rural way. Living in this house is very peaceful far from the crowded cities. The garden is planted with different kinds of plants specific to the region, for example: Arabian jasmin, Cactus, Olive trees, Mint plant, Guava tree, roses, and Bougainvillea which is a genus of thorny ornamental vines.

Living in this house creates an atmosphere that feels calm, grounded, and strongly connected to place, internally, the experience is defined by stable thermal comfort, softened daylight, and a sense of privacy produced by thick, natural walls and compact openings, conditions that support quiet Daily routines and reduce dependence on mechanical cooling. Externally, the house extends into a socially active yet environmentally responsive setting, where shaded thresholds, and semi-open spaces mediate between indoors and outdoors, encouraging natural ventilation and gradual transitions throughout the day. The internal and external atmosphere work together to produce a balanced “sense of living” that is both climatically comfortable and culturally meaningful, reinforcing community life while maintaining domestic intimacy.

- Location: Robua Village (500 m from Tunis Village, Fayoum, Egypt
- Date: Built 1991-1997
- Designer: Office of Arch. Dr. Mamdouh Sabri
- Typology: Residential villa (small size)
- Total area/ built area: 465m2/ 158m2
- Primary materials: Mountain stone, red brick (vaults), wood (openings)
- Key features: Terrace, domes/vaults, passive ventilation

Figure 6.3: Photos of Villa (A) (Alilatif, 2024).

As evident from the pictures, the interior and exterior atmosphere gives a feeling of comfort and tranquility, also a healthy environment as a result of using traditional building materials and natural earthed colors.

6.2 VILLA (B) ROBUA VILLAGE

Villa (B), (Figure: 6.4) is considered relatively of medium size. It has Patio or courtyard, terraces, 3 bedrooms, and living area. The garden is enough big. The house is suitable for a medium size family. As shown from the drawing, I have used different colours to clarify each building material.

Total Area of Villa (B): 850 m2. Built Area of Villa (B): 300 m2.

Figure 6.4: Plan and Material Analysis of Villa (B) Robua Village (Alilatif, 2024).

As you can see from the plan, each material is presented with a specific color: The cutted mountain stone walls in black color, the elevation of mountain stone walls in brown color. The internal thermal brick floor in yellow color, the external egyptian stone floor in orange color, and the grass floor in the garden with green color, to clarify the surface of each material. I chose those specific colours because it is almost similar to the real color.

As you can see from table (Table 6.3), all materials used comes from nature. The internal Floors material are made from Thermal brick, represent 29% of the total area. The Patios or Courtyards, and upper terrace floors material are Stone marble, represents 15% from the total area. The external floor material is egyptian stone, represents 28% from the total area. The garden grass floor, represents 28% from the total area. All the walls are made from Mountain Stone, represents 100% from the walls. Roofs made from Red bricks represent 80% from the built area. Roofs made from Swedish wood represent 20% from the built area.

Table 6.3: Areas and Materials in Villa (B).

Place: Ground Floor	Area	Floor Material	Wall Material	Roof Material
Living area	55 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room1	27 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room2	36 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Dining	12.5 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Patio1	16 m2	Stone Marble 	Mountain Stone 	----
Patio2	22.2 m2	Stone Marble 	Mountain Stone 	----
Kitchen	18.5 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Bath1	9 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Bath2	8.4 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Internal Coridors	37 m2	Thermal Brick 	Moutain Stone 	Red Brick 

Table 6.3: Areas and Materials in Villa (B) (Table Continued).

Security Room	9.7 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Terrace (Pergola)	91.4m2	Egyptian Stone 	Mountain Stone 	----
Exterior Corridors	104.8 m2	Egyptian Stone 	Mountain Stone 	----
Garden	193.7 m2	Grass 	Mountain Stone 	----
Place: Roof Floor	Area	Floor material	Wall material	Roof material
Room3	36 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bath 3	8.4 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Living2	18.5 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Internal Coridors2	18.9 m2	Thermal Brick 	Moutain Stone 	Red Brick 
Terrace2	46.4 m2	Stone marble 	Mountain Stone 	----

As you can see from the table (Table 6.4), the chimney, grill and swimming pool exist.

Table 6.4: Items in Villa (B).

Item	Exists	Does Not Exist
Swimming Pool		✓
Chimney	✓	
Grill	✓	

As you can see from photos (Figure 6.5), external and internal materials all comes from nature: stones (mountain stones for walls), Bricks (red bricks for domed and vaulted roofs, thermal brick for internal floors), wood (Muski for Windows and doors), even internal items like pictures on walls, furniture and fabrics, are made from wood (Muski), and cotton, there are handmade cotton colored carpets, and the lighting units are made of black wrought iron.

The house is fully furnished in a primitive rural way. Living in this house is very calm and peaceful far from the crowded cities. The garden is planted with different kinds of plants specific to the region, for example: Arabian jasmin, Cactus, Olive trees, Mint plants, Guava trees, roses, and Bougainvillea which is a genus of thorny ornamental vines.

- Location: Robua Village (500 m from Tunis Village), Fayoum, Egypt
- Date: Built 1991 – 1997
- Designer: Office of Arch. Dr. Mamdouh Sabri
- Typology: Residential villa (courtyard/ terraces) (medium size)
- Total area/ built area: 850m2/ 300m2
- Primary materials: Mountain stone, red brick (vaults/ domes), wood (openings)
- Key features: Courtyards, domes/ vaults, passive ventilation

Figure 6.5: Exterior & Interior of Villa (B) (Alilatif, 2024).

As seen from the pictures, the interior and exterior atmosphere gives a feeling of comfort and tranquility, also a healthy environment as a result of using traditional building materials and natural colors.

6.3 VILLA (C) ROBUA VILLAGE

Villa (C), (Figure 6.6) is considered relatively midium size. It has patio or courtyard, terraces, swimming pool, 3 bedrooms, and a living area. The garden is big enough. It is

suitable for midium sized family. As shown from the drawing, I have used different colours to clarify each building material.

Total Area of Villa (C): 850 m2, Built Area of Villa (C): 300 m2.

Figure 6.6: Plan and Material Analysis of Villa (C) Robua Village (Alilatif, 2024).

As you can see from the plan, each material is presented with a specific color: the cutted mountain stone walls in black color, the elevation of mountain stone walls in brown color, the internal thermal brick floor in yellow color, the external egyptian stone floor in orange color, and the grass floor in the garden with green color, to clarify the surface of each material. I chose those specific colours because it is almost similar to the real color.

As you can see from table, (Table 6.5) all materials used come from nature. The internal floor material is thermal brick represents 30% from the total area, the patio or courtyard, and upper terrace floors are made from Marble Stone, represents 16% from the total area, the external floors are made from egyptian stone, represents 36% from the total area, the garden floor is grass, represents 18% from the total area. All walls are built from Mountain Stone, represents 100% from the walls. Roofs made from Red Brick 75% from the built area, roofs made from Swedish wood represent 25% of the built area.

Table 6.5: Areas and Materials in Villa (C).

Place: Ground Floor	Area	Floor material	Wall material	Roof material
Living Room	48.3 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room1	21.3 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bedroom1	24 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Dining Room	21 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Patio	36 m2	Stone Marble 	Mountain Stone 	----
Bathroom1	9.7 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Kitchen	29.6 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Internal Corridors	26.6 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Seating Area	54 m2	Egyptian Stone 	Mountain Stone 	----
External Corridors	212 m2	Egyptian Stone 	Mountain Stone 	----
Garden	97 m2	Grass 	Mountain Stone 	----

Table 6.5: Areas and Materials in Villa (C) (Table Continued).

Place: Roof Floor	Area	Floor Material	Wall Material	Roof Material
Bedroom2	24 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bathroom2	9.7 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Terrace	58.3 m2	Stone Marble 	Mountain Stone 	----

As you can see from table, (Table 6.6) the chimney, grill and the swimming pool exist here. The grill and Chimney exist in all Villas, but the swimming pool exists only in some of them.

Table 6.6: Items in Villa (C).

Item	Exists	Does Not Exist
Swimming Pool	✓	
Chimney	✓	
Grill	✓	

As you can see from photos, (Figure 6.7) this villa has swimming pool. All material used are natural, stones (mountain stone) and wooden (Muski) materials. Earth color building, made from natural materials. And the swimming pool in the garden surrounded by palm trees, plants and natural trees. Stones (mountain stones for walls), Bricks (Red bricks for domed and vaulted roofs), Wood (Muski for Windows and doors). Living in this house is very calm and peaceful, far from the crowded cities. The garden is planted with different kinds of plants specific to the region, for example: Palm trees, Arabian jasmin, Cactus, Olive trees, Mint plant, Guava trees, roses, and Bougainvillea.

- Location: Robua Village (500 m from Tunis village), Fayoum, Egypt
- Date: Built 1991 – 1997
- Designer: Office of Arch. Dr. Mamdouh Sabri
- Typology: Residential villa (courtyard / terraces / swimming pool) (midium size)
- Total area / built area: 850m2 / 300m2
- Primary materials: Mountain stone, red brick (vaults / domes), wood (openings)
- Key features: Courtyard, domes / vaults, swimming pool, passive ventilation

Figure 6.7: Villa (C) Elevations and Swimming Pool (Alilatif, 2024).

As seen from the pictures, the interior and exterior atmosphere gives a feeling of comfort and tranquility, also a healthy environment as a result of using traditional building materials and natural earthed colors.

6.4 VILLA (D) ROBUA VILLAGE

Villa (D), (Figure 6.8) is considered relatively of midium size. It has patio or courtyard, terraces, 3 bedrooms, and a living area. The garden is big enough. It is suitable for midium sized family. As shown from the drawing, I have used different colours to clarify each building material.

Total Area of Villa (D): 850 m2, Built Area of Villa (D): 300 m2.

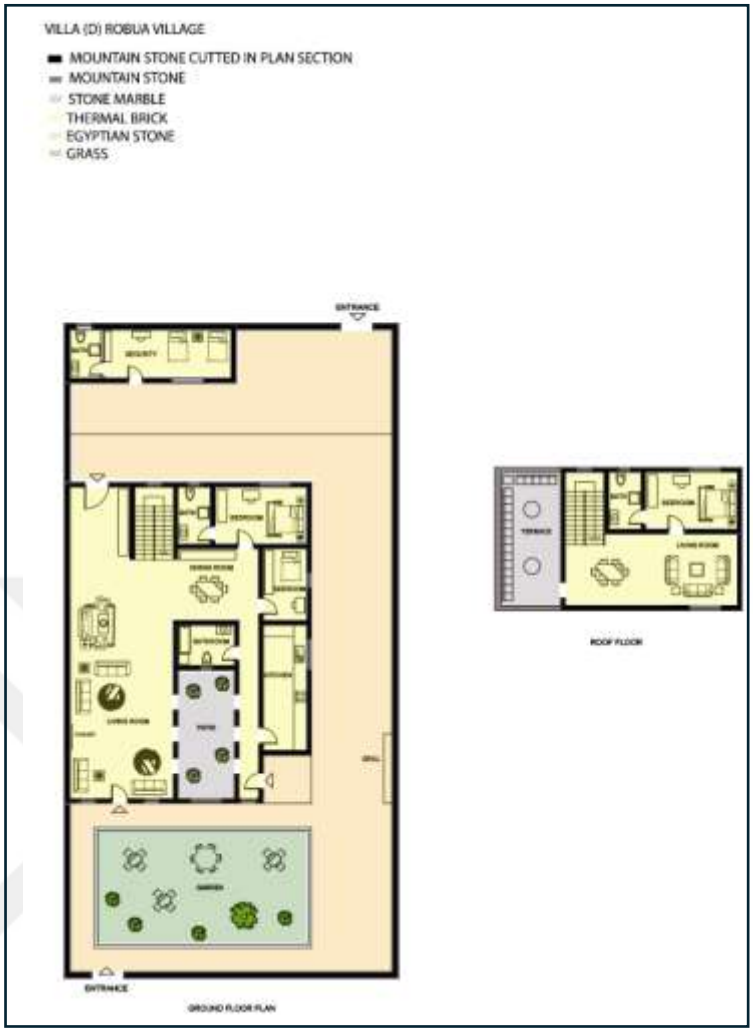


Figure 6.8: Plan and Material Analysis of Villa (D) Robua Village (Alilatif, 2024).

As you can see from the plan, each material is presented with a specific color: the cutted mountain stone walls in black color, the elevation of mountain stone walls in brown color, the internal thermal brick floor in yellow color, the external egyptian stone floor in orange color, and the grass floor in the garden with green color, to clarify the surface of each material. I chose those specific colours because it is almost similar to the real color.

As you can see from table, (Table 6.7) all materials used come from nature. The internal floor material is thermal brick, represents 35% from the total area, the patio or courtyard, and upper terrace floors material are from Stone Marble, it represents 15% from the total area, the external floor is made from Egyptian Stone, it represents 30% from the total area, the Grass garden floor represents 20% from the total area. All walls are built from Mountain

Stone, represents 100% of the walls. Red Brick roofs represent 75% from the built area, and Swedish wood roofs represent 25% from the built area.

Table 6.7: Areas and Materials in Villa (D).

Place: Ground Floor	Area	Floor Material	Wall Material	Roof Material
Living Area	112.5 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room1	20.2 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room2	12 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bath1	7 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Bathroom	8.7 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Patio	28 m2	Stone Marble 	Mountain Stone 	----
Internal Corridors	12.5 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Security Room	19 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Servant Room	19 m2	Thermal Brick 	Moutain Stone 	Swedish Wood 
External Corridors	208.8 m2	Egyptian Stone 	Mountain Stone 	----
Garden	101.3 m2	Grass 	----	----

Table 6.7: Areas and Materials in Villa (D) (Table Continued).

Place: Roof Floor	Area	Floor Material	Wall Material	Roof Material
Room3	20.2 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bath2	7 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Internal Corridors	12.5 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Terrace	62 m2	Stone Marble 	Mountain Stone 	----

As you can see from table, (Table 6.8) the chimney and grill exist, but here the swimming pool does not exist. you can notice that the chimney and grill exist in all houses, but the swimming pool exists in some of them.

Table 6.8: Items in Villa (D).

Item	Exists	Does not Exist
Swimming Pool		✓
Chimney	✓	
Grill	✓	

As you can see from photos, (Figure 6.9) frontal and back views of the earth colored villa built from natural materials stone (mountain stones for walls), Bricks (red bricks for domed and vaulted roofs), wood (Muski wood for doors and Windows). The house construction is not yet finished, that is why there is no internal pictures for the house, and the garden is not planted yet.

- Location: Robua Village (500 m from Tunis Village), Fayoum, Egypt
- Date: Built 1991 – 1997
- Designer: Office of Arch. Dr. Mamdouh Sabri
- Typology: Residential villa (courtyard / terraces) (midium size)
- Total area / built area: 850 m2 / 300 m2)
- Primary materials: Mountain stone, red brick (vaults / domes), wood (openings)
- Key features: Courtyard, domes / vaults, passive ventilation

Figure 6.9: Exterior Architecture of Villa (D) (Alilatif, 2024).

As seen from the pictures, the atmosphere of the villa gives a feeling of comfort and tranquility, also a healthy environment as a result of using traditional building materials and natural earthed colors.

6.5 VILLA (E) ROBUA VILLAGE

Villa (E), (Figure 6.10) is considered relatively a big sized villa. It has patio or courtyard, terraces, 3 bedrooms, a big sized living area, a big sized garden and a swimming pool. It is suitable for a large family to live in. As shown from the drawing, I have used different colours to clarify each building material.

Total Area of Villa (E): 1000 m2, Built Area of Villa (E): 323 m2.

Figure 6.10: Plan and Material Analysis of Villa (E) Robua Village (Alilatif, 2024).

As you can see from the plan, each material is presented with a specific color: the cutted mountain stone walls in black color, the elevation of mountain stone walls in brown color, the internal thermal brick floor in yellow color, the external egyptian stone floor in orange

color, and the grass floor in the garden with green color. I used those different colors to clarify the surface of each material. The used colors are chosen almost similar to reality.

As you can see from the table, (Table 6.9) all materials used comes from nature. The internal floor material is made from Thermal Brick, it represents 30% from the total area, the Patio or courtyard, and upper terrace floors material are made from Marble Stone, it represents 10% from the total area, the external floor is made from Egyptian Stone, it represents 35% from the total area, the Grass garden floor represents 25% from the total area. All walls are built from Mountain Stone, represent 100% of the walls. The Red Brick Roofs represent 80% of the built area, the Swedish wood Roofs represent 20% of the built area.

Table 6.9: Areas and Materials in Villa (E).

Place: Ground Floor	Area	Floor Material	Wall Material	Roof Material
Living Area	79 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Salon	60 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Dining Room	21.5 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room1	17.2 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room2	20.6 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Kitchen	15.5 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Bath1	6.8 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Patio	20.3 m2	Stone Marble 	Mountain Stone 	----
Internal Corridor	25.7 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Security Room	13.7 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 

Table 6.9: Areas and Materials in Villa (E) (Table Continued).

External Corridor	350 m2	Egyptian Stone 	Mountain Stone 	----
Garden	229 m2	Grass 	Mountain Stone 	----
Place: Roof Floor	Area	Floor Material	Wall Material	Roof Material
Room3	20.6 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bath2	6.8 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Terrace	72.4 m2	Stone Marble 	Mountain Stone 	----

As you can see from table, (Table 6.10) the chimney, grill and the swimming pool exist here. We can notice that the chimney and grill exist in all villas, but the swimming exists only in some of them.

Table 6.10: Items in Villa (E).

Item	Exists	Does not Exist
Swimming Pool	✓	
Chimney	✓	
Grill	✓	

As you can see from the photos, (Figure 6.11) for external and internal architecture, all materials used are from nature: stones (mountain stones for walls), bricks (red bricks for domed and vaulted roofs, thermal brick for internal floors), wood (muski wood for Windows and doors). Even internal items like pictures on walls, furniture and fabrics, are made from wood (muski), and cotton. There are handmade cotton colored carpets, and the lighting units are made of black wrought iron. The house is fully furnished in a primitive rural way. Living in this house is very calm and peaceful far from the crowded cities.

- Location: Robua Village (500 m from Tunis Village), Fayoum, Egypt
- Date: Built 1991 – 1997
- Designer: Office of Arch. Dr. Mamdouh Sabri
- Typology: Residential villa (courtyard / terraces) (big size)
- Total area / built area: 1000 m2 / 323 m2
- Primary materials: Mountain stone, red brick (vaults / domes), wood (openings)
- Key features: Courtyard, domes / vaults, swimming pool, passive ventilation

Figure 6.11: Exterior & Interior of Villa (E) (Alilatif, 2024).

As evident from the pictures, the interior and exterior atmosphere gives a feeling of comfort and tranquility, also a healthy environment as a result of using traditional building materials and natural colors.

6.6 VILLA (F) ROBUA VILLAGE

Villa (F), (Figure 6.12) is considered relatively big. It has terraces, pergolas, 3 big bedrooms, big living area, big garden and big swimming pool. It is suitable for a large family to live in. I have used different colours to clarify each building material.

Total Area of Villa (F): 1000 m2. Built Area of Villa (F): 340 m2.

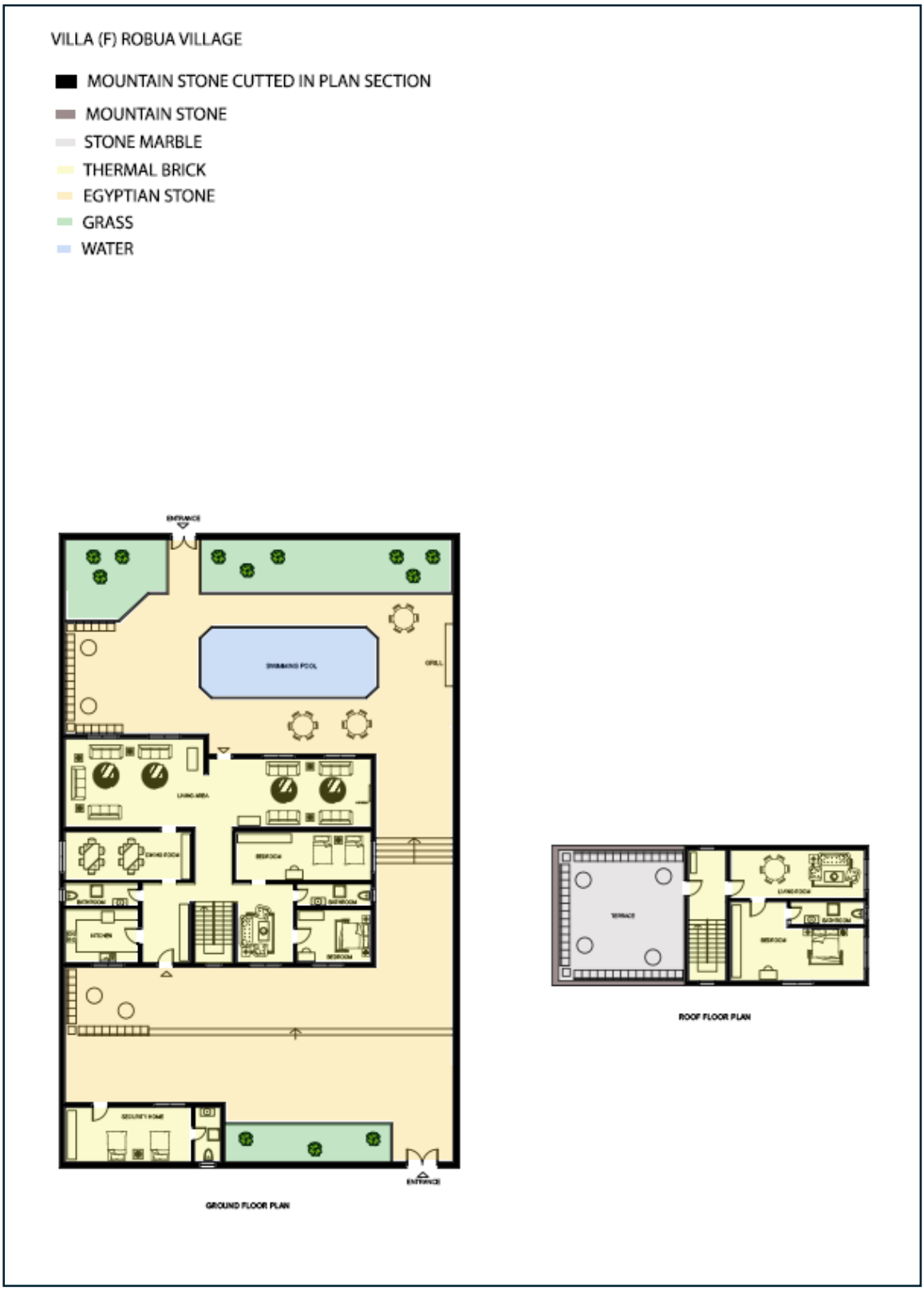


Figure 6.12: Plan and Material Analysis of Villa (F) Robua Village (Alilatif, 2024).

As you can see from the plan, each material is presented with a specific color: The cutted mountain stone walls in black color, the elevation of mountain stone walls in brown color, the internal thermal brick floor in yellow color, the external egyptian stone floor in orange color, and the grass floor in the garden with green color. I used those colors to clarify the surface of each material, those specific colors are almost similar to reality.

As you can see from table, (Table 6.11) all materials used come from nature. The internal floors are made from Thermal Brick, represents 45% of the total area, the upper terrace floor is made from Stone Marble, represent 15% from total area, the external floor is made from Egyptian Stone, represents 20% from the total area, the grass floor of the garden represents 20% from the total area. All walls are made from Mountain Stone, represent 100% of the walls. The Red Brick Roofs, represent 80% of the built area, the Swedish wood roofs represent 20% of the built area.

Table 6.11: Areas and Materials in Villa (F).

Place: Ground Floor	Area	Floor Material	Wall Material	Roof Material
Living Area	98 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Dining Room	25.7 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room1	27.5 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Room2	16.5 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bathroom1	6.9 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Bathroom2	6.9 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Kitchen	16.24 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 

Table 6.11: Areas and Materials in Villa (F) (Table Continued).

Seating Area1	30.3 m2	Egyptian Stone 	Mountain Stone 	----
Seating Area2	30.7 m2	Egyptian Stone 	Mountain Stone 	----
Internal Corridors	50.3 m2	Thermal Brick 	Moutain Stone 	Red Brick 
Security Home	35 m2	Thermal Bricks 	Mountain Stone 	Swedish Wood 
External Corridors	270 m2	Egyptian Stone 	Mountain Stone 	----
Garden	113 m2	Grass 	Mountain Stone 	----
Place: Roof Floor	Area	Floor Material	Wall Material	Roof Material
Bedroom	63.2 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bathroom3	6.9 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Terrace	68 m2	Stone Marble 	Mountain Stone 	----

As you can see from table, (Table 6.12) the chimney, grill and the swimming pool exist here. We can notice that the chimney and the grill exist in all houses, but the swimming pool exists only in some of them.

Table 6.12: Items in Villa (F).

Item	Exists	Does Not Exist
Swimming Pool	✓	
Chimney	✓	
Grill	✓	

As you can see from the photos, (Figure 6.13) for the front and back views of villa (F), all materials used are from nature: stones (mountain stones for walls), Bricks (red bricks for domed and vaulted roofs), Wood (Muski wood for Windows and doors). The garden is planted with different kinds of plants specific to the region. The interior of the house is decorated with furnishings made of natural materials and fabrics, such as cotton and wood (Muski wood, doors, Windows, and pictures).

- Location: Robua Village (500 m from Tunis Villge), Fayoum, Egypt
- Date: Built 1991 – 1997
- Designer: Office of Arch. Dr. Mamdouh Sabri
- Typology: Residential villa (terraces) (big size)
- Total area / built area: 1000 m2 / 340 m2
- Primary materials: Mountain stone, red brick (vaults / domes), wood (openings)
- Key features: Terraces, swimming pool, domes / vaults, passive ventilation

Figure 6.13: Exterior & Interior of villa (F) (Alilatif, 2024)

6.7 VILLA (G) ROBUA VILLAGE

Villa (G), (Figure 6.14) is considered relatively a big sized villa. It has large terrace, 3 bedrooms, a big living area, a big garden and a large swimming pool. It is suitable for a big family to live in. I have used different colours to clarify each building material.

Total Area of Villa (G): 1000 m2. Built Area of Villa (G): 300 m2.

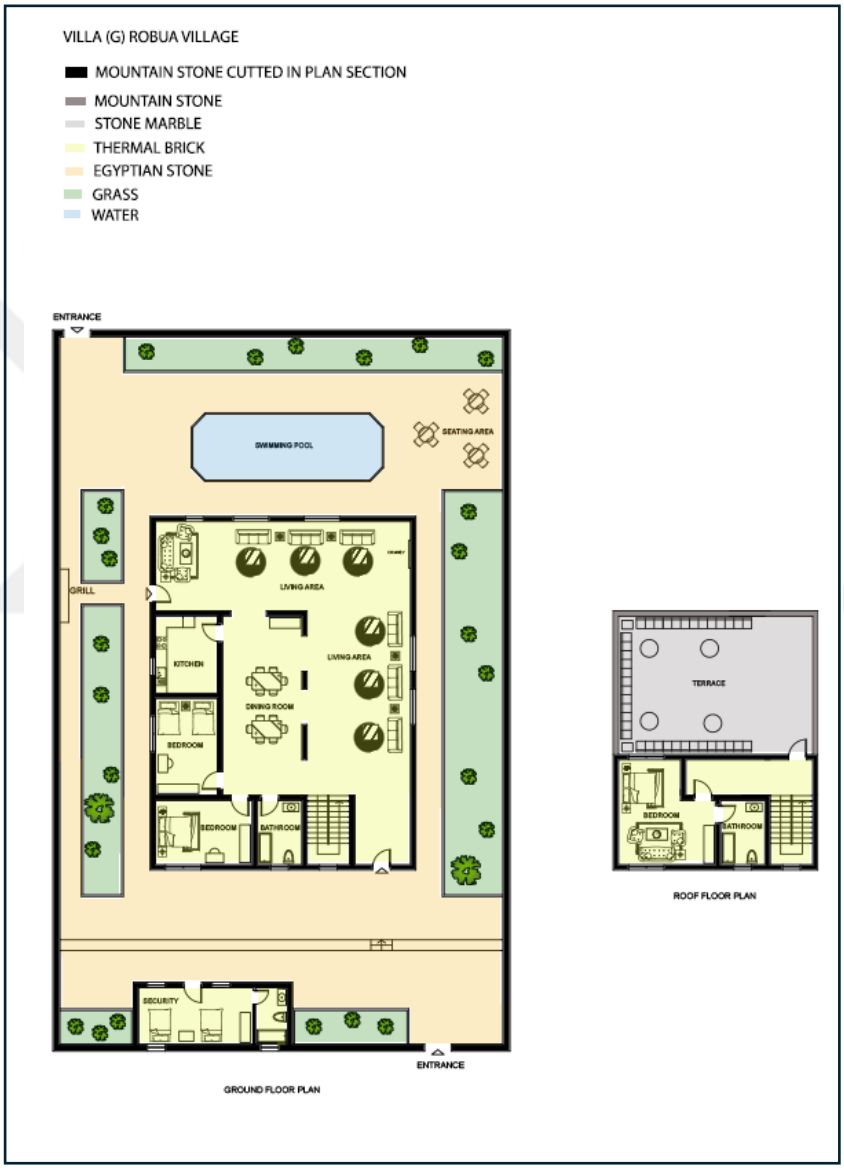


Figure 6.14: Plan and Material Analysis of Villa (G) Robua Village (Alilatif, 2024).

As you can see from the plan, each material is presented with a specific color: the cutted mountain stone walls in black color, the elevation of mountain stone walls in brown color, the internal thermal brick floor in yellow color, the external egyptian stone floor in orange

color, and the grass floor in the garden with green color. I used these colors to clarify the surface of each material, as the colors are almost similar to reality.

As you can see from table, (Table 6.13) all materials used come from nature. The internal Floors are made from Thermal Brick, represent 40% of the total area, the upper terrace floor is made of Stone Marble, represents 15% of the total area, the external floors are made of Egyptian Stone, represent 20% of the total area, the garden grass floor, represents 25% of the total area. All walls are built from Mountain Stone, represent 100% of the walls. The Red Brick roofs represent 85% of the built area, the Swedish wooden roofs, represent 15% of the built area.

Table 6.13: Areas and Materials in Villa (G).

Place: Ground Floor	Area	Floor Material	Wall Material	Roof Material
Living Area	134 m2	Thermal Brick	Mountain Stone	Red Brick
Dining Room	45 m2	Thermal Brick	Mountain Stone	Red Brick
Room1	19.2 m2	Thermal Brick	Mountain Stone	Red Brick
Room2	20 m2	Thermal Brick	Mountain Stone	Red Brick
Bath1	9 m2	Thermal Brick	Mountain Stone	Swedish Wood
Kitchen	15.3 m2	Thermal Brick	Mountain Stone	Swedish Wood
Internal Corridors	12.3 m2	Thermal Brick	Mountain Stone	Red Brick
Servant Room	13 m2	Thermal Brick	Mountain Stone	Swedish Wood
Security Room	13 m2	Thermal Brick	Mountain Stone	Swedish Wood
External Corridors	138 m2	Egyptian Stone	Mountain Stone	----

Table 6.13: Areas and Materials in Villa (G) (Table Continued).

Garden	183.3 m2	Grass 	Mountain Stone 	----
Place: Roof Floor	Area	Floor Material	Wall Material	Roof Material
Bedroom	28 m2	Thermal Brick 	Mountain Stone 	Red Brick 
Bath2	9 m2	Thermal Brick 	Mountain Stone 	Swedish Wood 
Terrace	86 m2	Stone Marble 	Mountain Stone 	----

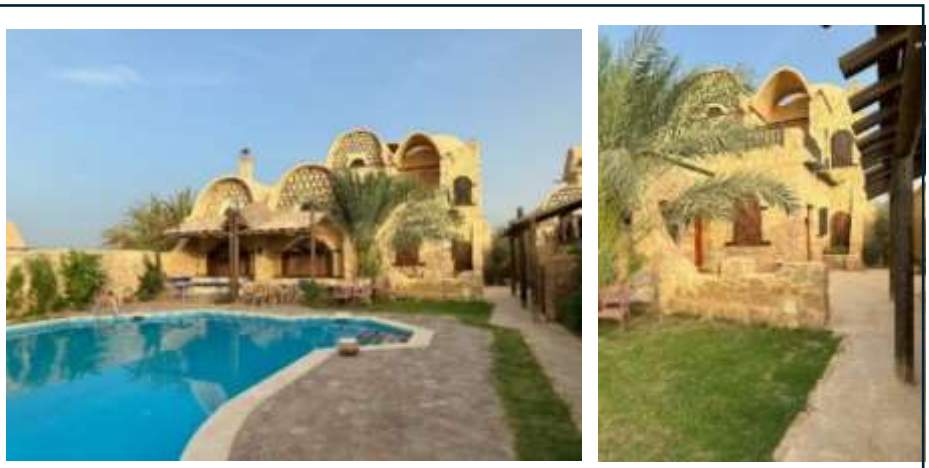
As you can see from table, (Table 6.14) the chimney, grill and the swimming pool exist here. We can notice that the chimney and the grill exist in all houses, but the swimming pool exists in some houses only.

Table 6.14: Items in Villa (G).

Item	Exists	Does Not Exist
Swimming Pool	✓	
Chimney	✓	
Grill	✓	

The images (Figure 6.15) show that all of the materials utilized in both the interior and outside architecture are natural. The desert and lake's natural environment served as inspiration for the colour scheme. Numerous earthy colours, such as beige, ochre, sand, and clay, are present. These colours are contrasted by vivid blues and greens that are reminiscent of the neighbouring Qarun Lake and palm trees.

The internal and external atmosphere work together to produce a balanced “sense of living” that is both climatically comfortable and culturally meaningful, reinforcing community life while maintaining domestic intimacy.



- Location: Robua Village (500 m from Tunis Village), Fayoum, Egypt
- Date: Built 1991 – 1997
- Designer: Office of Arch. Dr. Mamdouh Sabri
- Typology: Residential villa (terraces) (big size)
- Total area / built area: 1000 m2 / 300 m2
- Primary materials: Mountain stone, red brick (vaults / domes), wood (openings)
- Key features: terraces, domes / vaults, swimming pool, passive ventilation

Figure 6.15: Exterior, Interior & Roof Terrace of Villa (G) (Alilatif, 2024)

As we can see from (Table 6.15), all villas are built with the same vernacular architectural style, using local materials from nature. The sizes of villas varies, villa (A), is the smallest one it has only one floor and a relatively small area. The rest of villas have ground floor and a roof floor and their areas are medium and large sizes. In some of the villas the garden contain a swimming pool but in others it does not exist, also some of the villas have a courtyard or patio inside the villa, in some others it does not exist. The villas variations in size, layout, and features like gardens, swimming pools, and courtyards reflect both their similarity in design and variety in purpose, even though they all employ the same vernacular architectural style and local materials.

Table 6.15: Comparison of Houses (A),(B),(C),(D),(E),(F), and (G).

Area: 465m2

Villa (A) Robua village

Area: 850m2

Villa (B) Robua village

Area: 850m2

Villa (C) Robua village

Area: 850 m2

Villa (D) Robua village

Area: 1000 m2

Villa (E) Robua village

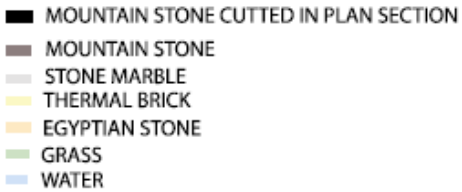
Area: 1000 m2

Villa (F) Robua village

Area: 1000 m2

Villa (G) Robua village

Color key:



6.8 BUILDING MATERIALS USED IN HOUSES

6.8.1 Meaning of Sustainable Building Materials

The building materials used in Robua and Tunis villages are considered sustainable because they are locally sourced, environmentally responsive, and climatically efficient, while also supporting cultural continuity and long-term durability.

Materials such as mud brick, clay brick, local stone, and natural wood require low energy for production and transportation, which significantly reduces embodied energy and carbon emissions compared to industrial materials; their availability in Fayoum region minimizes environmental disturbance and supports local craftsmanship and economies. In addition, these materials possess high thermal mass, allowing buildings to remain cool during hot daytime hours and warm at night, which reduces reliance on mechanical heating and cooling systems, they are also biodegradable, recyclable, and long-lasting; they are well adapted to the local climate and environmental conditions. Their use reflects accumulated vernacular knowledge, as demonstrated in Robua and Tunis Villages, where passive design strategies and natural materials work together to achieve sustainability in environmental, social, and cultural terms; this makes them not only ecologically sustainable, but also socially and culturally resilient within the context of Egyptian vernacular architecture (Sharma, 2020).

6.8.2 Source of Building Materials

Fayoum, Egypt Native building materials are drawn from the region's geological assets and setting. Fayoum is not far from the Nile Valley, where stone quarries have existed for millennia. Originally, Egypt had a great deal of limestone, especially in the Eastern Desert and around Fayoum. Its durability has made this stone commonly used in walls, foundations, and other structural elements. Fayoum is rich in new deposits of alluvial soil because of its proximity to Qarun Lake and the Nile River. Adobe (mud) bricks are usually prepared by mixing the clay from these deposits with water and straw. Sun-dried, these bricks are a cheap and eco-friendly building material. In traditional and rural constructions mud bricks are often used for insulation and walls. There is a lot of sand at Fayoum because it is surrounded by desert. It is commonly used in mortar, plaster and concrete. Fayoum's native sandy soil is also used directly in foundations or mixed with clay to build bricks. There are lots of palm dates in the Fayoum oasis and its surrounding. In traditional architecture,

roofing and shade structures are constructed out of palm leaves and reeds. They are light, sustainable, easily interchanged materials that provide a natural insulator. (Maher & Madrigal, 2021).

Thermal Brick: Mainly used for the internal floors. It is a type of brick produced from porcelain and refactory soil. It has a dense and fine molecular structure. The method of producing this type of brick is that first the stones are ground, then they are turned into fine soil. After three days of baking in the oven at a temperature exceeding 1500 degrees celsius, then it is ready for use.

Mountain Stone: Used for all walls. It is a natural rock extracted from the mountain through mining and quarrying.

Stone Marble: Marble is a material extracted from natural quarries. Marble pieces are extracted in the form of large blocks, then divided into smaller pieces using large cutting machines. This is done to obtain marble slabs with the required dimensions and thickness.

Red Brick: One of the basic building materials, it originates from clay and turns red due to its passage through several different factors that help strengthen it, including entering the oven, which is why it acquires the red color, as it remains inside for long hours.

Egyptian Stone: Egyptian Stone is considered a natural material used in construction and decoration, and it is extracted from the mountains.

Swedish wood: Swedish wood is a natural wood extracted trees from Sweden.

Muski Wood: Muski wood is a natural wood extracted from trees from Russia.

A use of locally sourced and regionally suitable natural building materials is clear in the construction of houses in the villages of Robua and Tunis in Fayoum, the clay (Figure 6.16) of the Fayoum region are usually used to make materials like thermal bricks and red bricks, which provide good thermal insulation and environmental harmony. In keeping with Egypt's long history of stone construction, egyptian stone, typically sandstone or limestone, is extracted from nearby quarries and used for both structural and decorative purposes, marble is chosen for its durability and aesthetic value. Swedish and Muski wood are imported and used moderately because of its excellent quality and finish. When combined, these materials show a mix of contemporary and traditional building techniques, grounded in the

surrounding landscape but allowing for more prolonged architectural influences, the architectural fabric of both villages benefits from this integration in terms of sustainability, cultural identity, and thermal comfort (Hana & Radi, 2024).

Figure 6.16: Peasant Making Sundried Clay Bricks (1929) (Maher & Madrigal, 2021).

As you can see from the table (Table 6.16), the Thermal Brick usage for floors, vary between 40% and 29%, the Stone marble usage for floors vary between 10% and 16%, the Egyptian Stone usage for floors, vary between 20% and 30%, the Grass usage vary between 18% and 40%. The Mountain Stone usage for walls is 100%, the Red Brick & Mountain Stone usage for roofs vary between 70% and 85%, the Swedish Wood usage for roofs, vary between 15% and 30%.

These natural materials reinforces the village's vernacular identity while providing a low-cost, locally sourced, and climatically responsive building system, when maintained properly (especially against moisture), these materials support comfort and sustainability.

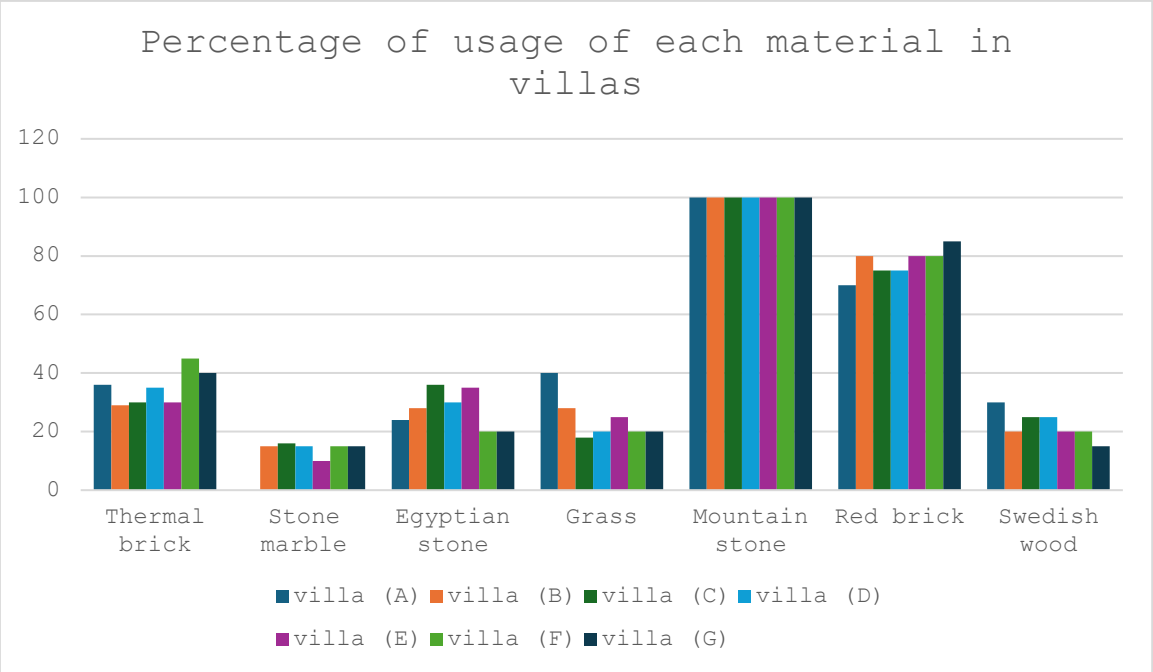


Figure 6.17: Percentage of Usage of Each Material in Villas.

As you can see from photos, (Figure 6.17) the name of each material marked on external and internal views of a villa in Robua Village. You can see from the images that all materials used in both the interior and outside architecture are natural, the desert and lake's natural environment influence the colour scheme, many earthy colours, such as beige, ochre, sand, and clay, are present. These colours are contrasted by vivid blues and greens that match the neighbouring Qarun Lake and palm trees. Using these regional resources helps to maintain Fayoum's traditional architectural heritage and sustainability.

The use of those natural materials, reinforces the village's vernacular identity while providing a low-cost, locally sourced, and climatically responsive building system, when maintained properly these materials support comfort, sustainability, and continuity of traditional craftsmanship within contemporary development.

Living in houses built with natural materials, for the internal and external atmosphere work together to produce a balanced sense of living that is both climatically comfortable and culturally meaningful, reinforcing community life while maintaining domestic intimacy.

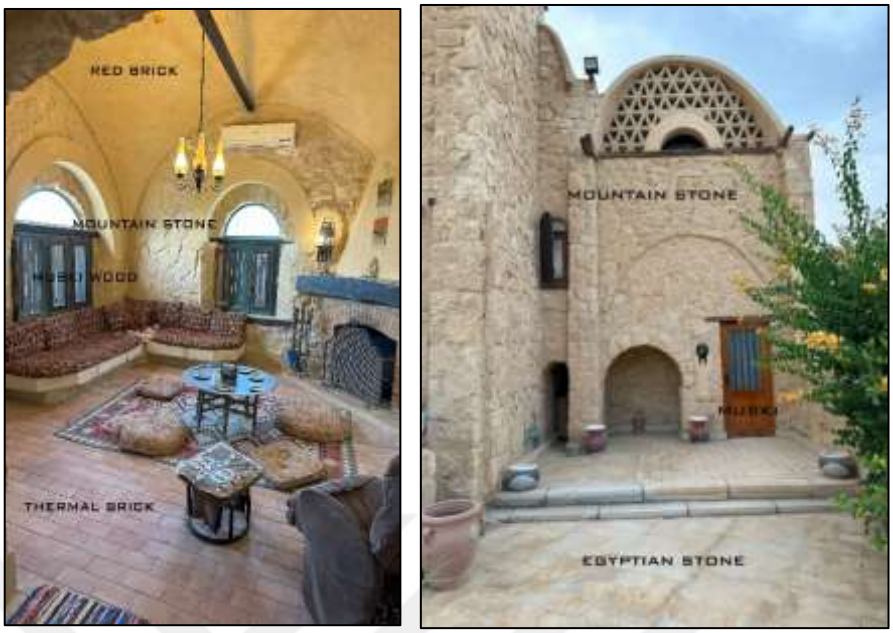


Figure 6.18: Names of Materials on External and Internal Views of Robua Village House (Alilatif, 2024).

As seen from the pictures, the interior and exterior atmosphere gives a feeling of comfort and tranquility, also a healthy environment as a result of using traditional building materials and natural earthed colors.

6.9 INTERVIEWS WITH THE HOUSES OWNERS

All 7 Houses are in Robua Village in the vicinity of Tunis Village, Fayoum, Egypt.

I conducted interviews with the owners of the seven houses involved in this study to find out their opinions about the village area, the style of buildings, and how satisfied they were to own a house in this area.

Table 6.16: Interview with Villa (A) Owner.

Question	Answer
How People can know the Place?	My mother knew the place from an old freind who told her about it.
Are you the first to buy or own this house?	My mother bought this house in 1995 from the first owner of the Village Mr. Mohsen Elabd, Then she gave it to me after getting old in 2008.
For how many years you own the house?	I own the house from 16 years ago.
How many people live in the house?	I live there with my son, we go there during holidays and weekends with freinds.

Table 6.16: Interview with Villa (A) Owner (Table Continued).

Is the house is built using natural materials?	The house is characterized by its natural building materials.
Is living in a house built with natural materials healthy?	Using natural building materials does, in fact, have several health benefits due to their inherent qualities and the positive impacts they have on indoor air quality and overall well-being.
Green area is enough or not?	There is enough green area, which is the garden and is suitable for gathering and grill parties.
Are you satisfied by owning this house?	Yes I am satisfied by this calm and healthy environment.

Table 6.17: Interview with Villa (B) Owner.

Question	Answer
How people can know the place?	By searching through internet about Tunis Village and Robua Village in Fayoum.
Are you the first to buy or own this house?	No, I am the second one. I bought it from another person on 2010.
For how many years you own this house?	I own this house since 14 years ago.
How many people live in the house?	We are 3 people living in this house: Me, my wife and my daughter. We come here on holidays and weekends.
Is the house built using natural materials?	Yes, all Tunis Village houses area, is built from natural materials.
Is living in a house built with natural materials healthy?	Yes, materials with good thermal and acoustic qualities include wood, straw, and earth. They can aid in creating a calmer, more comfortable atmosphere, lowering noise pollution, and maintaining a constant indoor temperature.
Green area is enough or not?	Yes, green areas are enough in the garden and courtyard for family and freinds to enjoy.
Are you satisfied by owning this house?	Yes, of course, it is a nice, calm and healthy place.

Table 6.18: Interview with Villa (C) Owner.

Question	Answer
How people can know the place?	I first knew the place because I was in a touristic tour, then I liked the place and thought about buying a house there.
Are you the first to buy or own this house?	I am the first to buy this house, I bought it from Orascom company on 2023.
For how many years you own this house?	I own this house since one year ago.
How many people live in the house?	I give the house for rent, it can accomodate 4 to 5 person.
Is the house built using natural materials?	Yes of course Robua village buildings are all made from natural materials.
Is living in a house built using natural materials healthy?	In fact, dangerous volatile organic compounds, which are commonly found in synthetic materials and can eventually lead to headaches, respiratory disorders, and other health problems, are typically not released by natural materials like wood, clay, and stone.
Green area is enough or not?	I wished if the green area was bigger as I really appreciate living surrounded by green area.
Are you satisfied by owning this house?	Yes, I am satisfied about it because I give it for rent, and I have an income from it, due to its characterized location.

Table 6.19: Interview with Villa (D) Owner.

Question	Answer
How people can find the place?	By searching on Google about touristic places in Egypt.
Are you the first to buy or own this house?	Yes, I am the first to own this house, I bought it from Orascom company in 2023.
For how many years you own this house?	I own it one year ago.
How many people live in this house?	We are 4 people planing to live in this house, me, my husband, my daughter and my son.
Is the house built using natural materials?	Yes the house is built using natural materials, that what makes it special.
Is living in a house built using natural materials healthy?	Yes of course, It makes living conditions more comfortable and lessens respiratory issues.
Green area is enough or not?	I am making arrangements in the house at the moment, but wish to enlarge the green area.
Are you satisfied by owning this house?	Yes I am satisfied about the healthy environment. But also there are some dificulties because of the primitive way of living here.

Table 6.20: Interview with Villa (E) Owner.

Question	Answer
How people can find the place?	By searching on internet about Robua Village, Fayoum.
Are you the first to buy or own this house?	Yes, I am the first to own this house, I bought it from Orascom company in 2022.
For how many years you own this house?	I own this house from 2 years ago.
How many people live in the house?	My family live there during weekends and holidays. We are 5 persons: me, my wife and our 3 children.
Is the house built using natural materials?	Yes, it is, that was the main reason that I bought it.
Is living in a house built using natural materials healthy?	Yes of course, using natural building materials offers several health benefits, they have on indoor air quality and overall well-being.
Green area is enough or not?	Yes, the garden and courtyard are enough green areas.
Are you satisfied by owning this house?	Yes owning a house far from the crowded city is good to relax during weekends and holidays.

Table 6.21: Interview with Villa (F) Owner.

Question	Answer
How people can find the place?	I knew about this place buy attending a real estate marketing exhibtion, there I liked it and decided to buy the house.
Are you the first to buy or own this house?	My husband bought it from Orascom company in 2013, we are the second to own this house.
For how many years you own this house?	We own this house from 11 years ago.
How many people live in the house?	We do not live in the house, we give it for rent in weekends and holidays. 5 to 6 person can live in the house.
Is the house built using natural materials?	Yes of course the area is all built with sustainable houses built from natural materials.
Is living in a house built using natural materials healthy?	Yes, the use of natural materials connect us to nature, which has been shown to reduce stress, enhance mood, and improve mental health.
Green area is enough or not?	Yes, the courtyard and garden are enough green areas.
Are you satisfied by owning this house?	Yes, because I give it for rent which give me an income, due to its special location.

Table 6.22: Interview with Villa (G) Owner.

Question	Answer
How people can find the place?	People can find the place by searching on internet about touristic places in Fayoum.
Are you the first to buy or own this house?	Yes, I am the first to own this house, I bought it in 2022 from Orascom company.
For how many years you own this house?	I own this house since 2 years ago.
How many people live in the house?	I live in the house with my wife and two children.
Is the house built using natural materials?	Yes of course, what characterize Robua Village is there beautiful sustainable houses built using materials coming from nature.
Is living in a house built using natural materials healthy?	Actually, by incorporating natural elements into the living area, homes built with natural materials promote calm and relaxation, which improves human well-being.
Green area is enough or not?	I preferred having a wider space of green area, because that give me more satisfaction and relaxation.
Are you satisfied by owning this house?	Yes of course the house is in a calm and sustainable area.

The answers to the interview questions show a connection and awareness of Robua &Tunis Villages residents, especially in relation to sustainable and traditional housing, the majority of owners discovered the area through freinds, tourism, or by searching on internet, emphasizing the village is developing as a calm and creative travel destination, recently, there has been a continuous and changing interest in property ownership in the village, as clear by the fact that most respondents were not the original owners.

The length of ownership varied, many residents had been in their homes for a number of years, which shows long-term ownership of the house and community attachment, but some others own the house since only one or two years. Limited number of houses with calm and peaceful living environment was reflected in the range of household sizes, from small families to slightly larger houses.

The use of “natural building materials”, like stone, wood, and other local resources, was a recurring theme in the responses, with advantages like natural insulation, thermal comfort,

and decreased chemical exposure, residents largely agreed that such materials make for a “healthier living environment”.

Most respondents said they were either satisfied with green spaces or wished there were more of them, this shows how important landscape integration and environmental quality are in rural areas. All owners were satisfied with their houses, theirs satisfaction are due to elements like comfort, cultural identity, environmental harmony, and aesthetic value.
The answers show how strongly tradition, sustainability, and community are present in Tunis and Robua villages, their long-term attachment reflecting both cultural identity and satisfaction with the quality of life these villages offer, houses owners place a high value on natural materials, tranquil living, and environmental integration.

7. DISCUSSION

7.1 BUILDING MATERIALS SWOT ANALYSIS OF ROBUA & TUNIS VILLAGES

Robua and Tunis villages in Fayoum, uses on locally accessible natural materials like wood, brick, and stone for climate resistance, sustainability. According to the SWOT analysis of building materials (Figure 7.1), while some materials are limited and less durable susceptibility to the demands of contemporary development are weaknesses, strengths include low environmental impact, cost effectiveness, and harmony with traditional architecture, threats include the influence of less sustainable modern materials, the loss of traditional knowledge, and the scarcity of some resources, opportunities include fostering ecotourism, heritage preservation, and skill-based local employment. To maintain the value of building materials in the long term, a balance must be done between adaptation and preservation.

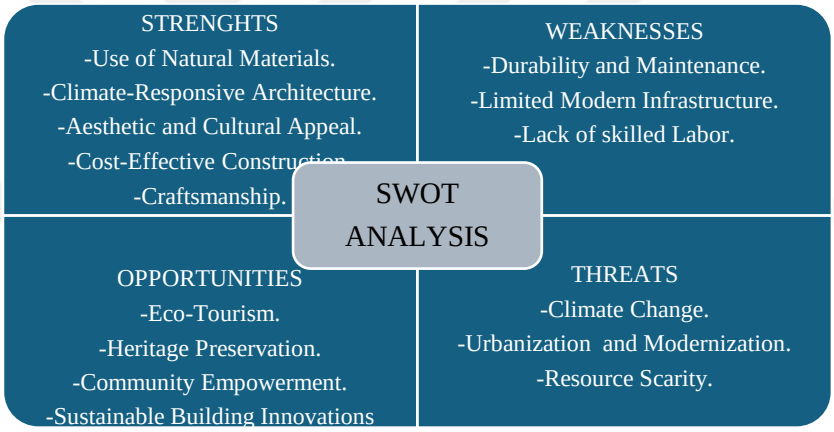


Figure 7.1: Building Materials SWOT Analysis of Robua & Tunis Villages.

As shown, weaknesses are mostly related to maintenance and skills, not to the concept of traditional materials itself.

7.2 ARCHITECTURAL IMPROVEMENT USING NEW TECHNOLOGIES

Enhancing Robua & Tunis Villages architecture with new technologies can have a big impact on sustainability, energy efficiency, and the villages unique cultural identity.

a. Sustainable Building Materials

   Merging modern building techniques with domestic, renewable and sustainable, eco-friendly materials such as mud. Examples of this include making sustainable bricks

with 3D printing technology from locally available materials, such as clay, which lowers transportation costs and carbon footprint, building with recycled materials, such as plastic and glass which means less waste and environmental impact.

b. Energy Efficiency and Solar Power

Solar energy is a highly desirable technology because Fayoum receives a lot of sunlight. Thus solar panels can be installed. One solution is to establish solar panels on rooftops and in public spaces to wean ourselves from fossil fuels. Double-glazing energy-saving Windows and the insulation help keep indoor temperature without consuming additional amounts of energy during hot weathers like Fayoum's one, it can be done with the help of better insulating techniques and low emissivity glass, building orientation and design, which work with solar design to maintain interior temperature naturally and minimize energy consumption, for example, the design of windows and thick walls that maximize natural light and ventilation.

c. Water Management and Irrigation Technologies

These on-site greywater recycling systems can assist in recycling water for agriculture, irrigation, and landscaping in water-limited regions, another option is to use a smart irrigation system that will use sensors to determine the soil moisture level, this method will help save water and utilise natural resources effectively, assisting the local rural community depending on pottery and agriculture.

d. Smart Village Technologies

Smart lighting can minimize energy costs and can improve the safety by placing motion-sensor, and solar-powered street lighting in public spaces.

e. 3D Modeling and Urban Planing Software

Architects can have more accurate, site plans that increase functionality and respect the environment with the use of 3D visualisation and modelling technologies.

f. Cultural Preservation with Modern Techniques

Tunis Village's artistic heritage and pottery are well-known, the village's creative past can be preserved by using contemporary technologies like 3D printing and laser scanning to help restore ancient buildings or save traditional designs.

g. Green Roofs and Urban Framing

Buildings with green roofs can also start small businesses growing local urban farms or grow local plants and herbs, to provide room for better insulation and rainwater management, also vertical gardens, so that even small spaces can contribute to the greenery of the village, improve the air quality and beautify it.

h. Smart Waste Management

Technology can help with the waste management by turning organic waste into bioenergy or fertiliser, which would improve the local farming and reduce the quantity of trash that ends up in landfills.

i. Education and Digital Platforms

To use online courses and e-learning platforms to offer digital training to local builders, architects, and artisans so that they can learn about sustainable building techniques and emerging technologies, another way is by creating applications that enable the community to participate in the planning process and to give feedback on building projects. This will ensure development is in accordance with local needs, and preserves the villages unique cultural identity.

j. Climate-Responsive Architecture

Modern smart Windows can be darkened when exposed to sunlight during the day, thus reducing home cooling costs, this can also improve airflow and circulation in house during the day and night, with automatic ventilation systems, reducing reliance on mechanical ventilation.

This upgrading of technologies in Robua & Tunis Villages may help in lessen modern day issues of sustainable living, energy efficiency, and community development, such features would develop the village but allow its identity to remain culturally unique.

8. CONCLUSION AND SUGGESTIONS

As you can see in (Table 8.1), the following is the typical consumption of building materials for all villas, (A), (B), (C), (D), (E), (F), and (G): Of the overall area, Thermal Brick makes average of 35% of the internal floor material. Typical 15% of the total area is Stone Marble flooring used in the floor roof terraces and courtyards. Comprising average of 30% of the total surface, for the outdoor flooring Egyptian Stone. For the garden's grass floor 25% average of the total area. Average Mountain Stone makes up the walls of villas, in average 100%. Villas average Red Brick roof percentage of the built area is 78%. Villas average Swedish wood roof percentage of the built area is 22%.

Table 8.1: Average Consumption of Building Materials of all Villas.

Building Material	Average consumption of villas: (A), (B), (C), (D), (E), (F), & (G)
Thermal Brick (floor) 	35% of the total floor area
Stone Marble (floor) 	15% of the total floor area
Egyptian Stone (floor) 	30% of the total floor area
Garden Grass (floor) 	25% of the total floor area
Mountain Stone (wall) 	100% of the walls
Red Brick (roof) 	78% of the built area
Swedish Wood (roof) 	22% of the built area

The research of Egyptian local building materials shows the correlations between local resources, cultural heritage and sustainable development, specifically in relation to Robua & Tunis Villages in Fayoum. Robua &Tunis Villages are an example of how durable, eco-friendly, and beautiful homes can be made from traditional building materials like clay brick,

wood, and stone, to stay in touch with their environment. Individual natural materials have considerable environmental benefits including thermal performance, a low embodied energy and reduced carbon footprint, which are key to both climate change and the evolution of sustainable construction.

8.1 SUGGESTIONS FOR IMPROVEMENT

The adoption of local building methods in the villages of Robua and Tunis enhances regional craftsmanship, revitalizes cultural heritage, and contributes to the local economy. It also preserves Egyptian architectural heritage and creates local construction jobs. Robua and Tunis villages are examples of design that is both architecturally and culturally appropriate.

Encouraging the Use of Local Materials in Modern Construction, this encourages architects and builders to use natural, local materials on new construction projects. Encouraging the use of clay bricks, stone, and other traditional building materials and other sustainable practices in rural and urban contexts.

Developing training programs on traditional building methods for local communities, architects, and builders can help future generations. Workshops and apprenticeships would also help the next generation to understand and make use of these sustainable practices in new and creative ways.

Traditional tools for modern sustainability, greening the grid, the integration of traditional materials and modern green building technology could investigate the ecology of structure and its utility through the ironworks, like solar panels or rainwater collection systems could be merged with clay or stone buildings to create hybrid constructions that maximize the positive effect that they can have on their environment.

Promoting awareness of the cultural and environmental benefits of traditional materials, public campaigns, architectural exhibits, and community events that inform residents, lawmakers, and visitors about the advantages of traditional construction materials can all aid in promoting sustainable practices, such increased appreciation can result in the growing need for culturally relevant and sustainable construction.

Accurate documentation could be useful for scholarly, as well as actual use on the architecture, materials, and methods of Robua & Tunis Villages, conservation measures

must also be taken in order to keep the buildings as they are in Robua & Tunis Villages to ensure that it can serve into the future as a living example of sustainable, culturally significant architecture.

Robua & Tunis Villages, marketed as an ecotourism model, could potentially appeal to tourists longing for sustainable architecture and cultural heritage, in addition to boosting the local economy, this will call the world's attention to the importance of Egyptian traditional building methods.

Finally, Robua & Tunis Villages ongoing use of traditional building materials not only indicates a strong link between architecture and the surroundings but also provides insightful analysis of environmentally friendly, culturally anchored construction techniques, the methods and materials used in this modest Fayoum villages offer an amazing example of how to strike innovation with tradition as world interest in ecological and heritage-based design rises. It is preserving and revitalising these customs a question of cultural legacy; it also marks a path towards a more resilient and context-sensitive future for rural development in Egypt and abroad.

REFERRENCES

Abdelaal, S., Vallet, J., Berthonneau, J., Mahgoub, G., & Ali, E. (2014). Degradation of engraved stone and renders from Qasr Qarun temple in Fayoum Oasis, Egypt. *Conservation Department, Faculty of Archaeology, Fayoum University, Egypt. CICRP-Interdisciplinary Center for the Conservation and Restoration of Heritage, Marseille, France. Ministry of Egyptian Archaeology, Egypt.*

Abouseif. (1992). Islamic Architecture in Cairo An Introduction. *Agha Khan Program for Islamic Architecture at Harvard University and the Massachusetts Institute of Technology*.

Abouseif, D., & Fernandes, L. (1984). Sufi architecture in early Ottoman Cairo. *Annales Islamologiques*.

Alilatif, M. (2024). Photos, Autocad and Photoshop drawings. *Egypt*.

Azad, M., & Barua, A. (2017). A case study of Ancient Egyptian Architecture. *International Journal of Engineering and Applied Sciences (IJEAS)*.

Creswell, J. W. (2014). Research Design: Qualitative, quantitative, and mixed methods approaches. *Book, 4th edition*.

El-Kabbany, M. (2013). Alternative building materials and components for Affordable housing in Egypt: Towards Improved Competitiveness of Modern earth Construction. *Master of Science Thesis, Ain Shams University Egypt and University of Stuttgart Germany*.

El Khoreby, EL Khoreby, S., & Samra, M. (2021). Towards New Policies and Strategies for management and Conservation of Cultural tourism in Egypt-Case Study: El Fayoum City. *Journal of Architecture, Arts and Humanistic Sciences*.

El Melegy, A. (2019). Traditional Architecture in Egypt: a sustainable approach to material use and conservation. *academia.edu*.

Hameed, A., Abdalla, A., & Solieman, N. (2020). Cult installation in Greco-Roman egypt. *Journal of the Faculty of Tourism and Hotels, University of Sadat City*.

Hana, M. & Radi, H. (2024). Informations and documents about Tunis village. *Robua Village Administration Office*.

Hewison, & Neil, R. (2008). The Fayoum: History and guide. *American University in Cairo Press, 4th edition*.

Maher, J., & Madrigal, J. (2021). Earth architecture in rural Egypt: Changes in the context and material. *A+ArchDesign- Academia.edu*.

Mazzone, D. (2017). The dark side of a model community: the ghetto of El-Lahun. *Journal of Ancient Egyptian Architecture*.

Mohamed, M. (2010). Traditional ways of dealing with climate in Egypt. *The Seventh International Conference of Sustainable Architecture and Urban Development (SAUD 2010).*

Mohmed, A., Mohamed, D., & Ewies, M. (2021). Social and economic impacts of rural employment in the rural tourism sector (case study in the village of Tunis in Fayoum Governorate). *Fayoum Journal of Agricultural Research and Development*.

Nassab, A. (2019). The social architecture and the ideas of Hassan Fathy. *Architecture Master Thesis, Mardin Artuklu University.*

Salama, A. (1999). Contemporary Architecture of Egypt. *The Aga Khan Award for Architecture (AKAA) and the American University of Beirut (AUB)*.

Sharma, N. K. (2020). Sustainable building material for Green building construction, conservation and refurbishing. *International Journal of Advance Science and Technology*, *29*, 10S.