TECHNISCHE UNIVERSITÄT WIEN
Vienna | Austria

DIPLOMARBEIT

WHAT ARE THE REASONS LEADING IRANIAN CONTEMPORARY ARCHITECTS TOWARDS TRADITIONAL KNOW-HOWS?

Rediscovering the Sustainable and Affordable Character of implementing such elements.

ausgeführt zum Zwecke der Erlangung

des akademischen Gradeseines Diplom-Ingenieurs

unter der Leitung

Univ.Ass. Mag. Dr.phil. Negar Hakim

E251

Institut für Kunstgeschichte, Bauforschung und Denkmalpflege

eingereicht an der Technischen Universität Wien

Linda Fresku, BSc Matrikel Nr: 00932060

Wien, am Unterschrift

Abstract

The presence of tradition in vernacular architecture, is undeniable, as it shares a close relation to the society's needs and cultural norms together with religious practices. Going on for generations to generations, the concept of continuity is what sustained Middle Eastern cultural heritages and many others around the world. In the core concept of Iranian Vernacular Architecture, sustainability undoubtedly finds a strong ground for architects to take inspiration from the times when architecture in the region was built from people to people, being foremost a solid ground for contemporary sustainable architecture, not only in the region of Iran, but that of Europe as well.

Identifying with a region's culture or even architecture, is what many architects are trying to revive due to the solutions found in these simple structures yet rich in information and experience, finding even today a large field of implementation - paying close attention to the needs of the society, by respecting the environment through material selection among many other. Vernacular architecture talks about affordable yet functional architecture, the type of architecture - from people to people - architects are struggling with the fact of designing affordable sustainable tradition-based contemporary architecture - yet many are finding ways of taking inspiration to this traditional heritage built around us in search of solutions.

This thesis is carried out by a descriptive, analytical and questionary method including Personal Interviews with architects working in the field of tradition-based contemporary and sustainable architecture, by conduction of questionaries in relation to my Master Thesis Research, regarding a comparison of the Middle Eastern architecture, with focus on Iranian contemporary architectural designs - analyzing traditional Iranian architectural building methods and the implementation into the contemporary projects - slightly compared to the European contemporary tradition-based sustainable designs. What does Traditional Architecture mean and how did it develop with time together with materials, building elements and their implementation into the contemporary architecture? This Study analyzes projects which are mostly located in Iran, and partly in Europe, in a timeframe between 2000 and 2024. Aiming to analyze thoroughly the relation between Tradition - Cultural Identity - Sustainability - Affordability, of contemporary tradition-based inspired architecture, this paper introduces us to the current situation of tracking, developing and implementing traditional elements into contemporary architecture in Iran - without neglecting the affordability and sustainability levels of such designs

Abstrakt

Das Vorhandensein von Tradition in der einheimischen Architektur ist unbestreitbar, da sie eng mit den Bedürfnissen der Gesellschaft und kulturellen Normen sowie religiösen Praktiken verbunden ist. Das Konzept der Kontinuität, das über Generationen hinweg Bestand hat, hat das kulturelle Erbe des Nahen Ostens und vieler anderer auf der ganzen Welt erhalten. Im Kernkonzept der iranischen Volksarchitektur findet Nachhaltigkeit zweifellos eine starke Grundlage für Architekten, die sich von den Zeiten inspirieren lassen, in denen die Architektur in der Region von Menschen für Menschen gebaut wurde. Dies ist in erster Linie eine solide Grundlage für zeitgenössische nachhaltige Architektur, nicht nur für die Region des Iran, sondern auch für Europa.

Die Identifikation mit der Kultur oder auch Architektur einer Region ist es, was viele Architekten aufgrund der Lösungen, die in diesen einfachen, aber an Informationen und Erfahrung reichen Strukturen liegt, wiederzubeleben versuchen und auch heute noch ein weites Feld der Umsetzung begründen – unter besonderer Berücksichtigung der Bedürfnisse der Menschen Gesellschaft, indem wir unter anderem durch die Auswahl der Materialien die Umwelt respektieren. Volksarchitektur spricht von leistbarer und dennoch funktionaler Architektur, der Art von Architektur von Menschen zu Menschen – Architekten kämpfen mit der Tatsache, leistbare, nachhaltige, traditionsbasierte zeitgenössische Architektur zu entwerfen – und doch finden viele Wege, sich von diesem traditionellen, denkmalgeschützten Gebäude um uns herum inspirieren zu lassen.

Diese Arbeit wird mit einer deskriptiven, analytischen und fragenden Methode durchgeführt, einschließlich persönlicher Interviews mit Architekten, die im Bereich der traditionsbasierten zeitgenössischen Architektur arbeiten, und der Durchführung von Fragebögen im Zusammenhang mit meiner Masterarbeitsforschung in Bezug auf einen Vergleich des Nahen Ostens mit Fokus auf zeitgenössische iranische Architekturentwürfe – Analyse traditioneller iranischer Architekturbaumethoden und deren Umsetzung in zeitgenössische Projekte – teilweise im Vergleich zum europäischen traditionsbasierte zeitgenössische Architektur.

Was bedeutet traditionelle Architektur und wie hat sie sich im Laufe der Zeit zusammen mit Materialien, Bauelementen und deren Umsetzung in die zeitgenössische Architektur entwickelt? Diese Studie analysiert Projekte, die größtenteils im Iran und teilweise auch in Europa angesiedelt sind, in einem Zeitraum zwischen 2000 und 2024. Ziel ist es, die Beziehung zwischen Tradition, kultureller Identität, Nachhaltigkeit und Erschwinglichkeit in zeitgenössischer, auf Traditionen basierender oder inspirierter Architektur gründlich zu analysieren. In diesem Study werden wir in die aktuelle Situation der Verfolgung, Entwicklung und Implementierung traditioneller Elemente in zeitgenössische Architektur im Iran eingeführt - ohne dabei die Erschwinglichkeit und Nachhaltigkeit solcher Entwürfe zu vernachlässigen.

The Research Objective

As an incentive to my master thesis, can be considered the research paper me and my colleague Branislav Stojkov did for the Module “Cultural Spaces”, for the seminar course in 2021, included in the module “Comparative research in architecture - Cultural Spaces and Identity in Architecture” supervised by Univ.Ass.Mag.Dr.phil Negar Hakim. Following up the paper submitted during the course, titled - “The influence of traditional elements and their implementation in the contemporary house design” - where during the research we were able to find out more about Iranian tradition-based building elements implemented into contemporary design, as well as how to deal with many issues regarding the matter, in the cultural heritage region of Iran, Yazd and Isfahan respectively - as well as in some parts of Europe, respectively Austria and Spain. As a result, the sustainable aspect of the vernacular architecture, in which tradition has a leading role towards sustainability - made me want to find out about tradition-based sustainable architectural elements and their affordability in contemporary designs and the architects’ approach to this matter.

Table of Contents

List of Figures

Introduction

When referring to Culture, we think of a certain location, language or individuals living in a particular region, owing certain habits, practices and beliefs. Throughout history, mankind has developed certain habits, such as languages, religious beliefs the society identified with. Their preservation and continuity, falls into the definition we have of tradition. Over the years, these practices would pass from one generation to the other, learning from previous generations experiences, applying them religiously in their daily lives. These practices developed and changed with time, adapting to new conditions, mentalities and of course people.

A certain language, religion, food, music and even architecture, would be the means of creating that sense of belonging to a particular place. This continuity and repetition of these practices is needed so that people can hold onto them. Holding onto something in terms of long usage, falls into the core concept of Sustainability. Sustain or hold onto something for a longer period of time, in terms of architecture means not wasting resources further, but instead make good use of them when necessary. From this point of view, the building tradition and the need of the people to hold onto it by passing it further, makes it inevitably sustainable, connecting to tradition and culture.

The need for a Cultural Identity always influenced the way society and its individuals live, create, communicate and build. Tradition has been defining the Cultural Identity of these societies long before architecture became what it is today. In Iran they are beautifully intervened together, and translate into tradition-based contemporary architecture. It is the reason I have decided to take a deeper look into this relation the architects have with *Tradition - Sustainability - Affordability*. Vernacular Architecture, has evolved throughout time and is not implemented the traditional way, thus has flourished and innovated to fit the sustainable building levels of the society in the country.

Considering that architecture is a scientific and artistic designing practice, it focuses in designing efficient solutions to existing problems including environmental and cultural ones. Therefore, achieving functional and sustainable architecture represents one of the most challenging issues of them all. As we know mankind has been dealing with construction challenges since the beginning of time. These implemented solutions resulted in responsive architecture, consisting in a smart and functional way of, - *the use of materials, space organization, building overtures and so on, - all serving the purpose of sustainability, affordability and cultural identity* in one. Where the implementation of such elements was influenced from economic and environmental circumstances, it ended up defining the building cultural identity of the region. Such elements were crucial in building artifacts which fulfill cultural and environmental needs of the society, offering multiple solutions which best deal with environmental, cultural and economic issues.

For an instance, to fight harsh arid climate conditions, mankind traditionally relied on passive cooling systems using natural resources, resulting in economic and environmental wellbeing of the building. Traditional architecture carries within, sustainable knowledge which benefits the building in matters of energy efficiency, sustainable planning including material selection and natural resources availability, shading systems, greenery and water efficiency. To achieve environmental quality, traditional architecture is a solid informational ground for creating sustainable and affordable contemporary designs.

Iranian architects applying tradition building knowledge, are going to be analyzed, in order to find out more in detail about the reasons leading towards tradition-based elements present in contemporary designs.

Consequently, one-on-one interviews with Iranian architects as well as n-depth research, will provide valuable information to the question posed in my thesis, thus aiming to find out the main reasons of why Iranian architects are opting for tradition-based contemporary architecture.

What is the main goal of implementing such an architecture? Is it about architectural Identity, Sustainability, or Affordability?

What are the reasons leading architects towards tradition-based type of architecture? Is the relation between Tradition and Sustainability the answer to a better architectural future leading to more affordable Architectural designs - housing in particular? Sustainable Design has become a necessity nowadays when we refer to the climate change situation. It is undeniable that architecture plays a crucial role in dealing with the situation.

It is one thing to track - detect - improve these building tradition-based architectural knowledge, and another very different, being able to make use of them and apply them into physical designs and projects. As we very well know tailored goods are in higher demand and less affordable in comparison to the one fit all type of design. It is the beginning of an era leading toward that type of future, where tradition-based architecture contributes to sustainable spaces where tradition is sensed and experienced in every way possible.

Are we as architects able to draw the line and provide solutions regarding the matter? As culture and climate conditions always defined the way people traditionally built, it conveys possible solutions to contemporary Iranian architects looking for answers in helping the whole situation including Cultural Identity - Sustainable - Affordable Designs today and tomorrow for all.

Tradition, Culture and Identity

Definition of Tradition

If we were to define Tradition by the word's core concept as described in the Oxford Learner's Dictionaries:

"A belief, custom or a way of doing something that has existed for a long time among a particular group of people, a set of these beliefs or customs, religious-cultural-ancient traditions" [1]

Trying to define tradition as a term or as a word, means recognizing one of the most powerful traits tradition has, continuity. The conception of continuity of culture, language or even beliefs, it is transmitted from one generation to the other, being in a written form and orally through people, passing it down on to the next generation. The backbone of tradition in architecture is the existence of these elements found as solid elements which are imbued with tradition.

"…reflect on the ancestral missions that have shaped us, the inherited values that we must reflect and must radiate into the future". [2]

Past practices being brought up as a starting point for new generations to find clues and inspiration too, leading to new creations in society, thus tradition, can be labelled as the perceived past. Talking about Middle Eastern cultures, particularly Iran, we find that tradition and sustainability are a close topic, as sustainability is embodied into the daily practices, as they are lived by, day by day.

Tradition produced architecture, which is considered to be a form of a society's frozen language - it is very present in our daily lives and it has always been that way. These - if we might call them products - are considered to be among the most expensive artifacts to be planned and produced by humankind.

These buildings impact people's lives daily, by always being at the forefront, yet economically speaking, impacts the individuals and the environment too. As per se, in these buildings our lives are being shaped from a very young age - people's houses, schools, working spaces or even playgrounds, are always placed near or outside of a building - be it open or closed areas. Influencing our thoughts and daily experiences through different

[1] Oxford Learner's Dictionaries (2023)

[2] Bronner (2000) p. 87

shapes, colors, materials, light etc. It is one of the many reasons of why, they are constantly changing and adapting to different functions, costs, people, climate conditions, ongoing cultural changes and so on.

Shedding light into this topic, the example of the well-known Austro-Iranian architect Armin Daneshgar currently operating in Vienna, during our talk he mentioned that as per a Middle Eastern Iranian student, calligraphy was of major importance - the young Daneshgar was so impressed from and by it that he found inspiration in this tangible element of the written language and translated it into architecture, serving as a cultural, social and sustainable inspiration for his projects.

Although it is not only culture or tradition that defines styles and the individual's path towards the future, does indeed have an impact. The impact can be taken to new heights serving the purpose of inspiring and even improving the way architects deal with architecture and culture by making sustainable designs without neglecting the Cultural Identity of it.

"*Vernacular architecture or structures are characterized by inexpensive materials and straightforwardly utilitarian design*". [3]

This Identity, which is very present in Iranian traditional buildings, it is sensed while in these spaces, therefore many contemporary Iranian architects are in search of elements and traditional know-hows, in creating new contemporary spaces where tradition is sensed, offering that belonging type of feel.

Vernacular architecture, or else known as common domestic architecture, be it culture, religious beliefs, social and economic norms - cutting extra costs, limitation on material availability or weather conditions, represents a type of architecture that gives people that what they need without extra efforts, limiting it to their needs and possibilities locally available, thus producing that belonging type of architecture. This concept is what is being rediscovered by many contemporary architects especially in Iran.

Tradition in Architecture

Tradition in Architecture is a sort of expressive culture - by being able to display different elements, forming such a visual and present element that exists for a longer period of time and speaks louder than any language ever will.

[3] Kuiper (2024)

It is exactly this aspect that we are trying to get out of this whole research - is it affordable being traditional and sustainable at the same time? Why is it that we connect tradition with sustainability? Breaking down the relation between one another, helps us understand and get the concept behind the whole situation.

Back at the time, when we were taught to use as long as we can, certain items of our daily lives, such as cars, toys, clothes, bags etc., we found the concept widespread in the building culture too to be applied. Using and reusing is a tradition-based practice passed from one generation down to the next one due to the way history has taught humans certain ways things are done. Considering this to be an important aspect of sustainability, tradition does have a share in it as a whole. From this point of view, architecture has been influenced by such practices too.

Buildings can be considered to be among the most cost-effective creation of humankind, as they apply to large scales of consumption in material, energy, labor force and foremost, it has a large visual and cultural value that cannot be erased as easy as one might believe.

"*Connecting these creations with the culture and the surroundings or even the practices of the society's individuals have always been a priority until global architectural tendencies pivoted the situation. Being able to select locally available materials, combining it with traditionally available construction methods - have been defining the what is called Architecture without Architects".* [4]

When talking about buildings, Kathryn Rodgers Merlino states in her book - *Sustainability, Preservation and the Value of Design*:

"They also embody the cultural, social, and historical narratives of our diverse society, helping us remember and understand our past and connecting us to our present communities". [5]

By preserving for as long as it was allowed by usage or even climate strikes of natural catastrophic events such as earthquakes or flooding for example, the building itself would be demolished only when it was necessary and not only for the purpose of building something from scratch again for the sake of design or a new desired function of the current building. As it is expensive to build, it is exactly that expensive to demolish the buildings, since we would be dealing with additional costs, creating unnecessary side effects. This construction waste, which most of the time ends up as a landfill without any further purpose - or maybe - but seldomly - find a repurpose opportunity in the design or construction market.

[4] Rudofsky (1964)

[5] Merlino Rogers (2018) p. 1

As Kathryn Rogers Merlino refers to buildings as large and expensive artifacts by saying -

"*Given that buildings are large, expensive artifacts built with vast amounts of labor, materials, and time, historically it was more practical to repair and maintain buildings over time rather than demolish and rebuild. Even when a building fell out of use or was no longer used for its original purpose, it was common to deconstruct and divide the building into useable parts for new purposes, thereby wasting nothing".* [6]

In terms of architecture and taking it from an architectural point of view, Iranian as well as European architects are applying the concept of traditionally using at full capacity materials - experience together with the cultural and architectural heritage inherited from generations for thousands of years.

Middle Eastern building heritage can be found in South Spain also, with Islamic Architectural Heritage buildings standing until today as a reminder of the golden-era of Islamic Rulership of Al-Andalus, today Spain. Having ruled Spain for about 800 years, in today's region of Andalusia, many of the architectural building methods and construction elements are still present and have been incorporated and implemented into the contemporary architecture, as means leading towards a better and sustainable architecture.

As I personally live and operate in Vienna, I could not help but recognize that similar efforts, are noted here as well, with many examples of implementation of traditional architectural elements in creating new and modern sustainable architecture, aiming to maintain a good connection to the surroundings.

To be able to understand more about the relation Cultural Identity, Sustainability and Affordability share with one another, primarily buildings and designs in Iran will be analyzed followed by Spain and Vienna. Defining how they have been used traditionally, it is crucial in understanding the contemporary way of their implementation, which is leading toward a better and greener architecture, without neglecting the Cultural Identity of the region.

Culture and Heritage

Cultural Heritage and the idea of how it has been created and passed down to the concept of Architectural Identity, is another way of dealing with tradition and the experience it conveys.

The idea to belong and identify with a certain type of heritage is essential for the individuals of a particular society.

As Derek Gillman states in his book *The Idea of Cultural Heritage, Revised Edition*:

[6] Merlino Rogers (2018)

"*…the idea of the heritage of all mankind, and cultural nationalists for whom art, architecture, theatre, music and food are always a part of someone's particular heritage*". [7]

It is exactly this compounded heritage that we are trying to take and interpret, as well as practice in the disguise of tradition. Heritage speaks of the location, people, tradition and ways of living of a certain society without the need of explaining it, it comes as it is, constructed throughout times, people and practices.

The relation these individuals and the way they live translates into - among many other - the field of architecture too. This close relation of identity and heritage shaped different architecture and practices of tradition and sustainability around the world. Iran has a special connection to tradition as the country itself speaks of culture and preservation in the best and longest way possible. Being considered as part of a society's cultural heritage, architecture as a practice and its methods, can be traced in the Iranian society as well as elsewhere around the world. Their practices and way of using and reusing principle, embodies into what we know as tradition - present in many aspects of the daily lives.

Figure 1 City Center, Yazd, Iran

"*The historic city of Yazd was listed as a national monument in 2005, which provides legal protection according to the law for protection of National Heritage (1930) and the Law of Establishing Iranian Cultural Heritage Organization (1979). The property is also subject to laws and standards for the protection of historic cities*" [8]

[7] Gillman (2010) p. 1

[8] UNESCO (n.d.)

The building authenticity of Iran's architecture, in particular that of the city of Yazd, among many others, it is worth mentioning that the city center includes several buildings, proving to have great traditional architecture which is being preserved until today, even though the city center is of 80% private ownership (UNESCO).

Architecture is without doubt one of the most recognizable element of tradition to be frozen in time and being displayed to the individuals, representing practices and culture all in one. In particular the historic center of Yazd in Iran, due to multiple criteria among which belong its astonishing earthen traditional architecture and historic buildings, was declared a region of cultural heritage by UNESCO.

„The use of earth in buildings includes walls, and roofs by the construction of vaults and domes. Houses are built with courtyards below ground level, serving underground areas. Windcatchers, courtyards, and thick earthen walls create a pleasant microclimate". [9]

It is one considered to be among the few cities to have escaped architectural modernization and to still preserve its earthen architectural, yet traditional and cultural character. Anyhow there was a hype of modernization in 1930, where modern housing was desired, yet it was always implemented outside the historic center.

Building in such a hostile region in the desert, it is a proof of the relation of the human and the environment, in creating responsive architecture, which by all means, speaks of a sustainable type of architecture to have always characterized the region, being so, an inspiration for contemporary architecture and architects from Iran and around the world.

Another Iranian city, home to cultural heritage is Isfahan. The outstanding *Grand Mosque of Isfahan* located in the historic center of the city, was listed as a national monument in 2012. The architecture of the mosque includes different building styles, especially the elements being built during the Seljuq dynasty. The traditional architecture of the mosque includes intricate work with brick and colorful tiles known as *fayence* (Sterlin, 1976, p. 95).

"The most brickwork in the Seljuk era is located in Isfahan province, which is undoubtedly one of the most beautiful and most magnificent mosques of this era from the perspective of the brickwork of the Grand Mosque of Isfahan". [10]

[9] UNESCO (n.d.)

[10] Shiran, Montesheri et al. (2019) p. 72

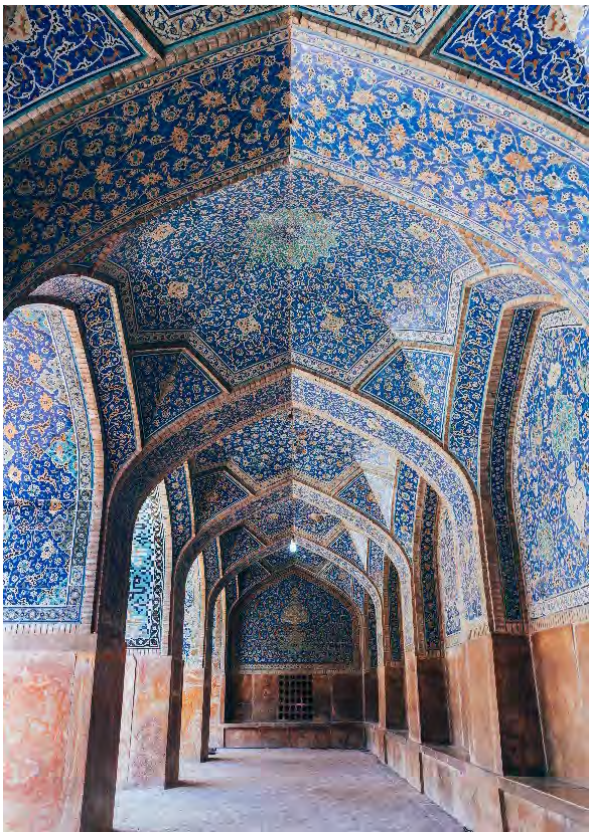


Figure 2 The Grand Mosque of Isfahan

A restored project in the city of Isfahan to hold an UNESCO award, is the *Polsheer House.* Being dedicated in finding an answer to the question of identity, Ghaneei, M. R, purchased the historical house, which back then was known as the *Zovelyan House*, and was a national heritage building.

Being under private ownership, the house was left unattended and in need of restoration. In the 20th century, Ghaneei bought and restored the houses, carrying within 300 years of history, being their headquarters *Polsheer House*.

"The house is a set of buildings arranged around an inner courtyard. The northern wing dates back to the Safavid period in the 17th century, the southern wing to the Zande rain the 18th century and the western wing to the Qajarid period in the 19th century" [11]

[11] Hakim Afyouni (2015) p. 158

Figure 3 Polsheer House Interior

Convinced that by recreating spaces that not only speak of identity but contribute to the sustainable value of such designs, the old building was given a new life. Sensing traditional architecture while in contemporary spaces, is what the restoration of the house aimed to reach, as a result Ghaneei was awarded the UNESCO Award in 2002 (Hakim Ayouni, 2015).

Sustainability in other words is known as circularity or circular process, being able to make use of the concept, which was passed down traditionally from generations to generations. Talking to architects about this particular topic, it confirmed the belief that when the individuals of a society applied the circular process to the field of architecture, that identified as sustainability, being able so, to claim that tradition has a close relation to sustainability.

Different environment refers to different culture and approach to Cultural Identity. The historic city of Vienna, is declared as national monument of UNESCO Cultural Heritage.

Being located on the Danube River, East Europe, developed into a medieval and Baroque city, which speaks of the wealthy character of the city, becoming the capital of Austro-Hungarian Empire, and considered as the Music Capital of Europe (since 16th century), Vienna also proves to have rich traditional architecture, therefore was listed in the UNESCO World heritage in 2001 (UNESCO 2001).

" Vienna is also rich in architectural ensembles, particularly Baroque mansions and gardens as well as the late 19th century Ringstrasse ensemble lined with grand buildings, monuments, and parks" [12]

Figure 4 Gloriette, Schönbrunn Palace, Vienna

Taking into consideration that the area is about 75% in private ownership, and 7% being owned by the Roman Catholic Church, the contribute of Vienna's inhabitants, share the same interest in preserving historical building character, helping the historic center of the city maintain its character.

The center accommodates three important European cultural and architectural development epochs, starting from the Middle Ages, proving to have traces of heritage from the Roman Empire, to continue with Baroque Style - where ornamentation had a substantive importance, influencing the mansions and palaces built or repurposed by noble families or even churches, adding baroque ornaments - to finish with Gründerzeit epoch - in which functionality was at the heart, introducing to symmetric facades, high ceiling and high windows together with balconies, without neglecting the heritage of ornamentation from the Baroque times mostly inside the city center (UNESCO, 2001) (Gründerzeit Museum, n.d.).

" Von der filigranen Verspieltheit bis hin zu wuchtiger Pracht verbindet die Gründerzeit Architektur verschiedene Stile und Techniken, die den Wunsch nach Fortschritt und Individualität widerspiegeln". [13]

The Gründerzeiten, represent the cultural and musical character of the city, times of development, where different traditional architectural styles and techniques are merged, aiming to reach individuality and functionality, matching very well the modern interpretation of tradition, existing nowadays too.

Beside Iranian and Austrian approach, very interestingly Spain represents a combination of Christian and Islamic architecture., showcasing great traditional buildings. For an instant the major influence of the Islamic Architecture merged with the Christian one, is concentrated in the South of the country, particularly in Andalusia.

[12] UNESCO (n.d.)

[13] Gründerzeit Museum (n.d.)

A blend of these two different architectural styles, is to be seen, and felt throughout the region, although the most of it is present until now, being listed as in 1984 UNESCO cultural heritage, Alhambra, Generalife and Albazyn in the city of Granada. With the features of a Hispano-Muslim architecture, altogether, showcase unique traditional architecture rich in ornamentation, gardens, domes, churches and mosques holding amazing heritage to take inspiration from. A blend of Medieval Arabic architecture and its features enriched by later the Spanish emperors with elements of Baroque elements, speak of a golden time of great architecture.

"Much of its significance lies in the medieval town plan with its narrow streets and small squares and in the relatively modest houses in Moorish and Andalusian style that line them. "… enriched with the Christian contributions of the Spanish Renaissance and Baroque period to the Islamic design of the streets". [14]

Figure 5 Alhambra Fortress Granada, Spain

Due to the smart traditional architecture which were built in response to the climate (semi-arid climate), many of the Middle Eastern building elements, techniques and materials, found a large application in the residential building around town. These elements are still being implemented nowadays in contemporary architecture, serving as a tool to fight climate change, and offering a tradition-based sustainable architecture in the region.

Cultural Identity in Architecture

Firstly, a place, its people, languages and even religious practices, need to be attached to one another, so that they can form a society belonging to a certain region, shaping the identity of a certain group of people, country and culture. When referring to the term *Identity*, - as defined in the Oxford Learner's Dictionaries, is *"the fact of being who or what a person or thing is, the characteristics determining who or what a person or thing is".* [15]

[14] UNESCO (n.d.)

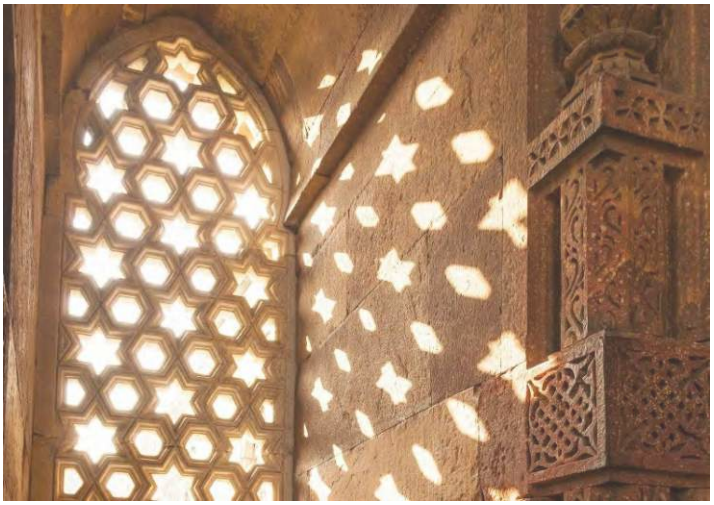
[15] Oxford Learner's Dictionaries (2023)

It is a composition of several elements and factors that define *identity* as a whole - the geographical location and positioning or climate conditions, together with the inhabitants and their culture, like the spoken language, or even religious practices shaping in a way or another what it is known as *tradition*. These multiple elements and the way they are intervened with each other, are of crucial importance, in defining how they impact architecture and display as a visual language.

"The thing that people don't realize is that culture is built by the place, and the place is built by the culture". [16]

Taking it from here, and from an architectural point of view, Iranian architects have a different approach when it comes to Cultural Identity. First of all, it is not about having the Cultural Identity implemented in the building, it is the logic of such contextual architecture found in the region, that it is inevitably present- not only in the traditional building, but as well as in contemporary architecture - making just sense. This architecture and the way it was done, proved withstanding throughout times and being a great proof of sustainability and Cultural Identity working as one element.

Creating new architecture, by taking reference to traditional building methods, reflecting people's cultural-economic-environmental needs, creates an advantage to be taken from contemporary architects. Especially in the region of Iran, architects are taking more and more advantage of tradition and sustainable lessons, it brings with, offering a new opportunity for the region to revive the local Architectural Identity. It is logic, what describes traditional architecture, a responsive type of architecture to the environment, which favors the usage of sustainable building structures and materials which are in harmony with the region.



"Architectural Identity of a particular local culture represents a living landscape with common sense of place, that is produced by the community's accumulated efforts over time, to contain meanings and way of life that form the cultural Identity" [17]

Figure 6 Wooden Lattice Window

[16] Henderson (2019)

[17] Vale (2008)

A good example of implementing smart architecture- rooted in the tradition, is the Austro-Iranian architect Daneshgar, A., who says - Cultural Identity in Architecture when well done, can be implemented not only in buildings built in the region in which these cultural values belong to, but can be brought to other cultures by making them benefit from cultural information and living up to new heights of qualitative designs (Daneshgar & Fresku, 2024, Personal Interview).

Saying so, and to satisfy my curiosity about wanting to know more of such implemented cases, he explained how he implemented an element of Iranian origins into a building in Vienna Austria, such as the courtyard and its compounding elements, offering a sustainable design in 2003 in the 1050 district in a residential building design - Obere Amthausgasse -, times in which sustainability in Austrian or European design did not surface as much as nowadays. This residential building was renovated and new building additions were made where necessary. In 2006 the design was even awarded by the Austrian State with the *Price for Architecture and Sustainable Design*.

The Jury member Mister Otto Kapfinger together with Mister Johannes Fechner commented when referring to the project:

"*Vienna is a multi-cultural city, a Persian architect managed to create a Sustainable attractive courtyard in the middle of the city, offering a type of Oases in the 5. District. This can be related undoubtedly to the topic of Sustainability*" [18]

In this case Tradition and the implementation of its elements in contemporary architecture does indeed contribute to sustainable improvement of such designs regardless of the location, if smartly implemented and without neglecting the surroundings - together with that particular region's Cultural Identity.

Climate, Norms and Religion

Geographical Position and Climate

To better understand the character of traditional architecture and the responsive character it represents, it is fundamental to know the climate conditions of the region this type of architecture is located. Therefore, the climate conditions of the cities in which the analyzed contemporary projects are located will be shortly treated, to provide a better understanding regarding sustainable and affordable type of architecture.

[18] Kapfinger & Fechner (2006)

Talking about countries with rich culture, heritage and thousand years of tradition as the Middle East is, especially Iran being the second largest country in the area, we come across many interesting facts in how tradition or even religious practices, defined the way people lived in their houses, traded and even acted. For an instance, if we refer to its geographical location, we see that the region is characterized by different types of climate conditions, varying between arid, semi-arid to sub-tropical climate conditions (Owuor, 2019).

Climate conditions did define the traditional Iranian residential design, developing many solution-responses to such dry and hot weather. As Yazdanpanah, P. describes in her Study about: *The traditional Iranian Courtyard: An Enduring Example of Design for Sustainability* [19], the region of Isfahan is characterized by following climate condition specifically:

-Hot to very hot summers with peak daytime temperatures reaching 36-37 degrees Celsius in July and August, with night time lows at 19-20 degrees Celsius.
-Cold dry winters with daytime temperatures in January reaching 6-12 degrees Celsius, dropping to 4 degrees Celsius at night or lower.
-Low annual rainfall - precipitation occurs mainly in the months December to March where it averages 15-25mm per month. In the summer months precipitation is rare.
-Dry air and low relative humidity. Daytime relative humidity ranges from 60-74% in the winter months, and the low 40s during the summer. However, due to high summer temperatures, humidity can cause discomfort.
-A relatively large diurnal range - as much as 20 degrees Celsius in the summer months.
-Dusty winds mainly in the summer months.

Taking into account that we are mostly referring to projects built in the areas of Yazd and Isfahan, the Iranian residential building design developed under these climatic conditions. This architecture, which developed throughout thousands of years by adapting and developing different types of solutions, proved to have sustainable building elements. This practical approach to the needs and cultural norms of the society, speaks of a sustainable approach to the way people traditionally operated, including the way they built and the perception of the traditionally developed architecture.

"*Traditionally, houses were built by local people or the home-owners from basic, affordable, locally available materials. Earth was removed to create a courtyard at a lower level than the ground level. A water pool in the courtyard would serve as the water supply for the household. The earth from the courtyard excavation would then be used to make bricks for the construction of the house*" [20]

[19] Yazdanpanah (2010) p. 262

[20] Yazdanpanah (2010) p. 265

Based on the climatic condition characterized mostly by high temperatures, surged many different solutions on how to protect oneself from heat and not only, having no choice but live, in harmony with the surroundings (Almatarneh Tawfiq, 2013, p. 8). The city's streets would be very narrow in order to provide shadowing for heat relief. Openings such as windows and doors would take a larger important part of the building's façade. These elements such as - windows would be developed in shape and size. These elements would be of importance, not only for the building's functionality such as air flow to cool down the living areas, but for the social functions too, like protection of the private sphere.

When we discuss about privacy and protection, we refer to both tangible and non-tangible elements. While shadowing can be somehow a tangible element as one would be able to feel it but not touch it, whereas the architectural elements being used to provide the shadowing are of a tangible nature.

"*Vernacular architecture is the build environment (city, architecture, and interior spaces) created based on the society needs. It is built in accordance with the natural environment (geography, topography, site, climate, local building materials, labor experience, and building techniques) fulfilling people's physical, economic, social, and cultural norms. Vernacular architecture is a sign of Identity*". [21]

Shading is a very important element in the Iranian culture as it does not only represent the protection from the heat itself, but it also provides privacy and personal space protection for the individual's living and operating areas - keeping up with the climatic conditions and the cultural norms of the Iranian society.

In societies though where climate has another character, shading seem to not represent such an important tool as in Iran, in terms of weather protection or even privacy. Anyhow, when mentioning Europe, we encounter a large palette when it comes to weather conditions, which will be mentioned, in order to understand better the following topics, which define the process on how people lived and built in their societies.

As mentioned by Vergas and authors, in their book *Vernacular Responses to Climate across the European Continent* [22] when describing Europe's climatic conditions, being home to three typical climates:

- *The oceanic climate, characterized by abundant rainfall, temperate winters and cool summers - covering large parts of its central territory.*

[21] Salman (2018) p. 4

[22] Vergas et alia (2014)

- *The Mediterranean climate - characterized by mild, wet winters, dry, hot summers and variable autumns and springs, regarding both temperature and rainfall - covering the areas located on the shore of the Mediterranean Sea.*
- *The continental climate, characterized by scant rainfall and extreme temperatures, having great differences between summer and winter.*

Considering that Spain represents a country where Islamic architecture thrived for about 800 years long, it is of substantive value for the research, to undergo a study of the weather conditions, which majorly influenced in applying Middle Eastern architectural building methods and techniques. Its climate is characterized by hot, dry summers and low rainy winters, in other words it has a Mediterranean type of climate. Even though very far from Iran, Spain managed to develop a type of vernacular architecture not very different to the one of Iran, due to the similar (semi-arid climate) weather conditions (Smith Delano & Rodriguez, 2024).

In Austria we have encounter a continental type of climate, as a result of its location, situated in the Eastern part of Europe. It is characterized by long, cold winters and short average warm summers (Climate Austria, n.d.). Being said that, Europe showcases different weather conditions, depending on where in Europe we are referring to.

If in Austria getting as much light as possible inside the building was crucial, escaping from light and heat in Spain was of a substantive value, as it was in Iran too. Climate conditions do reflect into the architecture and the building methods it develops with time, in trying to get the best possible from the environment, offering a pleasant quality of life.

"*The challenging issue is how to apply a particular architectural style, at the same time consider the local identity within its particular milieu, composed of its local natural and cultural realities. The underlying logic of this method is to prevent architectural identity from being only a product but also a living process*". [23]

Cultural Norms

In the topic of Tradition, cultural norms and identity, are elements which cannot be separated from one another. Identifying with a religion, language, food, music or even architecture - it all serves to the concept of Cultural Identity. Traditionally practiced religion and the religiously influenced architectural designs, are what speak of culture and identity. Religion teaches to protect oneself from excessive display of one's image into the society, especially when referring to the female beauty, preserving and protecting it from the rest of

[23] Nooraddin (2012) p. 83

the world, serving as a protecting veil, or hijab. Playing an important role in Iranian society, many of the cultural norms would be defined from a religious point of view. Referring to the Cultural norms of the country, privacy and protection of the most intimate living areas, would define the translation of norms into architecture. In Iran the practiced religion is Islam - the religion has a deep connection to Nature and the individual - as a monotheistic religion, teaching the oneness of God as the universal creator of everything. Floral patterns translated into window concepts; coverage of the buildings serving as a type of hijab-coverage contributing to the purpose of privacy and simultaneously offering relief from the hot temperatures (Daneshgar & Fresku, 2024, Personal Interview).

The translation of protection of privacy in one's life and the private sphere of the inhabitants, in architecture translate into a visual type of protection. As when one is at its most private time at home not wanting to be displayed anywhere for the outside world to see. Being said that, protection of the privacy can be considered a religiously derived type of concept embodied in architecture, translating as small openings in the façades of a building, allowing the necessary light and air to flow without excessive display.

Therefore, a compilation of many issues would lead to have very secretive windows, where one would be able to see the outside world without being observed, basically having a possibility to observe without being observed, having a well preserved and protected private sphere even if we are talking about a visual type of protection. At the same time air flowing and daylight would be a must for the building's effectiveness and quality of design. Anyhow the amount of the daylight for regions with extreme summer climate with hot temperatures reaching up to 49 degrees with humidity as high as 100 percent (Madan Singh & Saxena, 2021, pg. 7).

Norms, Religion and Identity, traditionally worked as one element serving to the society as a tool of fulfilling its needs without neglecting the duties and cultural necessities of its individuals. From a religious point of view, families are meant to be growing and growing and living altogether, which would then be very important for the society thus translating in architecture too.

As Mister Davarpanah, A. would say during our talk about the Iranian culture and architecture:

"For the people of our culture, it is very important to gather and sit with the whole family together and have dinners, talks over a cup of tea- therefore a big living room is a must when planning a residential house, this though depends on the type of family and their needs" [24]

In Europe we face another situation, when referring to the matter - as we encounter different religious practices and cultural norms differing from those in Iran. From this point of view - European architecture with the building tradition and cultural identity, - buildings seem to have been shaped from the society's needs, religious beliefs and climate conditions.

[24] Tadayon, Davarpanah et al. (2024) Online Zoom Personal Interview

Depending on the geographical position and weather, vernacular architecture responded as practical solution provider to the environment together with cultural practices of that particular society.

The majority of the European countries are of Christian belief, therefore the sacral architecture would influence the residential building tradition, as a need of having God's presence into their everyday life - more on this later - next chapter.

Onwards historical buildings across Europe would be built referring to different cultural norms and traditions depending on its location. From sacral architecture, to Baroque, Renaissance or Modernism - Vienna, Austria, has a rich architecture heritage in terms of different epochs in which they were built. For an instance, the façade's color would speak the historical building period of construction (Ivanova & Marinova, 2020, p. 3).

"*Historical buildings were admitted to be ones in which color is more visible due to the smaller façade openings. In these cities, feeling of being in a space with strong identity is experienced*" [25]

On the other side, a fusion between Islamic and Christian architecture, makes Spain house to great cultural heritage architecture. Spain shares many traditional architectural elements with those in Iran, as they have been under Islamic rulers for over 800 years, as a result many of their traditions including architecture were adapted by Spanish people, as they were responsive to the environment - climatically, socially and culturally speaking.

A traditional building element present in contemporary Spanish architecture is the courtyard, where European and Middle Eastern know-hows merge. As in many other parts of Europe, the Roman courtyard would be centering the house, the Moorish influence would bring to Spain the greenery and water pool element additionally, creating an oasis inside the house. This type of Courtyard is widespread and can be found in many residential buildings especially in the region of Córdoba, Andalusia [26] - more on this, later.

Christianity as well as Islam, played a justifying role in judging the smaller openings in residential buildings in Europe and Middle East. Privacy and protection of the individual's life, foremost surging as one of the main reasons to be building in such secluded way.

The outside can be displayed for the public eye to see, but the inside is sacred, - just as the soul to the human is, - sacred and private. According to not only the cultural identity and the society's practices yet to religious beliefs as well, we see that architecture is not only part of it, but it does represent the culture and the individual's life practices on a daily basis.

[25] Ivanova & Marinova (2020) p. 4

[26] ArtenCórdoba (n.d.)

Religion and Architecture

Connecting to the religious realm, most of the traditional building elements have been inspired from culture, tradition including religious beliefs. Being said that, cultural practices and even religious practices, privacy and the preservation of it, would define most of the shading elements in the Iranian culture.

From a religious point of view, the Iranian architecture has been influenced from Islamic religion depicting for an instance the light and its reflections as the embodiment of God's presence in the building itself. On the other, Europe being mostly of Christian belief, would prove to have same approach when it comes to the presence of God in buildings, introducing and developing the ultimate sacral architecture, the Gothic churches represented.

Figure 7 Gothic Church - Pointed Arches Walkway

"*…ultimate expression of the medieval spirit, reflecting a society so fixed on heaven that it developed pointed arches and buttresses to aspire to the realm of God*" [27]

Regulating almost every field in the society, the church in the Middle Ages, would develop to be the center of cultural, economic and social affairs of the society. The introduced arches would allow more daylight to enter the buildings, influencing somehow the traditional residential buildings, the perception of feeling God's presence inside the very private space a human lived.

[27] González (2022)

"*…filled with luminous light symbolizing God's grace, exemplify the essence of Christian architecture*" [28]

The Light and Shade type of concept, represents the dark and the light, as elements representing the good and the bad in monotheistic religions, therefore is present in both religions - Christianity and Islam. High and wide openings pointing to the sky, seeking to reach the divine heavens in hope of sensing God's presence in the structure, aimed creating bright and open spaces. As sustainability was considered a way of life, available materials would define, the materials used in the sacral building to later influence the private dwelling's material choice too.

In Germany and other Baltic countries, natural stones where not locally available, therefore brick would be the selected material in completing sacral buildings as well as private dwellings too. The Gothic-Brick, would later be adapted due to its humble character and association with the church and the divine, into private buildings too (Sarda, 2023).

On the other hand, in Islam, the presence of light throughout the history, has always been involved in the openings of the building. Illumination would have more of a spiritual connection and would be referred to, as spiritual and at the same time as private, as one's soul, is.

Following the logic, the Associate Professor at the Department of Art Research, Faculty of Art, at the Alzahra University in Tehran Iran, Fatemeh Kateb, states in her study regarding openings in Iranian Islamic Architecture:

"*During Islamic epoch, light was the manifestation of God's existence, and for this reason it is respected and deemed as sacred*". [29]

From this point of view, windows and the way developed would mean more than just functionality or meeting the social norms of society, in this case, they would in a way have a divine function too, lighting up the building.

[28] Sarda (2023)

[29] Kateb (2018) p. 215

"Light in Islamic thinking is very sacred and respected because it is the manifestation of God's existence and based on preference of mystical aspects over physical aspects of light use in the building, it is the cornerstone of Islamic aesthetic architecture and it is referred to as the main purpose of movement from darkness to light". [30]

Figure 8 Mashrabiya Window, Alhambra, Spain

From a practical point of view, the light and shadowing, in the residential buildings, would not only be perceived as relief from the outside heat, but would be implemented in providing privacy working together with shadowing as one element when implemented. The intangible element of light would then be translated into tangible elements such as window openings, doors or even voids in the buildings like courtyards among many other elements.

How would the topic of secrecy and privacy be integrated in these openings? On one side the need of light and cool air flow, on the other side the need of protecting the private sphere of the building, is what defined the windows and its shapes, but most importantly their function.

The window can be considered to be a blend of social, cultural, religious and climatic factors all in one working as one whole element. A very well thought and developed yet shaped through tradition and religious practices kind of element, defines the relationship between the interior and exterior of the building and environment, among many other architectural elements, which we are going to discuss about in the following chapters.

[30] Kateb (2018) p. 216

Tradition and the individual's practices developed architecture, the practice of making use of goods and even buildings to large extents, people together with their daily practices, developed vernacular architecture - and the combination of these elements turned into what we know and nowadays mostly need - Sustainability.

Sustainability

Definition of Sustainability

What does it mean when we talk about Sustainability? As per definition of the Oxford Learner Dictionaries Sustainability follows the perception:

"The use of natural products and energy in a way that does not harm the environment - The ability to continue or be continued for a long time" [31]

When we talk about Sustainability nowadays referring to the daily life - we are more aware of our consumption and the way we and our activities affect the environment. We try to recycle the most possible, buy from providers that ensure us of recyclable packaging, but is not as easy as it appears to be.

When referring to arid and semi-arid regions such as Iran, this concept implementation in terms of architecture, when building in harmony with nature and the community - by implementing smartly traditional building clues to modern architecture, Almatarneh [32] states in her Case Study on Vernacular architecture, advantages of applying such principles to contemporary designs aiming towards sustainable architecture:

- *The utilization of natural building materials, relatively low energy content of energy building material, excellent energy-efficiency during the phase of use.*
- *Natural thermal insulation (cold and heat) through appropriate orientation of the building, utilization of thermal masses, integration of shading elements, utilization of the cooling effects of water expanses, compactness of the buildings, bright colors of facades, intelligent inner structure, consideration of heat bridges etc…,*
- *Regional building materials, relatively high share of handwork positively affecting the local labor market, generally user friendly and easy-to-use materials, adaptation to most adverse conditions, and value enhancement of the building.*

[31] Oxford Learner's Dictionaries (2023)

[32] Almatarneh Tawfiq (2013) p. 108

From designs, to material selection - Iranian traditional architecture offers multiple solutions when it comes to Identity, Sustainability and affordability in contemporary designs. Contributing positively to climate change situation, culture and identity to modern structures. The connection to the environment should be achieved in a visual way where its physical display is crucial when dealing with weather conditions, community needs and affordability of such designs.

Taking it from this point of view, tracking, detecting and developing the already known methods of planning and building, present in vernacular architecture, - does not only help to create authentic spaces with a sense of feel and connection to the environment, making maximal use of natural energy resources like *sunlight*, *wind, water*, *fresh air* - but as well increases the *belonging feel* of the humans to a specific space, with that space belonging to a specific environment.

French Eco-Focused Designer, operating in the U.S., Lauren Carr, adds when asked about sustainability consciousness in Europe, that the majority is sensitive when it comes to circularity and the resource of goods and services - including sustainability in all levels - especially when it comes to material selection - as that goes back centuries to European countries with craftmanship and traditional practices (Kaminer, 2022).

She argues about sustainability, to be hidden inside the relationship the human shares with nature and its resources - as the way one deals with resources says a lot about the fact of wasting less and using only what is necessary - thus reflecting in the well-being or even health of the inhabitants living in a certain space - benefiting both parties of the relation equally. The approach many societies developed while in different regions, speaks of the importance the relation human - environment has, sustaining one another.

When referring to the relation between Sustainability and Tradition nowadays, is worth mentioning that in the core concept of this relation actually stands the relation between the Human and the Environment - taking care of this relation stands for creating mindful spaces where the human does not only fulfill its needs and desires, but contributes as well to the preservation and conservation of the surrounding environment. Thus, the cultivation of such relation benefits the human and the environment, socially, culturally, and economically.

"…traditional architectural forms often prioritize human scale and integration with the natural environment. Their use of local materials, vernacular construction techniques, and contextual designs establish a harmonious cohesive relationship between the built environment and its surroundings". [33]

[33] Subhedar (n.d.)

The creation of such long-lasting artifacts, when implemented disdaining this relation, can turn in devastating architecture which, if affordable for us, might not be affordable for our environment. Nursing the well-being of both parties equally, does not help only creating natural spaces with high sustainable character, but helps in making such architecture more *affordable* for both.

Supporting the idea of sustainability, the Austrian architect, Kahr. F., of Querkraft Architects mentioned during our talk regarding the issue:

Sustainability is what we aim to implement in each and every proposed project, through the technological abilities of the Austrian know-how- being able to calculate the energy consumption of a building and defining in beforehand the best adapted shape of a certain building, by reinforcing the character of green buildings, it is what describes us best (Querkraft Architects: Kahr & Fresku, 2024, Personal Interview).

Different approaches to solving the same big problem, are crucial to be combined in order to offer a palette of different countries *know-hows* that can find a larger implementation around the world and not only in the country of origin.

Architecture and Sustainability

Being able to handle the building process with care throughout each part of it, requires being considerate with the design itself, - the usage of materials, their adaptability and implementation without neglecting the community's needs.

As Silvia Mazzetto mentions in her Study about *Sustainable Reuse of heritage in the Middle East constrained Environments:*

"Therefore, the sustainability concept is addressed through its meaning of harmony and unity and harmony in a comprehensive meaning, considering the materials used, respect for the ecosystem, cultural aspects, investments, costs, and the enhancement of the sense of community belonging" [34]

By starting the process of planning, architects must grasp that there is a conformation with the notion of use and re-use of regional cultural and traditional practices regarding different fields. Taking it from an architectural point of view, the reinstatement of the traditionally used materials and the need of their cultural practicality or harmony with the surroundings, is what makes a utile environment adaptable building in.

[34] Mazzetto (2021)

In a way or another, building with the intention of purposing and repurposing these huge products, while sustaining them for as long as possible, makes them sustainable for the mere fact of being built.

"It is often said that the greenest building is the one already built. Increasingly, research has supported this statement - the reuse and sustainable renovation of existing buildings can result in fewer adverse environmental impacts than sustainable, or green, new construction. Typically, older buildings are regarded as less energy-efficient than new, green ones, creating the perception that they are obstacles too, not opportunities for, sustainable development" [35]

Supporting the upper statement, another example in Vienna worth mentioning, when talking about boosting the energy efficiency levels of an existing building, is the ancient dwelling built during the Austro-Hungarian Empire, about 120 years ago, located in the Quellenstraße 10th district. The dwelling has been restored, increasing the building's energy efficiency up to 70%.

Figure 9 Favorite Spring Residence, Vienna

Favorite Spring, restored from Daneshgar Architects, has been awarded the third Place in Vienna, Austria for the *City's Energy boosting buildings renewal 2023.* Furthermore, Favorite Spring was distinguished with the *EAEAWARD 2023/2024*, in Brussels, Belgium, as a winner in the category of *"Renovation&Extension - Residenetial building/Mixed use"* for its sustainable qualities, consisting in blending energy efficiency with innovative architecture (Daneshgar & Fresku, 2024, Personal Interview).

[35] Merlino Rogers (2018) p. 35

Among the sustainability pointers, such as energy and water consumption, amount of waste, greenhouse gases or even the inhabitants' satisfaction with the inhabited space, are indicators worth considering strategically, as it helps improve sustainability levels in the purest form of the relation between two parties - starting from the human to continue with the built environment.

Being able to offer a solution in terms of renovation by taking reference to the traditionally applied solutions regarding building materials or sometimes even building techniques, it serves the purpose of reusing and repurposing a building without the need of demolishing - what can be remastered and repurposed as an answer to climate change and affordability too.

Anyhow it is very important to mention that the world including Europe, followed by Iran and many other countries, took action in the topic of Sustainability by introducing the Paris Agreement in 2015. Now what is The Paris Agreement? For the first time we have an agreement bringing all nations together to combat and adapt to climate changes, which was adopted by 196 Parties at the UN Climate Conference (COP21) in Paris, France, on December 12th in 2015, came into effect later, on November 4th in 2016 (United Nations, 2016).

Its goal is to reduce the temperature increase to 1,5C degrees by the end of this century, thus by crossing the 1,5C degrees, might trigger drastic climate change impacts, introducing to droughts, heatwaves and uncontrolled rainfall. Such changes bring with it the financial issue not many countries can cope with and adapt to. Climate finance is equally important for adaptation, as significant financial resources, are needed to adapt to the contrary effects and reduce the impacts of climate change (United Nations, 2016).

Since the 2016 and ongoing, architects in Europe, Iran (who signed the Paris agreement) and around the world, tend to deal with providing sustainable solutions with their designs as it is not a matter wanting an improved design only, that matters, but a need of solving the growing problem of climate change. Going far back into our past to find solutions to nowadays climate change matter, seem to be a relief to the issue, be it in Europe, Iran or elsewhere (Gabbatiss, 2020).

Opting towards a traditional type of architecture it supports the idea of sustainability - as tradition with a thousand years old experience, taught societies the concept of use and re-use, and applied that same idea in every field possible. It is this concept, that a considerable part of the architects around the world, are trying to bring back - by engaging in, not only smart and functional architectural designs, but as well as paying attention to the costs of energy invested in a building, reducing them at the least amount possible.

Working closely together, does define the level of efficiency a building has, and by doing so, new heights of sustainability in Iranian contemporary architecture are being defined. Iranian architects are now required to work with meteorologists, building physics engineers etc. But is that it? Do architects nowadays have the need to go back to traditional know-hows, improving and applying them into contemporary designs?

As Maha Salman states in her Study about *Sustainability and Vernacular Architecture: Rethinking what Identity is*, by saying:

"*Elements of sustainable design are integral to vernacular architecture that have evolved over time using local materials and technology emerging from ambient natural and cultural environment creating optimum relationships between people and their place*". [36]

Being able to identify with a certain geographical location, a language, a religion or even an architectural style - it serves the purpose of identity and cultural heritage, is here where the topic of sustainability arises - as a need for identity in architecture and contemporary designs.

It is the need for this identity combined with the need of more sustainable designs that leads architects towards implementing more and more traditional architectural elements into contemporary designs.

This identity and its preservation, refers to the Iranian identity in the region - understanding the nature-place relation, thus buildings represent the time-tested cultural responses to that particular environment, addressing and representing the essence of sustainability (Salman, 2018).

With the global design modernization, there was the need in the region to explore more with the modern architectural designs which not always were of convenience in the region. For an instance around the world there was this boom in contemporary architecture in using glass facades, although in regions with 4 seasons type of climate such as Europe, Austria - this type of façade found large usage, being in line with the country's climate, on the other hand, it was not an easy topic for Iran, resulting in negative environmental impact.

Analyzing today's-built environment, appears that little consideration is inclined in the built region and its respective climate conditions among all, resulting in a non-contextual architecture (McLennan, 2006).

David Nicholson-Cole, as a professor of architecture at the University of Nottingham comments: *…glass exteriors trap the sun's rays during summer and haemorrhage heat throughout the winter, requiring year-round air conditioning and climate control*. [37]

[36] Salman (2018) p. 1

[37] Holland (2017)

According to architecture globalization, contemporary modern architecture introduced many different materials usages, which were not suitable for regions like Iran. The big glass facades implemented in buildings located in Iran, were not in accordance with the climate conditions of the region. Anyhow trying to follow up with these "trends" in architecture, many built buildings had to be abandoned as there was impossible to operate inside these buildings, due to inadequate building materials - Glass heats very fast and allows the heat to penetrate the area without allowing it to cool down during daytime, - resulting in major amounts of energy consumption.

"*Most of modern cities lack identity due to imported global styles and techniques that do not cope with ambient environment and do not reflect the uniqueness of each city/country and its people and society".* [38]

Architecture is built from people to people, developing throughout different times, it changed, by adapting to the society's needs, securing a harmonious relation between the environment and human operations.

"Vernacular architecture is a sign of identity, it is the "mirror" of nations that reflects place, time, and culture". [39]

Relying on local materials and skills, because of transportation instruments restrictions - preserving resources, traditional architecture, created uniqueness and identity matching each region's architecture and most importantly identity.

The need of creating "localism" by not only adapting some elements used in the past - as a copy paste type of concept, but instead understanding the essence of such practices and elements, requires deep research of the traditional compounding elements by finding the clue behind the traditional usage and implementation of cultural practices and building materials.

Reuse of Material Waste

Considering the whole cycle and lifespan of buildings, it is worth mentioning that it is not only the designing and the efficiency of the building, what defines the whole life cycle, but it is about the afterlife of these buildings, that contribute to the circular cycle. Interestingly enough, buildings are seldomly thought of being reused when not anymore functional, and

[38] Salman (2018) p. 5

[39] Salman (2018) p. 4

they are mostly demolished and end up as landfills. But is it actually possible to use building waste as sustainable raw material, giving it a new life, rather than ending up as landfills?

Using and re-using Anyhow demolishing buildings instead of reusing them, means more of the unnecessarily construction waste, being seldomly recycled, ends, most of the time, in landfills (Merlino Rogers, 2018, p. 79).

These landfills end up creating unnecessary waste, which when implemented with the use re-use type of logic, can actually add to sustainability and to cultural and economic improvement. When talking about using waste as potential building material, Iran has a good relation when it comes to implementing waste material into contemporary architecture. In Iran, the country is rich in material resources, although new materials introduced to the world are also being implemented in the region - architects try to implement the concept of use and reuse as much as possible.

When discussed about the matter, with Polsheer Architects in 2021, they mentioned - the concept of implementing waste into a new building or in terms of restoration - speaks not only of contextual and cultural identity in the region, but reinforces the sustainable character of that particular building, making tradition and sustainability applicable to contemporary architecture in the simplest of ways.

Figure 10 Aftab Cultural House, Isfahan, Iran

In fact, the *Aftab Cultural House Project*, Shoor Farm, Isfahan, represents a great example when it comes to the implementation of waste construction materials.

Every year, UNESCO Asia-Pacific Award for Conservation of Cultural Heritage, is awarded to restoration projects. Thus, understanding in-depth the place, helps contributes to society, culturally, socially and even economically. The Aftab House, working as a library, is a house full of colors, a project that revived the village, therefore in 2017 it was awarded the UNESCO honorable mention Award (United Nations, 2017).

The Shoor Farm, bought and restored by Polsheer Architects, is located near Sezgi, 35km away from Isfahan. The Aftab House Project transformed the village, and gave the locals a social life, uniting all the people of the village participating in different social activities.

With family roots in the village, Ghaneei wanted to do something charitable for the village out of good will. Therefore, the affordable and sustainable character of the project, stood at the heart of the restoration. As a result, the architects and the locals worked with waste material found near the Shoor Farm, which was brought to the ceramic factory of the village, producing colorful tiles, out of waste materials.

It was very important for the architect, to show what great results can be achieved through recycling, contributing not only to the identity of the space but to sustainability and affordability too. Colorful spaces, not only pay tribute to the colorful tiles used traditionally in Iran, but visually invites the young people of the village, participating in social events rising interest in further education of the young generations.

Figure 11 Mosaic Floor Made Out of Farm-Waste

Figure 12 Mosaic Detail

In the European Region, concretely Austria, although with minor steps, waste materials are being used as first-hand construction materials. In the summer of the year 2023, I was given the possibility to be part of the project *Material Resonance*, where our group was given the task to create sustainable 1:1 building elements with locally found raw materials and their implementation into the design.

Figure 13 Concrete Waste

Figure 14 Waste as Building Material

The European Legislation suggests that: "*The waste framework directive with its objective of reaching 70% of preparation for reuse, recycling and other forms of material recovery of construction and demolishing waste, contributes significantly to the European policy towards increased resource efficiency in the construction sector and to treating waste as a secondary raw material in more general terms*" [40]

For the first time we were faced with actual landfill - as the European Legislation mentioned, - coming from the demolished buildings in the region of Klagenfurt, Austria. We were allowed to enter the restricted area for research and collection purposes, interestingly enough in these huge piles of landfills, we were able to collect between concrete waste or brick waste among many others.

The fact that, we were given the possibility to use actual waste and see the practical implementation into building element, was fascinating. Having the opportunity to visit myself these places where construction waste is being transported, recycled for later to be reused as construction material, gave me a glimpse of hope, in finding out that landfill was not anymore just lying there somewhere wasted, but could finally be re-used, instead of just continuously eating up more of the nature's raw materials, taking the concept of sustainability to new heights in the European region.

[40] European Commission (2014) p. 6

Traditional Architectural Elements in Iran

The Courtyard

Interestingly enough in the Iranian traditional architecture, when building a traditional house, the void is planned as first. That void represents one of the most important features in traditional architecture, representing culture, philosophy and religion. For Iranians, this void in the house refers to the *Courtyard*, and is of a major importance for the regional cultural identity, not only covering the functional part of it, consisting in relieving senses from the heat, but also fulfilling the social and cultural, and even the religious norms of the society. When mentioning shading as a component of the courtyard, privacy and shading go hand in hand - as covering a space means protecting a space, physically and visually.

For an instance, the Iranian houses would appear very modest and closed on the outside, without transmitting much on the outside façade, without compromising this way, the privacy of the encounters and happenings in the house. Once entering the house, the visitor would firstly encounter with the Courtyard - therefore this area would be very decorated and beautified with water fountains, flowers and even statues, displaying the wealthiness of the family. The relationship between the multiple and diverse functions of this element, reflect the history and the traditional use of the courtyard as a response to the environment - climate conditions and cultural norms.

"They functioned as a microclimate to provide an improved climate inside compared to outside environment - It should be noted that the size of the courtyard is essential to achieve an optimum level of both cooling and heating efficiency". [41]

Among the features of the Courtyard, we can mention the secretive nature this element represents - located in the center of the house, inbuild, adorned with water and greenery elements, surrounded by high walls - creates a shading effect for the hot summer days. In capturing the heavy cold night air, the yard would serve as a humidifier, improving air quality during day times. For an increased cross ventilation, the openings in the façade and their size would be crucial in regulating the circulation of air throughout the house. The windows placement in the walls adjacent the courtyard would reinforce cross ventilation and the high size would allow the hot air escape the building much faster.

[41] Almatarneh Tawfiq (2013) p. 106

Figure 15 Traditional Courtyard Inside Borujerdi House Kashan, Iran

The courtyard belonging to the traditional Iranian architecture, is described more in detail from Dr. Poone Yazdanpanah who is a Senior Lecturer at the Lancaster University and holds a PhD in Sustainability, stating that the Courtyard is not only one element but is a combination of many smart vernacular elements, simply functioning as one, fulfilling the cultural norms and respecting the environment. Found almost in every building, the Courtyard would sometimes have a windcatcher, helping direct winds down to the water cistern, creating passive cooling in the building, thus, the air entering the space it is cooled via natural energy resources without consuming additional sources of energy (Yazdanpanah, 2010).

"Iran's hot climate, the harsh, bright sunlight and certain national and religious beliefs had encouraged architects in the past to opt for lighting from the inside and to design latticed surfaces for the outer openings in order to protect the interior". [42]

In the residential vernacular Iranian architecture, the building concept evolves around the center, in this case the courtyard centers the house, and everything else is built basically around it. A void space, in the ground floor, surrounded by high thick walls made out of mud bricks - offers shading, privacy and thermal efficiency by regulating temperatures in summer and winter. Considered to be the heart of the house, the courtyard has evolved into an

[42] Afyouni Hakim (2015) p. 134

architectural - if we can call it - element, that adapts in the best way possible to the climate conditions of the surrounding environment.

Recognizing that Iran has an arid type of climate, the courtyard serves as a perfect element which provides privacy to the house, - the addition of trees and water elements like water pools inside it, and the high walls built around it, help lower the high summer temperatures, preventing dust from entering the living areas in the house. The courtyard imitates an oasis inside the house - fitting all the norms and even religious practices in the region, a valuable element in people's lives, living under arid and semi-arid climate conditions.

"A house in Islam is represented as a shelter where family members can find their privacy and comfort within the realm of Islamic values, i.e., privacy, modesty and hospitality". [43]

Acknowledging the social impact, the *Courtyard* - has in one's life, is worth mentioning that it would bring the inhabitants together, by performing different daily activities, such as decorating the courtyard in times of celebrations, during weddings, religious, and traditional feasts such as the Nowruz - Persian new Year, usually beginning on March 21 and it is a secular celebration which dates back to Zoroastrianism and Parsiism, in which Nowruz is a religious celebration (Preston, 2024). In fact, it would even provide with important insights on the way individuals live and operate, sharing knowledge and experiences with one another.

"Such activities are consistent with contemporary understanding of sustainable lifestyles that entail communal activities and sharing of resources". [44]

Stating to be affordable, tradition-based architecture, is all about sustaining and preserving the information conveyed throughout years and epochs. Solving climate issues, social and economic matters, contributing to sustainability from every point of view. Anyhow the social and economic values, philosophical and spiritual meanings are of a substantive meaning, as the environmental impact itself is. This space centering the house, referring to it as an empty space inside the house, developed to have huge impact on people's lives, on every level. As the Austro-Iranian Architect, Daneshgar, A. says when referring to design and architectural elements - *the nothingness is as important as the physical elements to a design* (Daneshgar & Fresku, 2024, Personal Interview).

[43] Trombadore & Visone (2019) p. 185

[44] Manzini (2003) p. 264

As per it, is meant the void in a space - from this point of view the courtyard represents a void in the residential building, and nothingness in this case, is to be understood as an empty space in contrast to the filled spaces around it, which evolve around it.

"The traditional Iranian courtyard is an example of the void in architecture. The "negative space" of the courtyard, surrounded by rooms as "positive", built forms, has roots in the "metaphysical principle of unity" of Islam. The Void has spiritual significance and the courtyard as a void, is a symbol of the presence of the divine in all things" [45]

Religion most certainly has influenced, and even shaped these architectural elements, giving them divine features as believed and taught in Islam, with promised gardens in the hereafter life, as the ultimate destination and reward for good doers of this world. In Islam, it is believed that the soul centers the body as being superior to the body and sacred in pertaining solely to God.

"The soul of most of us is not integrated into its center and is usually scattered in many directions, pulled by the passions which manifest themselves outwardly as actions that bring about division and discord" [46]

Following this logic trajectory, the same concept and sacrality has been implemented in the residential architecture by centering the courtyard in the house. Vernacular Iranian architecture has a deep connection to the Islamic religion, implementing the core concept of the religion and practices to the residential architecture. This relation is reflected in the importance the Courtyard has, exemplifying the divine in the house (Yazdapanah, 2010).

In understanding the logic of traditional architecture, the implementation can differ in shape and type yet serving the same purpose, Identity and sustainability. The Iranian H.T Architects have designed *The Kharand House*, where they transformed the yard, applying it to the whole house. The house is explained more in detail in the chapter: *Contemporary Tradition-based Projects.*

[45] Nasr (1997) p. 185-186

[46] Nasr (1997) p. 657

Figure 16 Kharand House

The concept of the divine sense within the element, has been adapted and implemented in other parts of the world too. For an instance Spain, being characterized by Mediterranean weather, with a semi-arid type of climate, the region has been under Moorish rulers for about 800 years (from 711 to 1492). As a result, many architectural elements are present in the region and found large implementation until today (Mingren, 2020).

When Moorish rulers arrived in Spain, they applied Middle Eastern traditional architecture, with buildings being present until today, such as the Alhambra fortress, located in Granada, South Spain. Due to the sustainable and affordable nature of traditional architecture, is still implemented in contemporary Spanish architecture.

The most famous courtyards - patios in Spain are those of Córdoba, Andalusia - in the region, the courtyard is part of the Spanish residential building's Identity, organizing annually even e festival in their honor - *The Córdoba Patio Festival* (S., 2024). These patios have been inscribed as UNESCO intangible Cultural Heritage of Humanity in 2012.

"The courtyard in Córdoba comes from the courtyards of the Roman houses, that is, the typical Mediterranean house, with a simple outside, without steps (or at least, not many), which could be accessed through a courtyard, with marble flooring and central fountain. The Arabs kept this type of building, although they added the riat (flower beds) with flowers and water, coming from the well or fountain". [47]

[47] ArtenCórdoba (n.d.)

Figure 17 Courtyard - Córdoba Patio, Andalusia, Spain

Attributable to these implementations of Middle Eastern architectural influences in the region of Andalusia, - el patio - the courtyard, characterizes residential buildings as an important tool in dealing with hot weather. The courtyard in its original shape has travelled culturally to Europe and found implementation in relieving from heat, creating a pleasant temperature in the house, as well as keeping privacy intact when in an open area - *allowing not only light and ventilation*, but serving as well as *a space of communication* and *life* within the house itself.

The courtyard is widely used as a beautifying and comforting element, adding quality of life in the house and offering relief from the heat during summer time and all year round. Keeping in mind that sustainable communal coexistence spaces differ depending on culture, tradition, and region, in Austria particularly in Vienna, the concept of the courtyard seems to have developed in another direction, yet still displaying the same sustainable space knowledge when implemented.

In residential building as for protecting the house entrances from the public eye, yet opened within the building itself, serving nevertheless, as a meeting point for the neighbors to interact with one another, *the Pawlatsche* is referred to an arcade type of inner yard used in traditional residential buildings in Vienna.

Open arches at equal dimensions (height and length), surrounding the inner courtyard of the implemented building, block direct light and solar radiation and help in increasing wind velocity - working as an important tool toward green building concept (Waziri, 2004, p. 43).

The word itself is adapted from the Czech language, meaning - open day or house - the Austrians refer to it as - the promenade inner yards of the city. This traditionally used building element, is characterized by wrapped-around wooden galleries, which are located in the atrium outside the building, making each apartment accessible through this gallery. Located on the outside, yet creating a buffer zone between the apartment interior and the void outside the building, this element characterized the residential architecture between the 17th and 18th century. Beside acting as a space of interaction, *the Pawlatsche* was used for drying laundry, or collecting water from the central well in the house (Vienna Unwrapped, n.d.).

Figure 18 Pawlatsche, Hotel Brillanten Grund, Vienna, Austria

The wooden galleries were often beautified with greenery elements to increase temperature regulation in the house. Due to safety reasons *the Pawlatsche* is no longer built, with wood being easily flammable in combination with the connected structure of the galleries in the whole building, spreading much faster. Their construction was banned after the fire in 1881 (Kospach, n.d.).

The Pawlatsche, nowadays, facing the climate change issue with temperatures rising every day more, is used in contemporary architecture because of the sustainable character it has, yet in another dimension which differs with the original. This inner Courtyard distributed through the whole building vertically, helps immensely in saving enormous energy consumption, working as an ecological element contributing to green building architecture, paying tribute to traditional architecture at the same time.

A great example showcasing and implementing this concept into contemporary architecture has been achieved from Querkraft Architects. Through smart and developed contemporary interpretation of the *Courtyard*, its implementation differs depending on the function of the building - as nowadays shared space has increased and are commonly used semi-public spaces, nevertheless without neglecting the privacy factor in the residential buildings, which in Austria is of substantive importance.

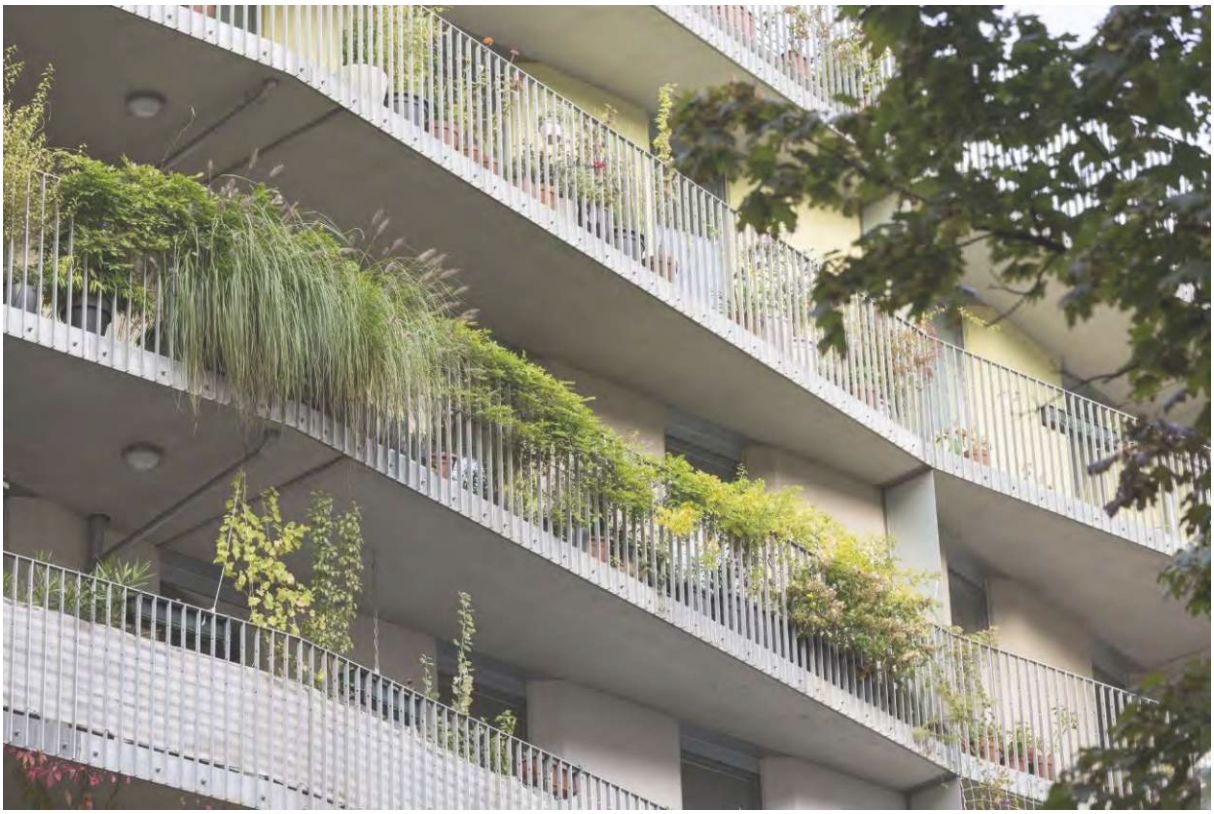


Figure 19 U31 Wohngebäude, Vienna, Austria

The U31 Residential building designed from the Austrian firm Querkraft Architects, located in Vienna, Austria, has implemented *the Pawlatsche* concept in a moderate and innovative way, translating in private and semi-private wrap - around courtyard areas.

Based in tradition and implemented in contemporary architecture, this element proves to be of a great importance in sustainable architecture, contributing so, to lower the negative impact on the environment, reducing the amount of energy consumption in the building. The vertically distribution of the garden elements beautifies the building, and at the same time serves the purpose of sustainability, adding Identity to the building itself.

The Window *Mashrabiya*

Traditional architecture dealt with cultural, religious and economic issues. Also, when referring to openings in a building, as these are crucial when it comes to shading and air ventilation yet without neglecting privacy which in the Iranian culture and religion is of substantive value. An element involving all these aspects in one, in the Middle Eastern world is known as *Mashrabiya* - literally deriving from the word *drink*, defining so a place where one would drink due to the cool room temperature, resembling a closed balcony or a form of a bay opening that extrudes out of the building's façade, located in the upper floors of the building, obviously not reaching the ground (Madan Singh & Saxena, 2021).

"Historically speaking the Mashrabiya, was a wooden grid wall opening where pots filled with drinking water were put to cool down". [48]

With time, the name strictly referred to the wooden grid, serving as tool for air ventilation in the house without neglecting the factor of privacy. The traditional knowledge required to manufacture these grids, was that of craftsmen with special knowledge and ability on developing these structures.

" Craftsmen have developed special skills to assemble the screens without using nails - a minimalistic and delicate approach, which modern high - tech Mashrabiyas often leave behind". [49]

The traditionally handcrafted structures consisted of carved wooden, perforated with an intricate network of small tight openings, the patterns of which would differ and vary in size, being smaller at the bottom and getting bigger on higher levels in the room - allowing a well thought air flow in the room, contributing to room quality. The patterns of which would differ from region to region, sometimes being decorated with stained glass giving that cultural identity a physical shape. Despite the enormous amount of heat caused by direct sunlight leading to high temperatures, - the window concept would solve the issue in times where air conditioning was not an option. The *Mashrabiya* window, prevented heat gain, offering shading and fresh air ventilation, especially during the hot summer times, hence being able to provide warmth during winter times. The lattice's overture sizes and its wood's porosity, influenced the efficiency of such an element.

[48] Fathy (1986) p. 46-49

[49] Schielke (2014)

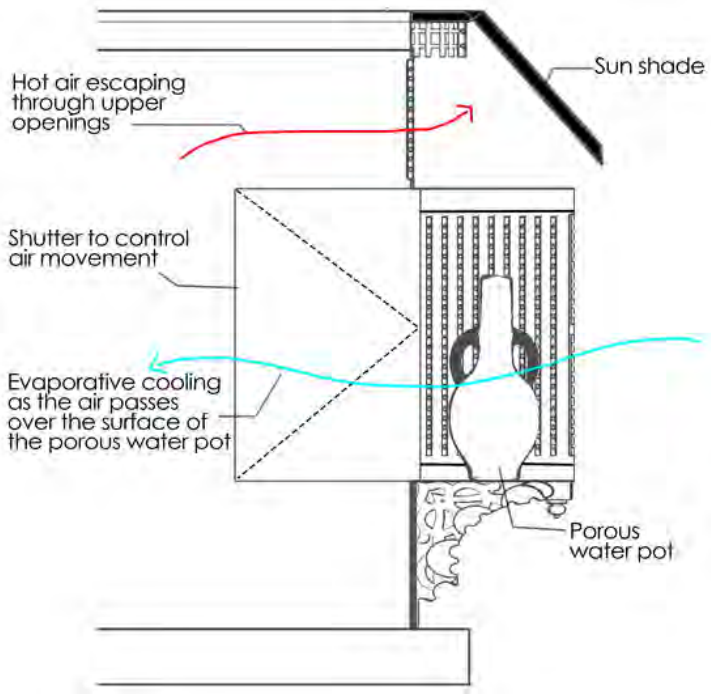


Figure 20 Mashrabiya Functioning Principle

To better understand the functioning principle of the window and the benefits of implementation in contemporary architecture, explaining the traditional concept is important. The air passes through the wooden structures, where some of the humidity is absorbed by the wood, holding onto the cool air of nighttime, which during the day will then be heated from sunlight, humidifying room air and cooling it, if necessary.

Among the functions of the Mashrabiya, encompass - captivation of cool air functioning as Wind Tower - giving so the possibility of a sustainable type of air conditioning for the house, yet controlling the amount of daylight-access to the interiors, moderating the light and preventing the access of excessive heat inside the building.

The efficiency of such an element lies not only in its aesthetics, but is functions and social and cultural values it represents. Theses ornamented perforated surfaces, add not only to the visual beauty of the building, but acts as a coverage - augmenting the dissipation factor, creating shade and privacy simultaneously. As meeting the privacy norms was a must, they would mostly be on the streetside of the building, although sometimes they would be found even in the courtyard side of the house.

"From the Mashrabiya window, occupants can obtain a good view of the street without being seen". [50]

[50] Times of Malta (2015)

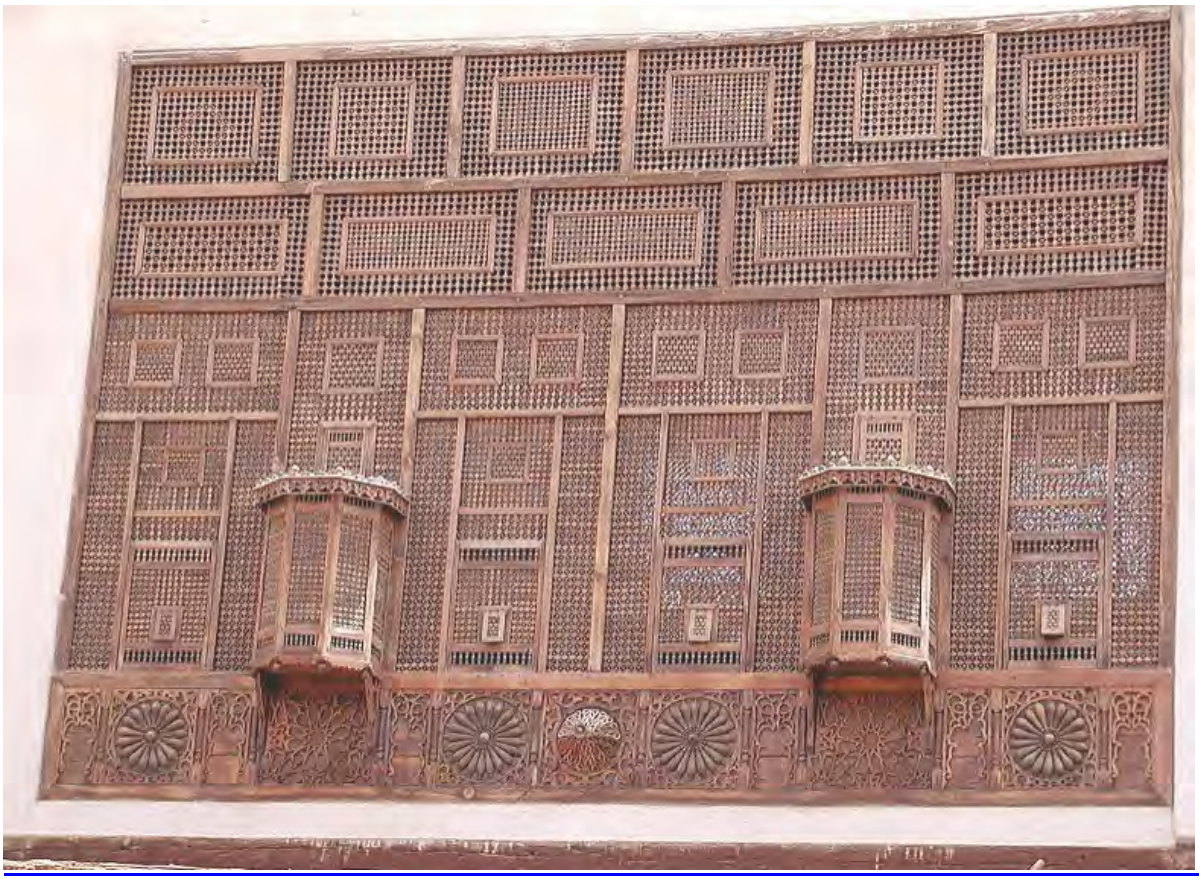


Figure 21 Mashrabiya Exterior Façade, Cairo, Egypt

Due to the environmental and social value of this perforated window - offering visual privacy and passive conditioning for the house, would spread very fast into the Islamic world representing great importance for the society. In the Middle East, gender separation - was a tradition influenced by religious practices, thus women could observe the outside streets and people, while in a protected or a veiled kind of space, preserving their privacy.

"In addition to replacing traditional spatial divisions and gender-based sections of the house with functional rooms, architects also developed a viable, functional, and regional idiom" [51]

Throughout time, in the Middle Eastern culture became more secular, therefore gender partition was not as important as in the past, resulting in lesser use of the window. Anyhow, beside the fact of developing more functional spaces, religious influences would be left aside, with spaces being more influenced by contemporary social practices. Sometimes

[51] Masoud Bani (2020) p. 2

though, architects would implement more modern and less contextual architectural elements dominating contemporary designs.

However sometimes these modern styles would not pay enough attention to contextual architecture and environment, resulting in devastating environment impact. Building in context, as it was in the past, helps keeping the environmental impact low without disrespecting the culture and identity of that particular region.

„Earlier transformations of built environment have always consisted of additions to existing built-up areas" [52]

Developed in need of fulfilling the societies cultural norms, by simultaneously responding to the environmental and climatic conditions, the *Mashrabiya* manages light access, regulates humidity, temperature and airflow inside the building, providing with beautiful and functional cultural ornaments, hence without neglecting visual privacy (Madan Singh & Saxena, 2021).

This tradition-based element - although not used in its original form, inspired many contemporary designs largely, which developed as energy efficient facades, reducing high consumptions of energy, proving to be a sustainable tool in designs.

By needing to recur to efficient buildings and smart energy solutions, traditional architecture came in handy especially when the application of such architecture was fully uncovered and understood, especially in Iran. Energy consumption and its importance in today's architecture, brought more attention to the vernacular architecture in helping find answers and offering long-lasting solutions, the modern architecture needs.

"Presently, the concept of the Mashrabiya is being incorporated in building design as one of the most prominent features of the tall buildings of the Gulf region giving them an extra-ordinary outlook while preventing constant penetration of solar radiations". [53]

Following the logic, and working with focus on cultural identity are Iranian *Polsheer Architects*. The Mashrabiya as a tradition-based element was beautifully implemented as a façade in the *Ghaneei House*, Isfahan, showcasing a combination of traditionally used materials and techniques.

[52] Nooraddin (2012) p. 86

[53] Madan Singh & Saxena (2021) p. 1

Figure 22 Ghaneei House, Isfahan, Iran

The perforated façade has been achieved by using locally available building materials, which are crucial in creating sustainable and affordable architecture while still in context. The implementation of the *Mashrabiya* principle, contributes in regulating heat access to the interiors, which are decorated with brick too, completing the sustainable character of the whole building. *Ghaneei House* is treated more in detail, in chapter: Contemporary Tradition-based Projects.

The Wind-Tower *Badgir*

The geographical position of a region, its climate conditions together with the society's cultural norms and practices, define most of the problematics and possible solutions to it. When talking about the Middle Eastern regions, sunlight and the heat combined with air dryness it comes with, creates the need for air-cooling system. In Iran an additional solution regarding this issue can be considered the *Badgir* a wind tower which facilitates wind ventilation in the building, creating cross ventilation, serving the purpose of passive cooling in buildings (Bouchahm, Bourbia, et al., 2010).

Bagdir refers to the Farsi word, literally of catching the wind, mostly found in the central part of Iran.

"Yazd, a city in central Iran known as the "City of Windcatchers", was inscribed as a UNESCO world heritage site in 2017". [54]

Figure 23 Traditional Wind - Tower, Yazd, Iran

Windcatchers vary in shape and height, depending on the location, weather conditions and wind directions. The wind's character influences the openings of the windcatchers, which functions relying on air circulation too. For an instance the unidirectional, bidirectional, or multidirectional type of winds, differ in altitude, humidity and dustiness. The traditional windcatcher usually is parted into four sections, making the windcatcher adaptable to recurrent wind changes. Anyhow depending on the function and the level of efficiency, many types of traditional windcatchers developed (Saadatian et al., 2012).

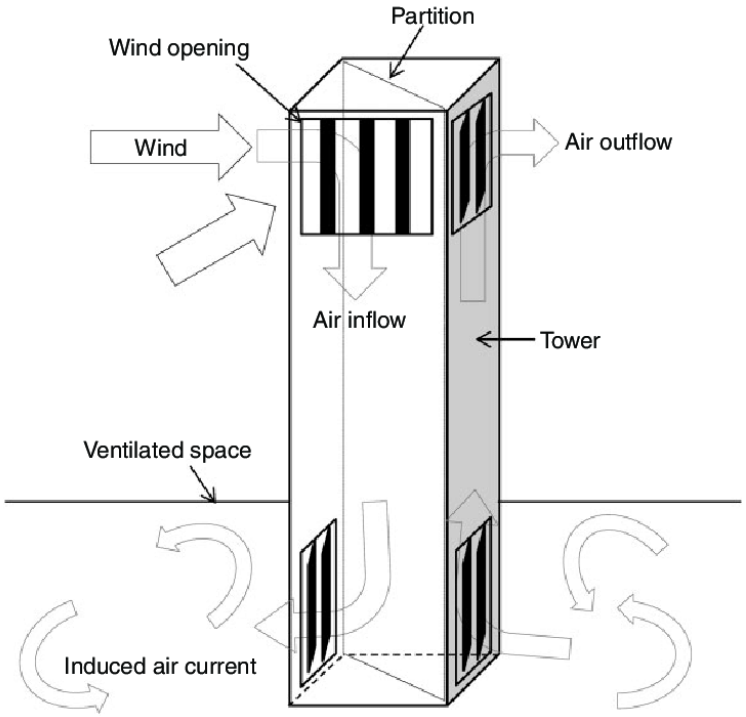
The efficiency and the functioning principle of the *Bagdir* depends on climatologic conditions, such as: the time of the day or night they are being used, the wind availability and the type of the Wind-Tower itself. Anyhow the level of efficiency can vary, depending on the changes of wind speed, direction and temperature levels, or even the number of openings in the building such as windows (Kolokotroni, Ayimomitis et al., 2002). It is a simple and low-priced construction, providing an effective solution for hot climate countries. When directional cool winds enter the tower, they push out the hot air at the top of the tower, cooling the spaces of the building located in. The simple structure of the tower, effectively

[54] Iran Front Page (2019)

sucks in the fresh air, by allowing cooler directed winds to enter and ventilate throughout the house, rinsing off the hot air trapped in the building.

"In the arid or semi-arid areas of the Middle East, such traditional elements are needed, to combat the severe temperatures and heat. It has been utilized for the past three thousand years as a passive cooling tool, helping so the building in relieving heat load". [55]

Contributing to being the main generators of carbon dioxide emissions, cooling systems - increase the negative impact they have on the environment, therefore the attempts of developing a ventilation and cooling-air system tradition-based like the *Badgir,* positively in lowers the substantive negative impact it has on its surroundings. Without additional energy consumption, the traditionally developed *Badgir*, promotes potential architectural elements providing with sustainable low-energy consumption structures largely used in concept, useful not only for residential architecture, but also in any type of buildings on a large scale. The peak of this element's efficiency would be during the hot summer times, cooling and ventilating the spaces of the house, remaining non-functional during winter times.



"Such a reason has caught the attention of building developers, in reducing energy consumptions of the buildings, entering the tradition-based low-energy architecture". [56]

Figure 24 Windcatcher Principle

[55] Bouchahm, Bourbia et al. (2010) p. 898-906

[56] Karava, Stathopoulos et al. (2007) p. 20-30

Traditionally used architectural elements as solutions to the climate condition of the region, conceptually work as potential inspiration in solving the climate change situation, and the challenges it brings with in terms of affordability and sustainability. Therefore, in Iran the architects are reviving the element, which serves as a tool in combating high energy consumption needed for cooling mechanisms. The technique was used in vernacular architecture in Iran and around the Middle East, as it provided relief from the heat, by combining natural resources such as water and wind. The water vapor efficiently cools the air, without the need of conventional cooling systems which count as generators of major amounts of gas emissions.

"Direct evaporative cooling is very conducive for multi climate countries such as Iran. Based on their computation simulation and long-term meteorological measurements, this technique provides comfort conditions for more than half of the Iranian people". [57]

The Iranian based, Sizan Architects, in the *The Pomegranate House of Grandfather*, they made use of such concept by interpreting the concept of the *Badgir* into thick walls being situated in different heights of the house, creating a passive cooling situation, supporting low-energy building architecture. Its implementation outdoors, is an innovation that the firm implemented by taking inspiration from tradition. Another example of Windcatcher principle implementation is the *Austrian Pavilion 2020,* designed by Austrian Querkraft Architects. These projects are treated more in detail, in chapter: *Contemporary Tradition-based Projects*. Usually located indoors in closed or semi-closed areas - the development and implementation of the element outdoors, is an innovation that the firm implemented by taking inspiration from tradition. The innovation of the underground water *Qanat*, accord additional function to the *Badgir* in helping evaporative cooling system. When fresh air enters the building, it rinses off the hot air pushing it out of the building, after the fresh air encounters a wet surface located in the building, the evaporative process starts (Ghiaus & Allard, 2005). However, the air ventilation combined with the water evaporation principle, decreases the temperatures indoors, however the effect of shading goes beyond the function of the evaporative systems (Soutullo, Olmedo et al., 2011, p. 2520-2528).

Bearing in mind that these architectural methods have been used traditionally on a large scale for controlling heat and fresh air - defining the quality of life in buildings, remains a fact that the combination of all elements in one system, provides with heat relief, offering quality in terms of sensory and visual experience. From this point of view, among other elements observed to work as climate regulators, are known as, arches or arcades. Arcades, being commonly implemented in religious buildings and institutions, prove to have sustainable character and have been used ever since.

[57] Heidarinejad, Delfani et al. (2008) p. 1946-1953

Traditional Materials – Brick

آنچه در آیینه جوان بیند، پیر در خشت خام بیند

“What the man sees in a mirror, the aged man sees in a mud brick” popular saying”. [58]

“Brick is brick…” [59]

Figure 25 Brick Wall with Cuneiform Writing on Brick, Shush, Iran

As talking about regionally available and traditional building material, soil derived materials have been traditionally used in vernacular architecture. With soil, being in abundance locally available in Iran, its usage for construction generated many material variations, easily adaptable in the field of architecture. With Brick being one of them, - is considered to be among most used materials in the Middle East.

Brick, commonly used due to its thermal qualities, absorbs heat during daytime, preventing it to reach the interiors of the building. During the night the thick mud walls release the heat absorbed during the daytime - as the nights tend to cool down pretty fast in the arid regions (Madan & Saxena, 2021, p. 3).

To increase air flow in the building, yet preventing the severe amount of sunlight, small openings in the facades would solve the issue, lacking though proper lighting on the interior. With the introduction of perforated lattice wooden window structures, allowing air to flow into the building, the *Mashrabiya window* principle - functioned as air ventilator for the interior without neglecting the decorative and cultural aspect of it. To help the air ventilation

[58] Ferrari (2021)

[59] Tadayon, Davarpanah et al. (2024) Online Zoom Personal Interview

inside the house, *high ceilings* would perform as room temperature regulators, by removing the hot air outside from the top (Madan & Saxena, 2021, p. 3).

As a result of the locally available materials and its implementation in the surrounding buildings, brick traditionally was a widespread material and its usage became fundamental, considered to be a sustainable material with high thermal storage capacity - low cost of production - easy to build with and locally available raw material.

Bricks, are known to be blocks made out of tempered mud- consisting of water and soil particles - which would differ in their drying process - being either sun-dried (*k̲ešt*)) or baked in a kiln (*ājor*) (Azarpay, 2012, p. 447-449).

"It has customarily been made from a mixture of water-soaked earth (gel-čāl), straw, and chaff (kāh) and formed in wooden molds, which in the 20th century are standardized at about 20 x 20 x 4.5 cm". [60]

Materially, Economically, Socially and Culturally - Brick connected these fields perfectly and was in harmony with all of the societies' criteria without neglecting Sustainability. From a sustainable point of view - Brick is an extremely sustainable building material - easily recyclable - indoor temperature and humidity regulator - providing high thermal insulation together with the ability of thermal storage, contributing in lowering the negative impact buildings have on the environment.

"The reconstructed and newly constructed buildings bear witness to the millennial knowledge and skills of erecting vaults and domes simply from the plateau's arid soil". [61]

The usage of appropriate materials, especially for achieving energy efficiency of the building is crucial. Wall, roofs and floors need to be designed with materials which prove to have high thermal capacity, regulating so the indoor temperature as needed - during winter preserving warmth, and passive cooling during summer time. Natural and locally available materials, contribute in having a lower impact on the environment because they do not need further material processing.

[60] Azarpay (2012) p. 447-449

[61] Ferrari (2021)

"When natural materials are incorporated into building products, the products become more sustainable. Furthermore, using locally produced building materials shortens transport distances, thus reducing air pollution produced by vehicles". [62]

Adding to the advantage of locally available materials, promote them to being better suited to the regions climate, making them totally affordable and supportive to the economy of the region. In the region of Iran, Brick found a large usage because of the material's availability in the region and not only.

The qualities Brick as a building material has, did match and fit into the society's needs in the area. Vernacular architecture in the region, is a living fact of the longevity of the material and its durability throughout centuries, being part of Iran's Cultural and Architectural Identity.

This concept is being implemented even in contemporary designs, highlighting the importance of combining traditional elements with traditionally used building materials. The combination of *Brick* and *Mashrabiya*, has been developed as a sustainable façade, - offering shade, ventilation, privacy, showcasing the architectural and cultural heritage of the region.

Planned by Iran based, Fundamental Approach Architects, in the *Saadat Abad Residential Building*, they opted for a sustainable façade, used the simplest building material, to create a rug façade. Creating a façade, which aims to connect the interior and exterior without compromising privacy - the architects opted for perforated brick structure for the façade, helping preserve the privacy of the building itself.

A great example for sustainable tradition-based contemporary architecture, is implementing brick, for creating perforated facades, that imitate in a way the concept of the *Mashrabiya*, allowing light enter the building, retaining the excessive amount of heat, acting as a temperature regulator.

[62] Almatarneh Tawfiq (2013) p. 107

Figure 26 Brick Façade

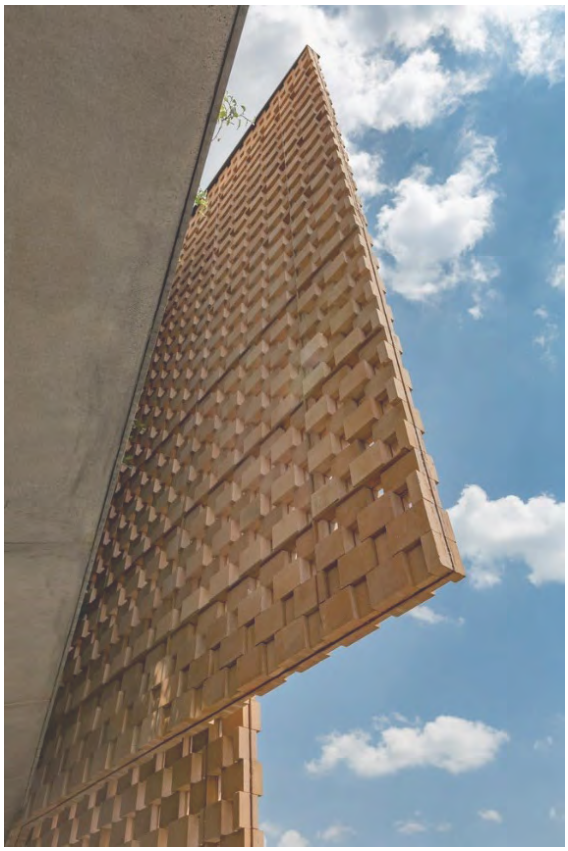


Figure 27 Brick Façade Detail

"…changing the border from a solid definite wall to a soft and fluid space is a crucial issue in this project". [63]

As building with soil as a naturally available material proved to be easy to work with by offering multiple benefits, another traditional construction technique developed, - the Rammed Earth technique, used in the Middle East for many generations continuously. Due to the advantages Rammed Earth has, it proves to have sustainable properties compared to modern construction methods, as it uses local materials, needing less energy and producing little waste, impacting negatively the environment as less as possible.

[63] González (2020)

Figure 28 Rammed Earth Walls with Colorful Soil, Ghana

Anyhow when implementing the technique, a thorough research of the region's climate is needed for high durability, as building with rammed earth, works best in arid and semi-arid areas with low humidity levels and moderate temperatures, whereas in regions with frequent rainfall a protection against it is needed, and in colder areas an additional insulation is necessary to combat cold (Cao, 2023).

Being used for many generations ongoing, up to this day, in Iran building with Rammed Earth (RE), is not only a reference to the country's architectural Identity, but fulfills the contemporary needs on sustainable building materials. Being environmental-friendly, durable and naturally available as an aesthetic material, Rammed Earth is largely used in the Iranian contemporary architecture - working as a tool in creating sustainable buildings with roots in the good old past. Some outstanding Rammed earth projects are planned by Alireza Taghaboni by *The Sadra Civic Center*, and *The Majara Residence* planned Mohamadreza Ghodousi - more on this in chapter: Contemporary Tradition-based Projects.

Figure 29 The Majara Residence, Hormuz

Figure 30 Sadra Civic Center, Shiraz

Made solely out of soil (mixed with stone particles, to make it durable - depending on the climate and region of implementation), cement can be added to the mixture as a stabilizer, Stabilized Rammed Earth (SRE) - though this would then manipulate the sustainable character of the material (Cao, 2023).

Anyhow with the climate changes the world is facing and the sustainable properties Brick or Rammed earth have, they have been rediscovered, widely used and implemented into contemporary designs.

Especially Brick due to the easy implementable, durable and sustainable character, does not need further research of the region's climate for implementation purposes compared to rammed earth.

In Austria the company Wienerberger - which is considered to be one of the largest brick producers in Europe, has a close relation to the usage of Brick, as a tradition-based building material, stating:

"We compared complete wall systems with similar properties over 100 years, as it is always important to consider the entire lifecycle - from production to recycling and reuse" [64]

Nowadays reducing energy costs impacts contemporary architectural designs, and the incorporation of traditional but improved materials such as brick, is having a revival in the modern architecture, owing to their ability of storing a certain temperature within a particular space solely depending on natural resources of energy, without impacting the environment to substantive levels.

Insulation of the brick structure impacts the energy efficiency of the structure. Mud, clay and sometimes gypsum were used traditionally to reinforce the structure with good insulation and thermal capacity - preventing daytime heat to penetrate inside, to later in the night return it outdoors.

Using locally available building materials, would not only be a good alternative to keep at pace the severe sunlight radiations, but achieve energy efficiency also - thus considering elements such as, the applied materials on the walls, their thickness and construction techniques - have always been able to withstand the test of time, stating great performance in terms of sustainability (Almatarneh Tawfiq, 2013).

[64] Jäger (2022)

Urban Fabrics

Considering the urban color fabrics of traditional buildings, there was not a specific preference on the color, beside color materiality of used materials in the building, as providing energy efficiency to the building, choosing sustainability over decoration. Naturally available materials, and their function would reflect in the region's urban fabric. Mud was largely used in vernacular architecture as a result of its durability, local availability and thermal storage capacity, making it adaptable to different climate conditions.

Beside the construction material used, to increase the building's efficiency, plasters and washings would be added to the building to protect the main construction from severe temperatures. In regions with semi-arid conditions, plasters would mostly consist of, - "*mud, lime mixed with flax-threads, brick-dust, sand or ashes"*. [65]

Contributing to temperature regulation purposes in the building, whitewash or limewash would be added to the surfaces, adding to the color fabric of traditional dwellings with a great remark in letting the building breath, adapting the temperatures to the climate the whole year round.

When referring to sustainable and energy efficient materials, during our talk with the Spanish architect Abelardo Linares from Jimenez & Linares Architects, being concerned with traditional inspired contemporary architecture, mentioned:

Limewash implementation in contemporary projects is important for multiple reasons: locally available, temperature regulating properties with an outstanding reflective natural and breathable texture, contributes to original spaces with inclusion of what is available in the environment around us.

Figure 31 Berro House, Limewash

[65] Almatarneh Tawfiq (2013)

Figure 32 Natural Limestone

"Limewash, it is made from crushed limestone that is fired at very high temperatures, mixed with water, and colored with natural pigments -

- Though trendy, it is not new - Lime paint has a deeply rooted history as one of the first - ever house paints emerging from the Roman and Mediterranean regions, and is being continuously used in contemporary architecture as being a conscious choice protecting not only the environment but our homes and spaces too - additionally it removes odors (and carbon dioxide), acting as an air filter in addition to being mold- and -bacteria-resistant". [66]

Beside limestone, or limewash being implemented in regions with semi-arid climate conditions, another simple material locally available with high sustainable qualities is gypsum. This material traditionally used in the European and Middle Eastern region, makes a great sustainable tradition-based building material.

Figure 33 Natural Gypsum Stone

Figure 34 Calcinated Gypsum

[66] Cheng (2022)

In Iran - Plasters, would be treated differently in terms of decoration and efficiency. For an instance *gačbori* - stucco - where natural gypsum stone is heated on high temperatures to turn into calcinated gypsum (Kröger, 2005) - as a construction element, available locally, would be used as a plaster, due to the material's qualities consisting of being - fire proof, easy carving, painting and molding, later becoming very important for the intricate decorated surfaces of in- and out-doors, such as Muqarnas or stalactite roofing elements.

As a building material derived from gypsum is - gypsum mortar, which when implemented using the Mesopotamian technique, was used for the purpose of protecting wall, roof, domes, - consisting mostly of brick and natural stone - from humidity, preventing moisture causing mold in the structures.

"…to mask unevenness in the wall surface, and sometimes to serve as a base for carved or painted decoration" [67]

Gypsum as a material mostly used in the Middle East and implemented into construction, flourished during the Islamic times in Spain and was traditionally used from the Romans to the Moorish rulers. The material is nowadays largely used for interiors in Spain, as it is in Iran as well.

Figure 35 Stucco-Work Wall, Located in Alhambra, Spain

[67] Azarpay (2012) p. 447-449

Spain, being the second largest producer of gypsum in Europe, applied broadly gypsum for construction and decorative purposes, especially during the Moorish Islamic rulership, today in the region of Andalucía, Spain. The usage of the material would vary as the material was extensively used for finishing purposes as decorative plasters, and for structural purposes such as *"columns, pillars, mortar joints, structural walls, plastering, façade cladding, and even flooring"* [68]

Among the properties of gypsum, as natural source locally available and affordable, vary - it has high durability unless it encounters humidity, affecting its durability. Depending on the thickness of the material application, Gypsum can even be fire durable. Anyhow, a clean usage of only gypsum as a building material, is restrained for washes and decorative purposes indoors, when used in construction a mixture of multiple components is needed, in creating adequate structural elements, for example gypsum-based concrete (Lushnikova & Dvorkin, 2016, p. 657).

The usage of gypsum in construction is gaining importance, although the implementation is limited to interior cladding, "*as lime has replaced gypsum in structural matters almost completely*". [69]

In Iran, gypsum is also limited to interior implementation in contemporary architecture, as in areas with higher humidity is replaced by cement. In construction and structural implementation, brick is largely preferred and used in contemporary architecture, - in different areas especially near the mountains, there is a large availability in natural stone, therefore stone is continuously implemented (Tadayon, Davarpanah & Fresku, 2024, Online Zoom Personal Interview).

Between brick, natural stones, and soil - contemporary architects in Iran take inspiration from nature and its surroundings when it comes to the colors' texture of the buildings. The new buildings should be organic, belonging and sharing a relationship between three parties - the building - the surrounding environment and the human operating in it. It should be what, and how it looks like, as imitation has no sustainable character, therefore implementing available materials with their natural colors should be a must in creating authentic spaces that communicate with the environment and the human itself.

"Memorable and original spaces are adapted to the climate and culture of the people because of using the natural and native colors and materials. Therefore, each city had its own color identity and was distinguished from other cities". [70]

[68] Bel-Anzué & Elert (2021) p. 4-17

[69] Bel-Anzué & Elert (2021) p. 6-17

[70] Khalili (2019)

The yellow color was implemented largely across Europe, and interestingly enough Vienna continues using this color frequently in contemporary architecture. From a purely quantitative perspective, it is true that the yellow tones are the most popular colors in Austria, as if residents want to follow the traditional folk architecture represented by this color.

"Buildings from the end of 19-th and beginning of 20-th century are colored in yellow, which symbolizes gold and therefore prosperity". [71]

With many contemporary architects applying the Schönbrunner Yellow to their designs, creates new spaces, transforming them yet offering a sense of belonging. The Austrian Querkraft architects, apply hues of yellow to their projects as it contributes not only to cultural Identity in contemporary designs, yet protects the main construction in terms of sustainability. For similar different reasons, the Austro-Iranian Daneshgar architects, uses yellow in his designs, to connect to his roots by simultaneously being in harmony with the country's preference for yellow hues in designs. Due to the largely used yellow pastel hues nowadays, researchers found out that Schönbrunn's façade was actually not always yellow as supposed and believed.

"Schönnbrunn was by no means yellow in Maria Theresa's time, but partly pink. The yellow ocher, painted using the lime technique, gets its color from the places where it is mined, with many variations" [72]

Figure 36 Schönbrunn Palace, Vienna, Austria

[71] Ivanova & Marinova (2020) p. 4

[72] Novotny (2020)

To better understand the sustainable nature of this particular color, during research of the naturally combined material colors found in the ruins of Persepolis, Iran, researchers have found out that when clay and iron are mixed, a particular rose hue is created.

"The clay likely acts as a binding material, and the iron gives the plaster a characteristic pink color". [73]

But is this case our case? Might be, further research should be done to support the theory. In understanding the wide usage of bright hues in construction, different insights show, on how this particular color affects the environment and especially the humans.

Interestingly enough, following the - it should be what it looks like - logic, architects claim that the phycology of colors and their implementation in buildings or architecture in general, depend on space, function and emotional transmitting, the architect or artist wants to convey through certain colors.

Bright colors are often associated with the sun, - representing joy and happiness people have when waking up to a sunny day. Besides, they offer a great advantage in terms of light reflection, protecting the building's structure as a protective façade, which helps sustaining the building's main structure (Querkraft Architects: Kahr & Fresku, 2024, Online Zoom Personal Interview).

Contemporary Projects Tradition-Based Iran

Contemporary Approach

Cultural Identity is still a very important issue in every country, as most of the architectural styles out there are somehow connected to the people and the way they feel and live. This tradition-based practice contemporary Iranian architects started, - Can it be used as an incentive for the architects worldwide, to cope with tradition by adjusting and adapting to all the challenges it comes with?

Dealing with climate change, economic issues, especially individuals and their perception of life and the spaces they want to live at, can be quite problematic to be packed in one layer only. To be able to answer that, we must look up into the definition of the compounded elements found in tradition itself.

As Silvia Mazzetto mentions in her Study when referring to sustainable architecture and culture altogether saying that building based on a sustainable framework, translates into *planning, implementing and executing* the design from an early stage to the end result. Taking it from this point and onwards, we can discuss about restauration in already existing

[73] Aloiz, Douglas et al. (2016) p. 3-10

buildings, meaning that there is more to sustainable tradition-based architecture, than to just planning from scratch. For an instance, in these cases, tradition is important to be considered as a founding element, working somehow closely with sustainability. Cultural identities have a powerful influence in architecture's past and future altogether, creating that sense of belonging (Mazzetto, 2021).

Based on traditional architecture, architects are discovering that there is more to tradition than just what is known, is more about the conveyed sustainable information grounded in these large built artifacts. The way traditional architecture responded to problems, stands until today as resourceful information to take reference from.

Among many other responsive reasons, one stands at the forefront of them all, and that is climate conditions. The way architecture responded to that one big issue through physical responses, standing as long-lasting artifacts to our day, making architects think about and act upon them, as tools of creating organic spaces without neglecting the sense of belonging.

Climate condition, is continuously being a problem without one universal solution, therefore sustainability deals with engaging natural energy at its best without needing additional energy consuming technologies, defining and developing in terms of contemporary building concepts, providing with not only smart solutions to the issue, but in a way contributing in preserving a certain architectural Identity worldwide.

"Reviving the lost connection, we once had with tradition and traditional architecture, it is a notion which we, Europeans as well as Middle Eastern have neglected, and I hope to be able to re-establish that connection, as it contributes to the close and continuous relation we once had with the environment". [74]

Being able to combine most of these elements and apply them into contemporary architecture by taking inspiration to tradition and traditionally implemented architectural building methods or materials, it is a challenge not many architects out there are willing to take advantage of.

The risk of such architecture might not only be the costs of implementation, but also the level of tradition implemented, which should be limited to using those concepts rooting in tradition leading towards smart, sustainable and affordable architecture, while fitting contemporary needs, practices and wishes of the community. As it is crucial for functionality and efficiency, to stand at the forefront in contemporary designs, contributes to a better relationship between the environment, building and the individual.

[74] Querkraft Architects: Kahr & Fresku (2024) Personal Interview

" Architecture can create spaces with a feel of belonging to the place and not only to the building itself, making the space connected to the nature, and the human connected to the environment and building, contributing to the well-being of both parties". [75]

Architectural Identity becomes a must, when the traditionally used building methods, techniques and materials have high potential in creating a better and more sustainable type of architecture. Taking the sustainability lessons, tradition taught us, - we can give tradition a new Identity - in implementing that which is profitable and not only decorative for the human and the environment. Creating architecture which benefits both parties, and serves to the big goal of sustainability.

Iran is home to many cultural heritage sites, mostly located in the area of Yazd and Isfahan, being on display for people and architects to take inspiration from traditionally used elements by tracking, detecting, developing and implementing them into contemporary architecture.

The incarnation of tradition-based knowledge implemented by the sustainable designs of Iranian architect Alireza Taghaboni, contributed in changing the definition the world has known to be as Iranian building tradition. As the architect himself mentioned, *we are as we can be and is best to be, rather at how the west pictures us to be* (Ayoubi, 2018).

It is an incentive for the tradition-based contemporary architecture to find inspiration that root in cultural heritage sites. Speaking about identity inclusion in architecture, with the Iranian architects, made me realize that culture and tradition is deeply embedded in their lives, with most of the designs taking inspiration through history, culture, language, calligraphy, markets, heritage buildings, spices, religion, celebrations and memories.

On the other hand, when talking about Cultural Identity in European contemporary architecture, we encounter a different approach to it. Europe has a large export-import history, be it regarding goods, languages, foods, spices, to even architecture and building materials. Anyhow, defining the European Cultural Identity, it is not as simple, thus Europe is compounded by many entities with different traditions, languages etc.

As Fabrizio Barozzi said when referring to European identity in Contemporary Architecture: *"I see European architecture as more of a collage of entities, than of one single Identity. This*

[75] Jimenez & Linares Architects & Fresku (2024) Online Zoom Personal Interview

implies that each unique European's country' architectural identity can only exist in its given location". [76]

These longer lasting artifacts, purposed for the sake of trends and implementation of new materials compared to the traditional ones - in the name of functionality and new shapes, influenced modernism in Europe (1920s-1970s), which still influences contemporary architecture to this day.

Modern architecture, started from European architects and followed by many others around the world, - as a product of context and history, has influenced the architecture world immensely (Lynch, 2015), which gave life to new materials, open floors, connected spaces, flat roofs, simple walls, maximized windows, logical designs rather than ornamental and beautified design. That was not necessarily considered a smart or sustainable type of architecture, even though many elements are being implemented into contemporary architecture to this day.

This type of architecture - reaching international levels in terms of construction, has been implemented in different areas of Iran too. Implementation without considering the climate conditions or even the Cultural Identity of the region, resulted in a copy-paste type of architecture, totally neglecting the relation the human has to the built environment.

The aim of implementing functionality in combination with new technologies and materials such as glass or steel, drove the attention away from traditional materials, which when not build in context with the located region, would lead in massive energy consumption, making it less sustainable in the long run (Hewitt, 2018).

Including the environment into the building, not only visually but physically too, creates architecture as a responsive tool to climate, requiring not only functionality, but mainly the efficiency of the building, aiming towards sustainability.

A combination of functionality mixed with natural and new materials, for the sake of including the environment in modern building, is what architects like: Le Corbusier, Mies Van der Rohe, Louis Khan, or Frank Lloyd Wright, did, by contributing to modernism and post modernism in Europe and around the world - opening the path towards a sustainable type of architecture (Cvetković, 2024).

[76] Lynch (2015)

A., Daneshgar – Daneshgar Architects

Researching about tradition-based contemporary projects in Vienna, I came across the well-known Austro-Iranian Architect, Armin Daneshgar, who applies tradition-based elements to his designs. Apart from that, sustainability seems to stand as a backbone to his projects. In reality, how did he make use of traditional architectural elements while merging his designs in the construction market?

In the residential building Obere Amthausgasse, Daneshgar architects, did a renovation instead of building new. The costs deriving from planning and building new, does not only cost in terms of construction expenses, it costs to the environment too. Such a smart solution helped in increasing energy efficiency in the already existing building, consisting in partial renewal of the non-efficient areas, and as well as adding new floors and elements, as windows, doors and greenery alongside the courtyard.

Figure 37 Obere Amthasugasse, Vienna

The Austro-Iranian architect, has developed a great energy saving concept and has implemented it into the renovation implemented design idea. Located in the 1050 district in the city of Vienna, the project's goal was to reduce the CO2 emissions to 200t/year and by reducing the heating energy costs by 60% (Daneshgar & Fresku, 2024, Personal Interview).

By applying the concept of a resource friendly and cutting additional costs type of logic, the purpose of the renovation was part of the resident's wish to not build new - instead taking care of the existing, by improving it to the extent of sustainable living.

From a cultural Identity point of view, there are tradition-based elements implemented in this building, yellow color being one of them. But what is the connection of the yellow color or the Safran color with the Iranian tradition? The architect's family traded the Safran spice as a family business, therefore the color has a deep connection to his family roots in Iran.

In this contemporary project, this element translated as a recognizable colorful element in the building's façade, aligning its walls, trying to tell a story. This type of storytelling elements, created a form of written verbal communication, displayed for the inhabitants to see. But is there a clue about these elements, and where do they lead? Calligraphy is very important in the Iranian tradition, representing not just written letters, but the empty paper too. Comparing this concept to that of the built and the void in a project, what is written, is as important "in where it is being written". The nothingness of an empty paper complements the written words, as the built completes the void-courtyard. As the architect himself puts it in his book when talking about his life and projects *Leben und Bauen:*

"Such a -thing- can resemble Persian calligraphy, where the ink continues to be drawn out at the end of a word. Just like the line peters out into the nothing, the buildings should fade into nothing as well. This nothingness is very important to me". [77]

Figure 38 Courtyard and Calligraphic Elements in the Façade

A simple element such as Persian calligraphy, found a beautiful translation into the building's façade, with yellow accentuated walls added in the interior living and working spaces too. In fact, the architect himself lives in the same building, surrounded by yellow hues, lighting up the space with that ray of sunshine inside out and the other way round. Sharing the preference for the yellow hue with the locals who refer to it as the Schönbrunn Yellow, even if unintentionally, relates to the similar choices in terms of urban fabric color application.

A beautiful intersection of tradition and sustainability into one design, was what the architect describes it as "A rainforest in the fifth district". This rainforest, includes the

[77] Daneshgar & Rademacher (2019) p. 62

implementation of courtyard elements into the courtyard of the residential building for sustainable reasons, as we previously mentioned.

"…and, those of us who are architects, like me, have a certain ability - the ability to hope for a better future and to not give up until the future looks bright". [78]

It is exactly this hope the architect is trying to reflect into his designs, alongside with his Iranian cultural heritage who always accompanies him, as he himself puts it:

"I left Iran, but Iran never left me". [79]

Figure 39 Safran Foyer Details

Figure 40 Entrance Façade

That taken by the word, he later on went to design for the Iranian state the - Iranian Ministry of Foreign Affairs in London. This project would include a blend of tradition-culture-architecture-sustainability and cultural identity of two countries - the culture and tradition of the British country the Embassy is located at, as well as the Iranian culture which would be displayed in this location. In fact, contextual architecture is a must when planning and building in prominent historical areas such as this one. One very important aspect of the project was the visuality of the project, as these areas could not only be used as offices but as well as display areas, meant for hosting cultural events and exhibitions, creating an interaction between both cultures.

[78] Daneshgar & Rademacher (2019) p. 23

[79] Daneshgar & Rademacher (2019)

Figure 41 Iranian Embassy Located in United Kingdom

Another element, representing the Iranian architectural Identity - implemented in the design of the Embassy, is the Courtyard. Located in the higher level of the building making good use of the element in terms of providing with comfortable air in the building, adding to the sustainable character of the building (Daneshgar & Fresku, 2024, Personal Interview).

"…one Important aspect in our design was to respond sensitively to the surrounding context of the site. We tried to give special attention to the adjacent Grade 2 listed church of St Augustine designed by Victorian architect Sir William Butterfield, and respected their need for daylight". [80]

Figure 42 The Embassy Relation to St. Augustine Church

[80] Daneshgar & Rademacher (2019) p. 53

When planning about the Embassy, the most important part of it was representing Iranian culture in the best way possible to the world. With that being said, the Architect mentioned that it was extremely important to create a building which is welcoming - resonating with the welcoming nature of Persian culture. With the building itself opening to the outside, displaying the local culture, adds to the cultural Identity of the building when in a contemporary design. Beside portraying culture in a building, creating an efficient building was crucial to the design, thus sustainability represents Iranian Culture and this type of Cultural Identity should be embodied in the building, always considering the environment and connecting with it (Daneshgar & Fresku, 2024, Personal Interview).

A., Davarpanah and H., Tadayon – HT Architects

Regarding the importance of the courtyard in the Iranian Vernacular architecture, there are new interpretations and implementations of this element and its compounds into the Iranian Contemporary Architecture. The Iranian architects in the region of Isfahan, where the houses are characterized by such a feature, its definition has been taken - developed - changed and implemented in the most contemporary way possible.

As we know, the courtyard is the void space in the house where the outside meets the inside space, melting public and private areas, creating a protected interactive space without intruding the most intimate part of the individual's life, its privacy. In resonance with that, the courtyard offers a type of privacy protection. But is that type of courtyard for today's standards of privacy and lifestyle enough? Comparing the traditional usage and its benefits of implementation into the design, the architects took into account the cultural norms' adaptation happening nowadays. Beside creating semi-private open spaces in the house, more privacy and visual protection is needed to match the cultural demands of the society and its individuals.

Figure 43 The Kharand House, Isfahan, Iran

In the analyzed project located in Isfahan, *The Kharand House* literally meaning - when translated from Farsi - *The Yard House.* The architects explained that this element has been changed to fit another type of extended interpretation of the traditional Courtyard.

Cultural norms together with society's policies and restrictions, define most of the implemented building elements or materials. Due to these new law implementations, the yard does not find a large implementation in contemporary designs the same way it did in the past. The combination of laws, building restrictions, cultural identity and societies' demands of living quality, made the architects answer through efficient tradition-based contemporary architecture.

Needing to match the wishes of a qualitative design and those of a lawfully approved design, the yard implementation changed with necessary adaptations and time related changings. In this project, there are two types of yards to be found in the design, one functioning as the main yard of the house, connecting the outside with the inside, as we know its implementation traditionally, and the other one located in the second floor. The innovation here offered by this design is the location of the courtyard in an upper level rather than just the ground floor as traditionally used, adapting to contemporary usages (Tadayon, Davarpanah & Fresku, 2024, Online Zoom Personal Interview).

Figure 44 Courtyard Element Distributed Vertically in the House

As we talked about privacy and the semi-private character of the yard in general as a traditionally applied concept, the evolution of times and the individuals' demands asked for the application of very private open spaces in a house. In fact, having the yard in upper levels in the house, increases privacy of this certain space, making it a relaxed and enjoyable space, reachable at any time, regardless where you are in the house. By aiming to create a new traditional contemporary yard with the three compounding traditional elements like water, greenery and privacy, the architects focused on the implementation and design of the yard in a new context.

Figure 45 Water and Greenery Elements of the Courtyard in the House

"Water plays a prominent role in as much as it provides ample condition by increasing moisture, visual quality and a pleasure sound of falling water. Such factors create a perfect traditional yard". [81]

The *Kharand House* is designed on three floors - the ground floor where the main yard is located in, together with a pool facing the living room, contributing to quality elevation of both spaces establishing a visual connection, - the first floor and the second floor where the void space was insinuated for placing a private yard, - and the third floor where the private open space used not only as a *baharkhab* - sleeping under the stars as practiced traditionally, but as well hosting private organizations such as parties or celebrations during the summer nights.

Fresh air, privacy, humidity facilitation, *wind ventilation* and *light* are the factors needed to provide the traditional courtyard implementation. Greenery elements has been applied in all the of the house's levels, to redefine the presence of the yard in the whole house, adding to sustainability.

[81] González (2018)

As the project design is all about tradition-based contemporary architecture, sustainability is an aspect the architects did not let unattended through the design. The façade covering up the house's walls and the partly added flower and tree boxes together with the water element, add to the sustainable value of the design.

"A sloping face is added to provide privacy and suitable shadow for use during the day. The sloping face is utilized to avoid reducing amount of light, the living room and other parts of the yard, get". [82]

In implementing sustainable and affordable tradition-based building elements, the architects, took reference to tradition when it comes to the façade too. Using the principle of the *Mashrabiya* allows moderated amounts of light entering the house, adding privacy yet being able to observe the outside. Covering the house with a façade that controls heat access, not only preserves the cultural and religious norms of the Persian Culture, but it also helps in avoiding vast amounts of energy consumption, using passive cooling systems, which rely on natural resources (Madan Singh & Saxena, 2021).

The water elements added along the courtyard, increase levels of humidity in the house, providing during hot summer days clean and fresh air in the house. In drawing the full picture of the project's sustainable character, beside using tradition-based building elements, materials play a crucial role in the process too. When discussed with the architects about the sustainable character of the materials used in the project, their aim was, to minimize as much as possible materials costs, by opting for locally available materials such as white marble, as a result of its abundant availability in the region. The urban color fabric in the project, refers to natural material usage only. Therefore, on the interior and exterior of the house, the architects took inspiration from the nature, including the surrounding buildings and environment, following the *it is what it looks like* type of logic, using materials restricted to the availability of the region. The usage of natural stone, brick and wood, helped in keeping a contextual type of design from every point of view.

M.R., Ghaneei – Polsheer Architects

One of the renown firms of tradition-based contemporary architecture is Polsheer Architectural Firm based in the region of Isfahan, Iran. The firm's interest in working with tradition-based architecture, for preserving the region's Architectural Identity, and adding to the sustainable and affordable type of contemporary architecture, made me want to know in-depth about their approach to the matter.

[82] ArchDaily (2018)

Figure 46 400 Years old Ruins, Jolfa Region, Iran

As the architects themselves mentioned when talking about one of their projects, particularly the *Safavi House*, monument preservation holds a special place of the firm's principles, as it is considered as a bridge connecting traditional Persian-Islamic architecture to the contemporary spaces where tradition is sensed.

Situated upon a 400 years old building ruin, located in the Jolfa region, on a large area of 700m2, the architects' goal was to preserve most textures existing in the monumental building - linking to the historical and cultural building tradition and their integration into contemporary architecture (Polsheer Architects: Ghaneei & Fresku, 2021, Online Zoom Personal Interview).

The building was repurposed and completed in 2017, as a museum for social interactions and cultural events, though being called the *Safavi House,* indicated that the building was once a residential one. The house preserved one of the typical functions for the Iranian residential houses - the social interactions and the organizations of celebrations and events.

Figure 47 Safavi House Museum, Current Renovated State

"Safavid House the museum of architecture and creativity, has become a space for creating new ideas" quoted from the official website of the architects". [83]

With the courtyard centering the space of the Iranian residential houses, in the repurposed state as a museum building, this empty space is used as a gathering point for the multiple ongoing events hosted by the museum. The existing windows and their different sizes, depend on the room's functions, providing privacy in every way possible. Restoring the original texture of the walls, the architects opted for locally available materials, as well as implementing construction waste into the design, going the extra mile in the field of sustainability (Golden Trezzini Awards, n.d.).

Next Project concerning the implementation of tradition into contemporary architecture can be considered the *Ghaneei House* where the architect himself resides. As per a start, the architects developed and changed the concept of the courtyard when compared to the traditional central void of the house.

The house is visually connected to the father's house - about what kind of visual connection are we talking about? Visuality plays a major role when it comes to connecting spaces. For an instant the interior of the house is concepted according to the Old-Persian houses circulation system - making a horizontal transition vertically into three levels - connecting its inhabitants eternally and endlessly (Gonzalez, 2021).

[83] Polsheer Architects (n.d.)

Figure 48 Ghaneei House, Double Façade - Mashrabiya

The façade is very important, when it comes to building energy performance, regulating temperatures and increasing the buildings efficiency. The *Mashrabiya* window concept was applied to the whole building, working as a kinetic façade in terms of sustainability, as well as a privacy and shade providing element. The double Façade concept is a sustainable type of design which is very relevant in regions with an arid type of climate, such as Isfahan.

The courtyards of each house are located in different levels, therefore the old trees of each courtyard are facing each other, allowing the courtyards to create a visual connection. With the new additions to the *Ghaneei House* was important to preserve a sort of connection of the house as a whole element, hence the passage or stairs - from one level to the other was not covered, instead was left open for the visual connection between the courtyards to take place (Afyouni Hakim, 2015).

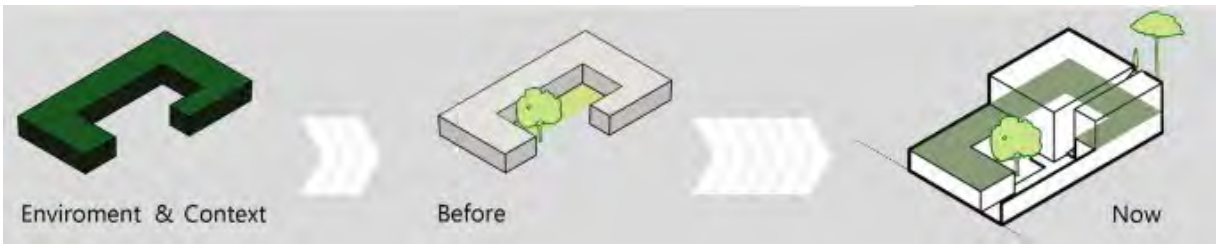


Figure 49 Courtyard Concept

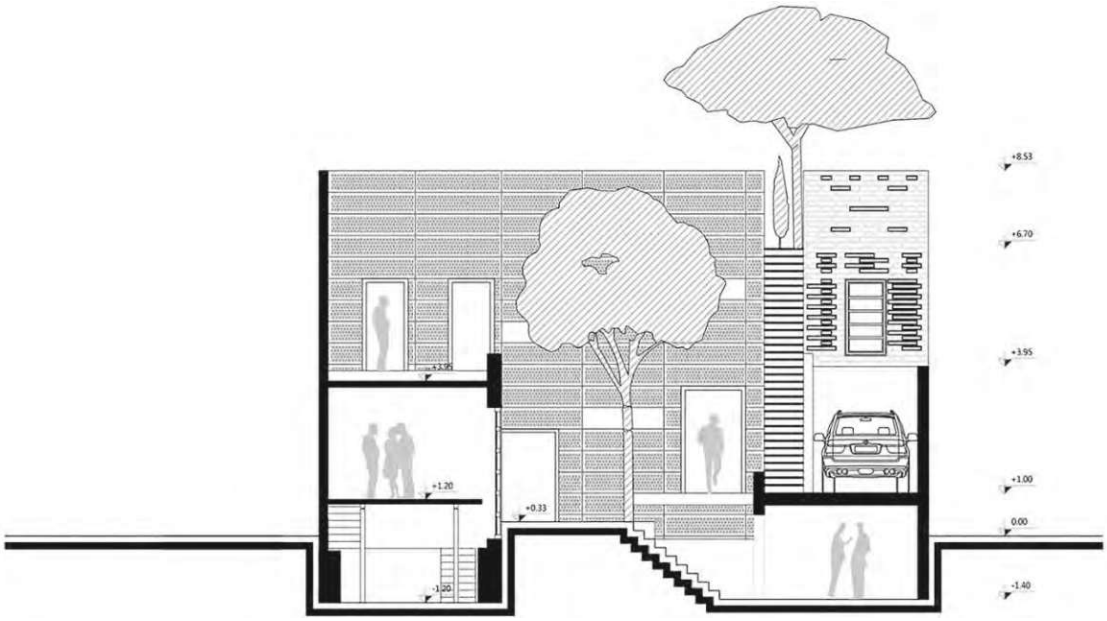


Figure 50 South Elevation of Ghaneei House - Courtyards

Bearing in mind, that using locally available building materials are crucial in creating sustainable and affordable architecture while still in context, the architects opted for Brick. The perforated brick façade, interprets the Mashrabiya principle, regulating heat access to the interiors, which are decorated with brick too, completing the sustainable character of the whole building.

Instantly a traditional element such as the Mashrabiya window concept, taken from the traditional architecture and developed into a kinetic façade - providing with sustainable architecture in the arid areas, reduces energy consumption, costs, and regulates indoor temperature. The benefit of such façade influenced by traditional architecture of the arid regions in the Middle East, stands for the cultural identity and its harmony with the surrounding by respecting the environment as well.

Figure 51 Interior of the House - Brick

Figure 52 Exterior Façade

Figure 53 Interior Colorful Glass Façade

"Presently, the concept of the Mashrabiya is being incorporated in building design as one of the most prominent features of the tall buildings of the Gulf region giving them an extra-ordinary outlook while preventing constant penetration of solar radiations". [84]

The transformation of such architectural element, generating from a heritage window element to developing as a climate responsive façade system - protecting from severe sun-radiation, saves large amounts of energy consumption.

Taking into account that the architects, strive in using traditional building elements in their architecture - benefiting cultural identity, speaks of a type of tradition-based architecture, building with sustainable and affordable techniques, and materials. This approach does not only prove to be sustainable but affordable too - completing the sustainable architecture inspired by tradition and innovated by architects.

N., and P., Jafarbeigy – Sizan Architects

Another Iranian office implementing tradition-based type of architecture, is the office of Sizan Architects, led by Jafarbeigy, P. and Jafarbeigy, N., which applied traditional building elements to their well-known Project - *The Pomegranate House of Grandfather*.

[84] Madan Singh & Saxena (2021) p. 1

Figure 54 Taft, Yazd,Iran

Located in Taft, about 200 km from Yazd's historical center, the project was completed between 2014-2017.

"The word Taft has two meanings, warm and wooden fruit basket which is an appropriate metaphor for the city since when viewed from the surrounding mountains, the many pomegranate gardens appear like a green basket, conveying the feeling of garden too". [85]

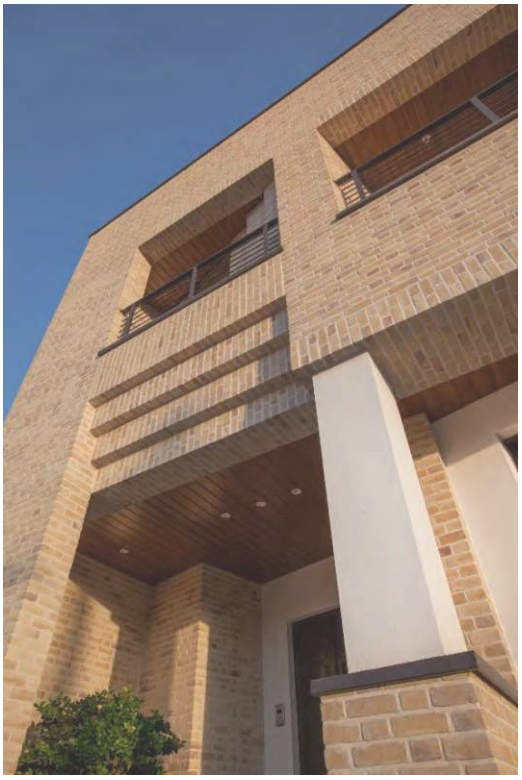
As previously mentioned, Iran is home to multiple World Heritage sites like the city of Yazd and Isfahan, where contextual architecture is a substantive issue. By being such a cultural and historical center - preserving tradition and traditionally used building elements and materials, the architects' approach to it from different points of view, including physical, philosophical and even religious ones, - carrying with it a certain responsibility.

It is exactly this issue that Sizan Architects tried to address and achieved it, with their project. Some of the main tradition-based elements to be implemented into this project is the courtyard, the ventilation techniques of the wind catcher, and brick as a traditionally used building material.

The Pomegranate Garden House of Grandfather is located in the cooler area of Taft, where the surrounding buildings are more of a contextual character. Influenced by this fact, they aimed toward a contextual type of architecture by choosing to plan a house in which you see and feel the Iranian culture, thus the primary used material was brick. Built upon the already existing concrete structure, they decided to build upon with brick - the traditionally used

[85] Contemporary Architecture of Iran CAOI (2019)

material, inside and outside. Having a good connection to nature and its surroundings, brick has sustainable qualities, as it can be easily recycled, making it ideal to build with, from a sustainable point of view as well as from a cultural one.



"The best example of this proportional unity in architecture and building material could be traced back to Seljuk dynasty". [86]

Figure 55 Brick Façade of the House

Staying loyal to tradition and the old architecture of the city, the element of brick is shown on the outside of the building's façade and it is not covered by any type of additional decorative elements, showcasing here the simplicity of traditional building materials. On the interior of the house the same material was used with better polished or smoother surfaces, adapting it to the living areas. Additional materials were used, depending on the area function of the house, combined with wooden and glass elements (Sizan Architects & Fresku, 2024, Online Zoom Personal Interview).

"…the Yazdi house is also built around one or more courtyards. However, analysis reveal that in Yazd the orientation of the rooms is much more consistent and rigorous, and the use of the basements, semi-open space (talar) and wind-catcher (badgir), more widespread" [87]

[86] CAOI (2019)

[87] Memarian (1998)

Referring to Yazd as the city of the wind-catchers, the architects could not leave this important traditional building element out of their design. Based on this concept, Sizan Architects, integrated in the design the traditionally usage of thick walls, which function as wind-catchers and help the ventilation process throughout the entire house including the courtyard area.

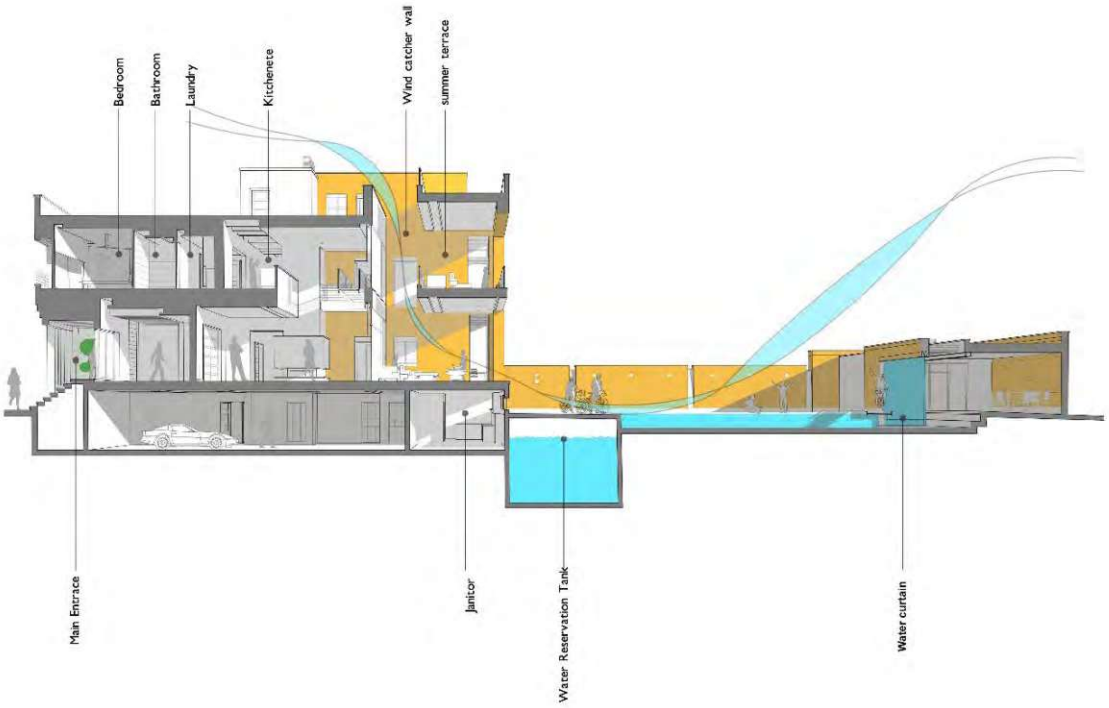


Figure 56 Pomegranate House of Grandfather, Thick Walls - Windcatcher Concept

"Traditional houses owing to their very thick walls remained cooler in the summer and warmer in the winter. Utilizing massive walls (80-120cm) with thermal capacity was a sustainable solution to reduce the energy demand and improve thermal comfort in buildings especially in hot-arid climates due to wide range of temperature variations during days and nights". [88]

Considering that the courtyard is an architectural element, that has been around for over 8000 years, especially in Yazd, where the houses offer multiple variations of courtyards house types, differentiating between single courtyard to multi-courtyard houses (Memarian, 1998).

Taking it from here, the Yazdi houses are characterized by the garden, where the traditional form of garden and the house itself work as one. The challenge the architects encountered here was the duality of implementing the garden and its elements, by keeping the

[88] Almatarneh Tawfiq (2013) p. 107

traditionally used building element, yet implementing it as a division between the public and the private space. The central opening in the house plays an important role when it comes to region's lifestyle. Privacy is one of the main elements to influence the design of the house, enabling the creation of an open space inside the house itself, thus life can be transferred on the outside without being seen or observed from the outer world.

Next step was the interconnection of the inside and the outside space. The other innovative way of implementing tradition into this project, was visually connecting the elements of the courtyard, like water pools or greenery. By using water, the architects created a waterway as the main axes of the house, which makes possible a connection between the two buildings, beautifying further the open space.

Water can be considered as one of the most important elements of the courtyard and its design in general, mainly because it has a special role in creating humidity during hot climate, visual beauty and relaxation in the area of the courtyard found mostly in residential buildings. The gooseberry tree planted by the grandfather himself 20 years ago, was included in the water way, as a treasure and inclusion of the already existing vegetation elements, adding to the preserving and co-existing with the surrounding. Water as one of the compounding elements of the courtyard, is used in a vertical way, functioning as a curtain fountain, putting even more in evidence the linkage function of water in the area.

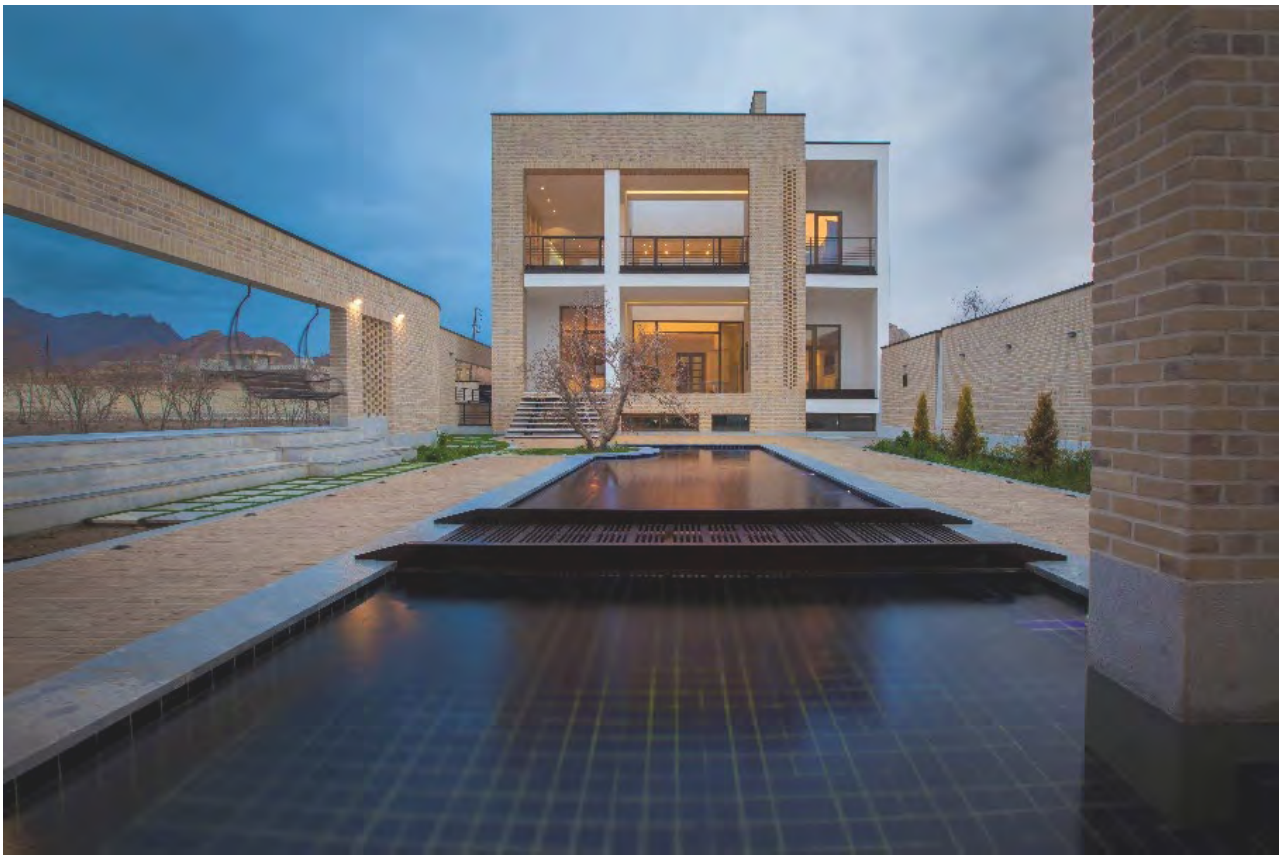


Figure 57 Courtyard of the Pomegranate House of Grandfather

"In order to unify the outside space with the interior and also better interconnect the interior spaces, a part of the top roof as well as the first-floor ceiling was left open creating a central void space" [89]

We see that the void is very present in Iranian culture as it creates visual space, which affects the physical and spiritual state of mind of the individuals. The multiple usage of different areas of the house, include - having moments of peace and good conversations during the hot summer nights, even sleeping outside under the stars or just having tea. Such an area is known in the Iranian tradition as the *baharkhab*.

It is exactly why these void spaces are as important as the built areas as the empty space is the beginning of the design in Iranian culture, therefore it has a special meaning for them. By implementing this tradition-based building concept, the architects tried to keep the physical connection to tradition in implementing these voids, traditionally used throughout history and individuals, who carry tradition and practices within themselves.

Anyhow these voids are connected through a brick wall built in the north-west direction (Esfahan Wind), which starts outside, and extends inside the building, making a great natural resource for natural ventilation and passive cooling. Designing a project, where the inclusion of Cultural Identity and building tradition resonate with sustainability and affordability, is what makes contemporary architecture want to include traditional building elements in their designs. In this case the house being physically located in Iran, makes its visitors feel the culture and tradition once entering that certain space as well.

Being people the ones who carry the cultural habits and identity within themselves, traditional elements are preserved and conserved throughout generations, that is why they are mostly to be found in residential contemporary architecture. Providing a certain space with greenery and water leads to a private space where life itself takes place, as it did long time ago over and over again.

A., Taghaboni – Next Office Architects

"There is a young, educated, middle class and they want good things". [90]

Another Iranian architect taking great inspiration to tradition is Taghaboni, A., from Next Office Architects. When designing architecture for a planned city, like that of Sadra, Shiraz County, tradition-based contemporary architecture buildings needed to be implemented, in giving the city an authentic image by responding to climate conditions - integrating locally available materials and as a result respecting the cultural identity of the area.

[89] CAOI (2019)

[90] Heathcote (2019)

Figure 58 Sandra Civic Center, Built Using Rammed Earth

"The gradual expansion of a new town requires an adaptable and expandable spatial structure in order for it to hold the potential for steady progression and excellence through time". [91]

Now how did the architects cope with the situation? By re-adapting the traditionally used building elements, restoring the traditional old architecture know-hows and materials created contemporary tradition-based sustainable architecture.

"The Sadra Civic Center"- it is planned to be a town within a town, built from the surrounding building elements". [92]

Considering that the *Civic Center* covers an area of 26,965 smq, it is compounded of semi-open adaptable communicating and gathering shaded spaces to protect the visitors from the direct and severe sunlight radiation. The performed cultural activities include celebrations, plays, games, music events among different civic activities. While these activities take place, a free-flowing communal unity of diverse participants of different spaces is created, allowing shade to create visual and physical comfort. Other elements, adding to the sustainable character of the project, alongside with the shadow generating elements, responding to climate conditions, is the implemented building material.

Taking into account that the building materials make most of the expenses during the construction process, the implementation of innovated old material recipes, have been a solution for the architect, opting at the same time for sustainable and affordable tradition-based architecture. With soil offering great material availability in the region, the implementation of soil-based building materials, increased not only the designs efficiency

[91] Next Office (n.d.)

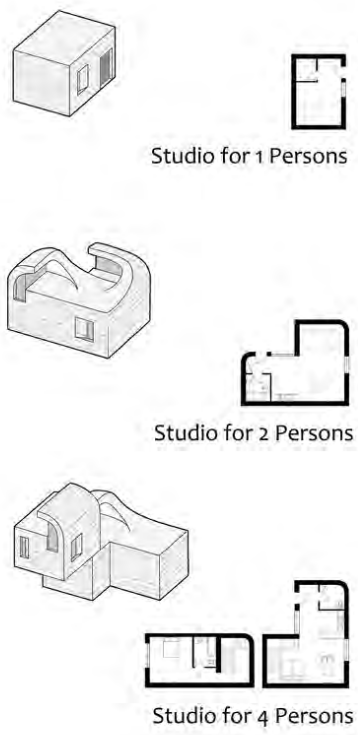
[92] Stouhi (2019)

but added to the Cultural Identity of the Center too. The traditionally used old recipe of clay and straw, was the ideal solution in re-creating new improved traditional architecture.

Constructing with Rammed Earth, was for the mere reason of the material availability in the region, extracting it locally, avoiding transport of additional materials thus eliminating reasons for further pollution and additional costs. On the other hand, the combination of this building technique together with the added yard elements, serve as an additional tool for passive cooling, increasing comfort in the spaces, by foremost protecting from the hot weather conditions.

"Obviously, the more it is possible to physically connect buildings, the better those buildings are able to function together as a whole unit, in terms of climate control". [93]

To deepen more the connection this contemporary design has to the good old building tradition, is reflected in the structure of the built spaces. The compactness of the structures, contributes in creating one large unit, as a responsive solution to the climate conditions. The compacter the structures, the less heating and cooling energy is consumed or required, increasing the structure's energy efficiency, working as an intelligent passive element.



As described by the Architects: *"Smaller structures have the ability of gradually transforming into larger ones, due to retractable and mobile structural elements, which provide additional social spaces to the residential units".* [94]

Figure 59 Residential Unit Typology

[93] Almatarneh Tawfiq (2013) p. 104

[94] Stouhi (2019)

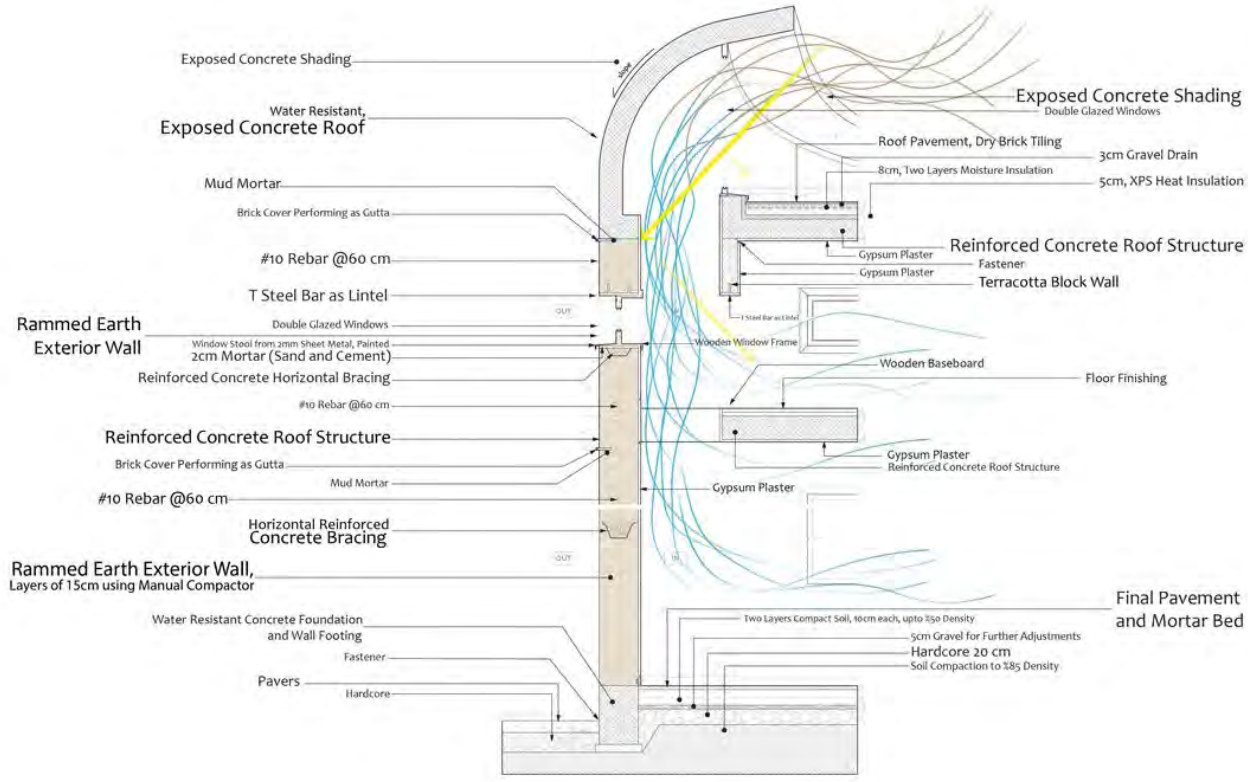


Figure 60 Wall Section Detail of the Sandra Civic Center

In contributing to the shading and sun-protection, due to the constant sun exposure - the top part of the structure is made out of concrete, whereas the walls are built using rammed-earth inside out, gypsum plaster and mud mortar - for better breathability of the structure - imitating the windcatcher principle, benefits the building and its visitors.

Thus, creating sustainable and low maintenance building in terms of energy consumption. Furthermore, as traditionally taught, the structures are designed tight next to each other, adding to the sustainable character of the center, lowering energy consumption too. As the Architect Taghaboni says: making the most out of the given space by designing loaded and dense capacity buildings, is what influences my designs, in creating efficient buildings (Taghaboni, & Fresku, 2024 Online Zoom Personal Interview).

Bearing in mind that, old cities were built traditionally in a dense way, with structures placed as near with one-another as possible, provided further heat relief (Almatarneh Tawfiq, 2013). This simple yet effective building strategy implemented to the structure, contributed further to the social, cultural and sustainable character of this new built center, rooting in tradition and displaying sustainability and affordability in every way possible.

The *Amir Villa* located in the Mohammad Shahr Gardens, some miles away from the city of Karaj, designed by the architects in 2011, remarkably reincarnates multiple traditional Iranian architectural elements into this contemporary summer villa design. Seeking to organize and fit all functions in the same level - with minor height differences to mark functions and users, the house was planned to avoid another multi-storey building in the region, a phenomenon which is increasing daily. In order to match the client's requirements and wishes, which was in for a two-storey building, architects proposed a building with public and private spaces all happening in the same level (Contemporary Architecture of Iran, 2020).

Figure 61 Amir Villa, Karaj, Iran

Preserving privacy and keeping open spaces at the same time, was achieved through restoration of the existing volume and connection through a glass bridge to the new building addition. Connecting these two zones, the existing building represents the semi-public usages, and the new addition represents the private area, where bedrooms and such functions are situated. The renovation of the building volume, included opening the view from the housefront towards the garden. The yard elements are implemented in every part of the house - whereas in the existing structure the water elements were placed facing the house, the new addition is set some inches above the existing level - so that a reasonable height is reached for implementing glass-floor, the floor is surrounded by water, giving the impression the house is almost floating (ArchDaily, 2012).

Figure 62 New Added Volume

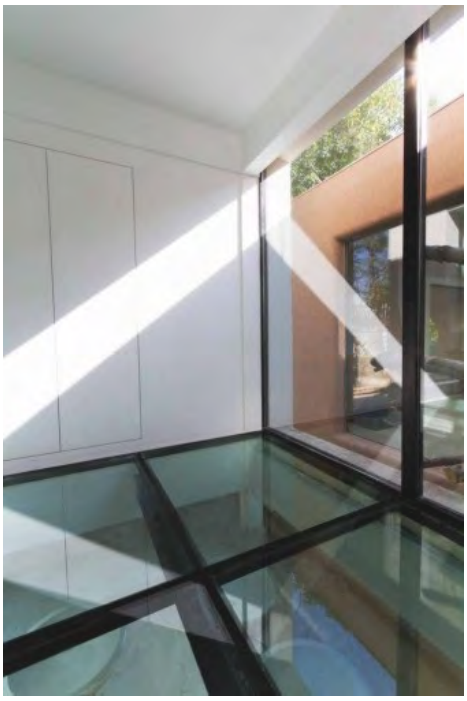


Figure 63 Glass Floor

In the new added structure (bedrooms), the floor was made out of glass, with underneath implemented light bowls to support lighting in the house, and setting the bedroom into that divine state much aimed in residential Iranian houses. Visually and through transparency connected, the structures, seem to communicate not only through vegetation and added water elements, but as well as through the implemented building materials. The “old” was given another materiality on the outside compared to the new structure, although a transition from traditional into contemporary can be already seen in the existing structure.

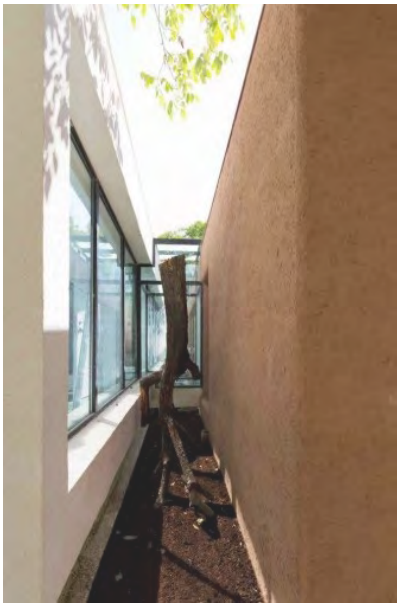


Figure 64 Transition Old-New

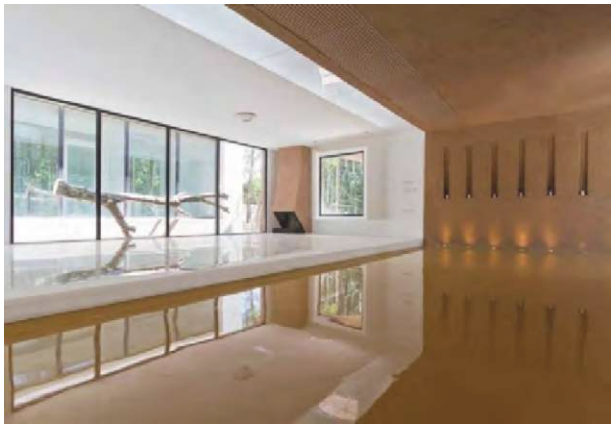


Figure 65 Interior Materials - Existing Structure

In designing contemporary tradition-based architecture, material selection and application is crucial in creating organic and authentic spaces. Creating spaces, that has a poetic character, as the architect himself puts it: *"space as a profound novel, it can have a great impact on a person's mental and approach to life*" [95] Therefore, the architects opted for a vernacular material mixture compounded of soil and straw. The raw and tradition-based material was implemented in masking the unevenness of the structure, blushing out the sharp edges of the exiting volume, resembling to the older vernacular structures, by implementing it in an innovated way, reminding of the old but built in the present. As to mark the location of the project, two dried tree trunks found in some part of the garden, were implemented as decoration, incorporating nature visibly, while transiting from one structure to the other, adding to the decorative aspect or as the architects put it: making one think and reflect for a moment (CAOI, 2020).

Figure 66 Facade Soil-Straw

Figure 67 Staircase

Figure 68 Vegetation Element

The Summer Villa planned as a retreat area for the elders but at the same time used as a party spot for the youth during the weekends (Arch20, n.d.), creates adaptabe spaces for different users and usages, highlighting the difference between the old and the new generations, reflected even in the house architecture. The first structure, appears softened out, having a modern-traditional type of façade, with an interior that shifts in materials, leading visually towards the new structure. A staircase showing the way towards the upper non-existent floor, represents the aim of reaching the skies and the infinite, showcasing the divine and philosophical meaning, connecting the physical and the mystical. These tradition-based contemporary architectural elements and their implementation in the design, represent not only the need of connecting to the nature and culture, but also speaks about the combination of sustainability and tradition, creating spaces that are modern yet have a tradition-based cultural identity.

[95] Hakim (2018), p. 252

M., Ghodousi – ZAV Architects

"The builder, building the future through traditional know-hows" - as the word ZAV translates from Farsi to the English word - builder.

Another remarkable contemporary tradition and culture inspired type of architecture, is created by ZAV-Architects operating in Tehran, Iran. The architects seek to revive the Iranian Architectural Identity, by implementing the traditionally used building techniques, locally available materials and labor force. Through complementation of numerous projects, the architects established their character, being influenced by tradition and sustainability, which is embodied in the vernacular architecture of the region (Pagliacolo, 2021).

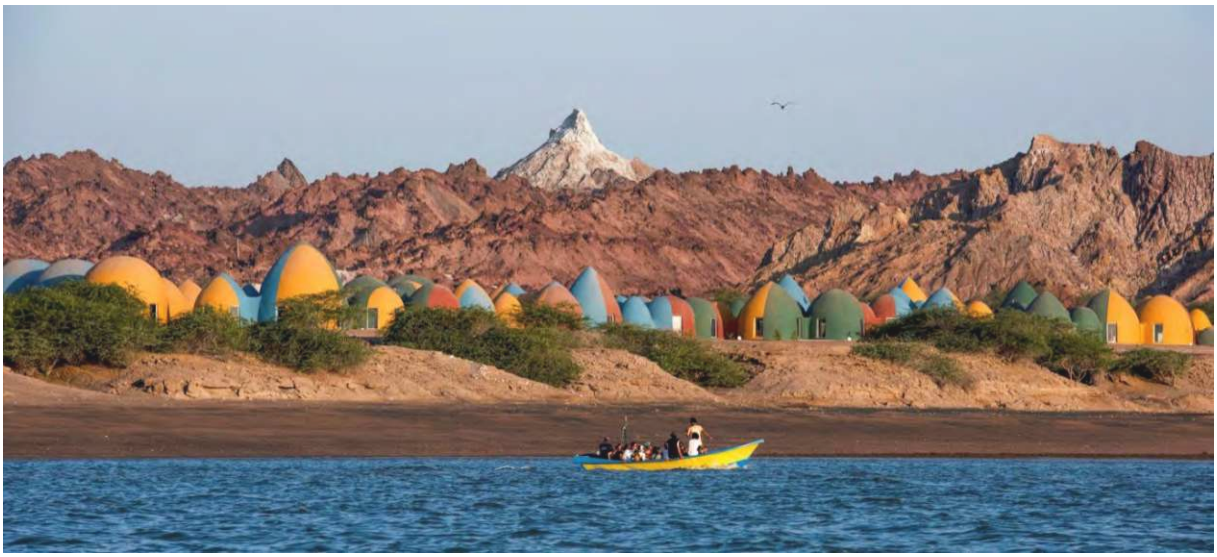


Figure 69 Hormuz Island, Persian Gulf, Iran

Located in Hormuz Island, other known as the Rainbow Island of the Persian Gulf community, because of the natural hues of ochre clay found in the area, the island encompasses 6,500 inhabitants. *The Majara Residence* which refers to the Farsi word for adventure, with colorful multi-colored rammed-earth domes, has been planned and built by the architects in the second phase of urban, social and economic development in the region.

"Hormuz is a formerly glorious historic port in the strategic strait of Hormuz in the Persian Gulf, South of Iran, that controls the shipment of petroleum from the Middle East, the island has outstanding colorful surreal landscapes, oddly the local inhabitants of the beautiful, touristic and politically strategic island, struggle economically" [96]

[96] Stevens (2020)

Seeking to increase the GDP-value of the Island - in the second phase of its process, the built multi-colored complexion of pointed and round sand domes aims merging in an organic way the tourists and the inhabitants of the island, by creating new job opportunities, initiating a positive development in the area.

Almost an imitation of traditional neighborhoods, with buildings being compact in height and size, located next to each other - as traditionally used to, creates a space for community co-existing with one another. It is not only an imitation, thus the small scale of the buildings of the complex, speak of easy to make structures, - making it easy for local craftsmen and non-professionals to complete the building using the simple yet innovative Superadobe technique of rammed earth.

This way local craftsmen gain experience in construction creating employment possibilities in the region, seeking to invest more in labor force cost rather than investing in high cost imported building materials. This way, a fully sustainable circle is created, which benefits the island and the land, both economically and socially. With the Project fitting in the environment, priority was given to choosing materials in harmony with the environment, by incorporating regional art and labor force (Hakim, 2018, p. 321). The Superadobe technology, designed by Nader Khalili, made possible the contraction of such a high number of the locally available craftsmen and other non-skilled workers. To complete this technique - bags of soil, with integrated steel construction, finished off with cement - were implemented.

Figure 70 Colorful Domes

Figure 71 Colorful Interior

"An ingenious technique that earned Khalili a 2004 Aga Khan Award, Superadobe uses sandbags, barbed wire, on-site earth, and few tools to build structural arches, domes, vaults, or more standard rectilinear shapes". [97]

Creating spaces which open up towards possible ideas exchange with the local people, aims reaching environmental coexistence followed by self-sufficiency and ease of implementation (Hakim, 2018, p. 341). This multipurpose cultural residence contains a total of 200 domes, all having different functions for different purposes and users - some of which include mostly temporary accommodations, like 15 homes - cafes, restaurants, administration, service spaces and a prayer room. Located in an open area facing the sea, being about five miles away from the city, the structures were planned in harmony with the islands landscape - inspired from the domes of the city of Yazd to the Windcatchers - matching the mountains, and painted in bright colors with hues of red, yellow, green, and blue, resonating the colorful natural character of the Island - without using the endangered natural colored soil of the region.

Figure 72 Colorful Domes, Built in Rammed Earth

"You cannot remove colour from the island of Hormuz - its coloured sand beaches change even the color of the blue sea, - nor of its people, for whom colour is an important mean of expression be it in their clothing, the interior of their houses, or even their food - "The colours surrounding us in Hormuz gave us the courage to be bold like the island." [98]

[97] Sacchetti (2021)

[98] Ravenscroft (2020)

Figure 73 Colorful Furnitures

Figure 74 Pierced Oculi

Following the logic, of trying to implement the island's special character together with that of its inhabitants, the architects - decided to apply bright colors to the interiors, furnishing further with colorful furniture and painted walls. The Domes are above 3,5m high each, and have a limited number of windows, whereas pierced oculi - a circular opening in the center of a dome, - were implemented, in providing natural lighting to the structures.

Seeking to create new structures by taking inspiration to the past taught sustainable building methods, the architects make as much as possible, use of the locally available raw materials and local labor force, engaging in locally produced goods, such as the furniture used in the complex, speaking of tradition and cultural identity in every step of it.

"Architecture has the capacity to be a mediator in the middle ground that converges the interests of different groups, from the state and investors to various classes and groups of people". [99]

Interconnecting different groups of people with one purpose in mind - Sustainability and Architectural Identity in contemporary designs, - implementing what is available rather than

[99] Stevens (2020)

importing expensive construction materials, investing instead in local labor force, provides wellbeing for the community and the country itself.

As mentioned by the architects themselves when referring to the project from a sustainable point of view, an average project design in Iran invests 80% of the budget in material costs, whereas labor cost is limited to only 20% of the budget, creating more pollution and disfavoring the country's economy. Whereas compared to the completed project in the Island, the architects managed to invest 65% of the budget on labor cost, lying low with material cost with about 30% only (Stevens, 2020).

Located in Khansar, Iran - humble and monumental, the Orphanage for Iranian girls planned from ZAV-Architects, contributes to the flexibility of the semi-private spaces, in which girls have the freedom to choose whether to wear or not to wear the hijab, which is under law compulsory head coverage for girls.

Figure 75 Yellow Roofs

Figure 76 Habitat for Orphan Girls, Khansar

The balconies have been covered up, offering the girls flexibility when going out in the balconies without the head scarf, allowing them to be free when in an open space.

Creating a flexible space, in which the inhabitants have the home-like feel, it was of substantive importance for the architect. The need of belonging in the building itself by making the building belong where it is placed, is how the sense of belonging goes both ways.

"Coverable balconies help the girls have inside-out spaces, and also avoid breaking the rules of a strictly religious context, which push them inside the spaces or wearing hijab all the time" [100]

Figure 77 Brick Façade and Covered Balconies

The combination of cultural, social and environmental norms was essential in creating a building which belongs where it is placed, transmitting that mere feeling to the girls living in it. A design building meant to feel like home was proposed, unlike a conventional disciplined dormitory. To contribute to this home feeling, many of the traditional building elements of the Iranian traditional architecture were implemented. The private sleeping rooms with a maximal number of 2-3 girls per room, the connected open spaces, courtyards, together with the implementation of brick as a traditional building material, created a building which is in context with the historical surroundings of the city of Khansar.

The bright yellow color applied on its roofs, reminds of the Safran spice, which is deeply connected to the country's culture and tradition. The balconies coverages are adaptable, and can be chosen - for a daily use yellow coverages are suggested in matching the yellow roof - but can be switched out depending on the occasion, matching the town's cultural timeline - as one would do with the hijab too. Since the building was contracted by a benefactor, the character of the building had to be sustainable and affordable, in which ZAV Architects are specialized, therefore local craftsmanship and locally available raw materials - was a must in

[100] Block (2018)

reducing construction costs to the bare minimum - making the exterior and interior of the building be identical, without any further improvement of the interior surfaces.

"*Creating an opportunity through architectural principles for such a space to exist through a charity program, provided the orphans a space with quality despite the financial issues of the project".* [101]

Smart architecture can improve not only the well-being of the community, but can offer affordable solutions when needed, creating longer lasting artifacts with low impact on the environment and positive impact on the daily lives of its inhabitants.

F., Kahr – Querkraft Architects

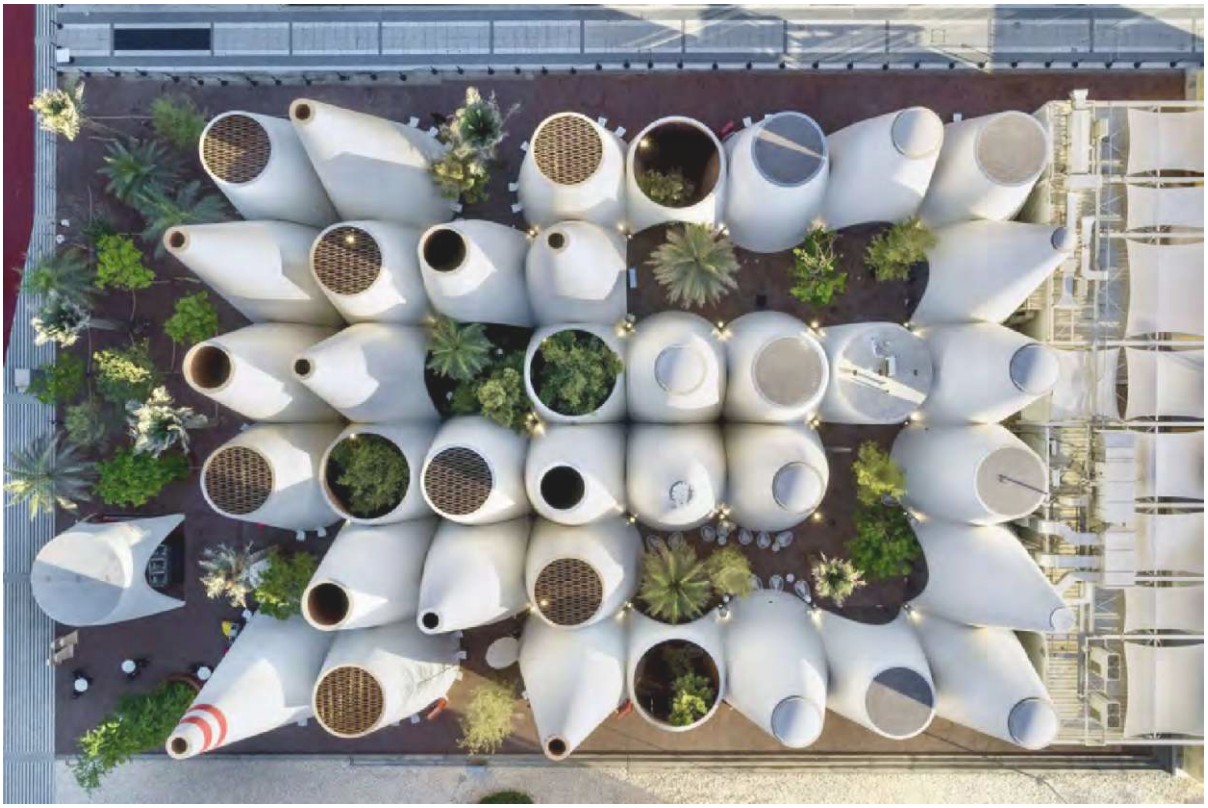


Figure 78 Austria Makes Sense, Austrian Pavilion, EXPO Dubai 2020

In depicting sustainability in European contemporary architecture, the Viennese based Querkraft Architects, is one of the best examples for that. The inclusion of sustainability together with the long forgotten good old vernacular architecture, is key in discovering new heights of green architecture. When talking about vernacular architecture and the learned

[101] Castro (2018)

sustainable lessons from it, the architects said that the connection to the old concepts has somehow been lost, but is reappearing again because of climate change issues.

Austrian vernacular architecture, has been long time forgotten, as most of the attention from our side goes in the sustainable character of the project, and that is what we aim in every single project - creating artifacts that consume minimal amount of energy (Querkraft Architects: Kahr & Fresku, 2024, Personal Interview).

The implementation of the Austrian know-how on the topic of developed technology (could not be specified due to information non-disclosure), contributes to the topic of sustainable buildings, although the architects should occupy themselves with the thought of efficient usage of natural resources, paying more respect to the environment.

Querkraft Architects and their know-how to deal with vernacular architecture and the advantages it provides, seem to have incarnated in the “Austria makes Sense” Austrian Pavilion in the Expo Dubai, Middle East 2020, exhibited in 2021 due to the Covid-19 pandemic restrictions (Abbas, 2020).

The climate conditions of Middle East, scream for sustainable architecture and innovation in terms of energy consumption structures, due to high temperatures - therefore the architects aimed making the most out of innovative technologies, by taking inspiration in the vernacular Middle Eastern architecture. Combining innovative technologies with the implementation of traditional building principles, offers a great solution in achieving sustainable low-tech building, conveying the project with a tradition-based sustainable character.

Building elements include various components, which greatly help with temperature regulation in the area - starting from windcatchers to courtyards, high ceilings, oculus together with building with soil, as a natural locally available material - allows the structure to regulate the temperature indoors, which at the same time pays tribute to the Middle Eastern architectural identity.

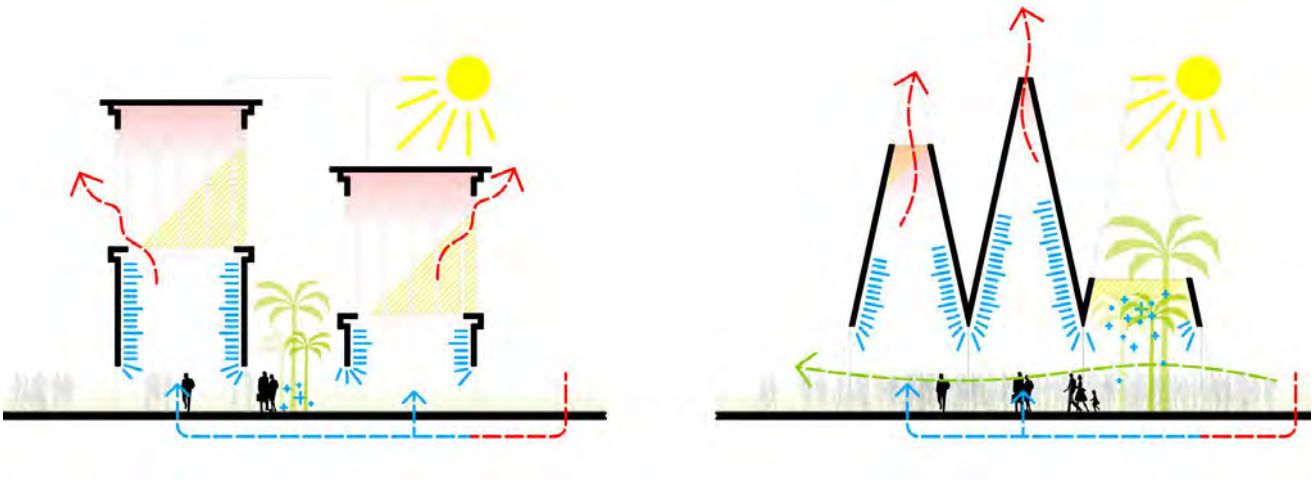


Figure 79 Windcatcher Principle Combined with Climate Engineering

The detachable intersected vault-like structures, placed next to each other, have different heights each, followed by top-openings respectively - defining the light and shadow situations in the vaults, is adapted to the use of the space, contributing to the climate regulation in the whole structure. The openings which resemble to the pierced oculi, are provided with temporary coverages during daytime, and are left open in the night to imitate the windcatcher principle, for ventilation during the night.

Anyhow, vaults, which originated from sacral architecture, aiming to reach the divine skies through physical structures at the conjuncture of a dome and a square base, found large implementation in ancient Rome (Byzantine Empire) and Middle East around the 5th century (Blog Kaarwan, 2020). These structures have proved to be a sustainable tradition-based element in helping ventilation inside the building, creating passive cooling system, creating the windcatcher principle.

"Vaults have proved as useful elements in natural lightening, ventilation and passive cooling. Under the Vaulted roof, the warm air flow occurs through the openings positioned on the far sides of the vault". [102]

When the fresh air enters the building, through the openings facing wind direction, the internally accumulated warm air under the vaulted roof, will exit through the opening located on the opposite side of the vault. The ventilation process or the passive cooling concept, was traditionally achieved through the high ceiling, which was reinforced by the roof's shape - Vaults. The height of the rooms - be it in Europe or Iran, combined with the element of the thick walls - promote a cross ventilation. This breathing concept allowing warm air to escape through the stairwells or chimneys - served as type of windcatcher, letting warm air out of the house, together with the courtyard - created a whole unit, in leveraging best passive cooling through natural resources.

Another added element, which contributes to lowering the heat in the structure, are the courtyards. Known as micro-oasis regulating temperature in the building, combined with the underground water reserve Qanat - adds another element which serves as an additional passive cooling tool - ventilating through the whole structure, providing climate comfort and a well-being feeling.

From an environmental point of view, the structure managed to save up to 70% energy consumption, compared to similar functioning structure, which lacked the know-how and traditional knowledge. The structure is built in a dismantling way, for re-use purposes - where each cone is composed of separable elements, making reconstruction elsewhere easy, supporting the concept of sustainability.

[102] Almatarneh Tawfiq (2013) p. 106

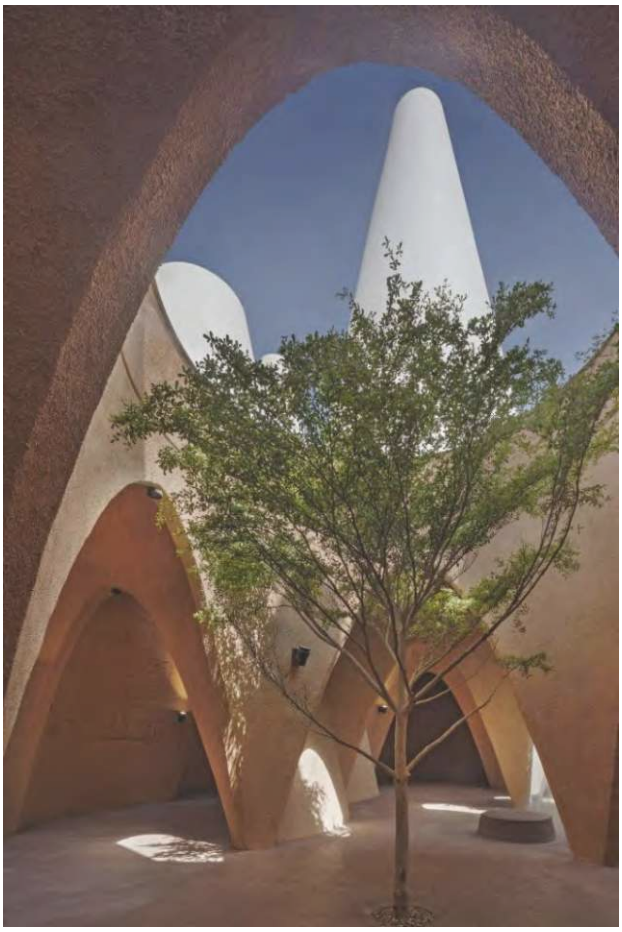


Figure 80 Courtyard Perspective

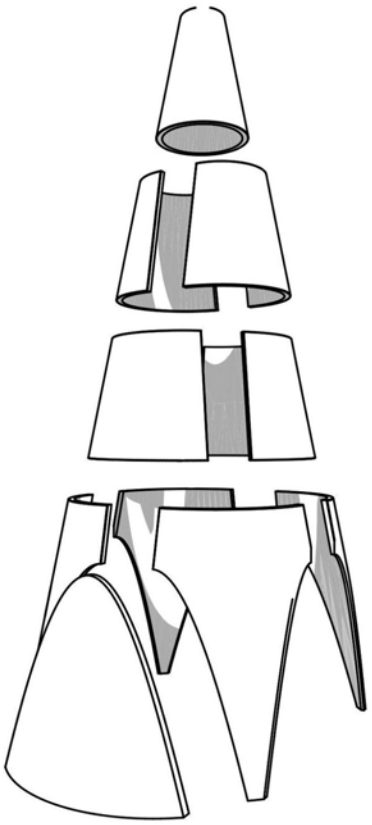


Figure 81 Detachable Cone

As Kahr.F., stated during our talk about tradition-based contemporary architecture:

"It is very important to revive the forgotten vernacular architecture, - be it in Europe or in the Middle East, - by developing vernacular architecture to the extent of implementation through innovation and technology, as the combination of both proved to be affordable and very profitable for the environment, impacting it positively instead of negatively". [103]

The forgotten good old past, offers a lot to learn from - and paying tribute to traditional architecture, can result in great contemporary architecture - creating a dialogue between the human, the environment and technology, thus such mindset help low tech architecture convey that of which we are in need of - less energy consumption.

"In any case, the approach is sympathetic and perhaps a transfer of know-how will actually succeed in the Arab-Austrian dialogue of building traditions, making old knowledge popular

[103] Querkraft Architects: Kahr & Fresku (2024) Personal Interview

again here and there, promoting its use in contemporary construction and offering alternatives to the energy-consuming technologies". [104]

Concluding with the fact that tradition-based architecture and technology are needed to match nowadays sustainable norms and requirements, such an architecture remains still expensive to implement, - yet such an investment is totally worth it, in terms of longer-term green architecture sustaining itself without huge amounts of energy being consumed in the future.

A., Linares – Jimenez y Linares

"Buscamos en el Pasado para construir el Futuro"

Taking inspiration from the past to create the Future - This is the motto of the Office Jimenez and Linares, based in Sevilla, Spain, who take reference to Tradition and Cultural Identity, to create contemporary tradition-based sustainable designs (Jimenez & Linares Architects & Fresku, 2024, Online Zoom Personal Interview). Prioritizing the architectural heritage, by implementing the usage of locally available materials, adapted solutions to the climate conditions, and respecting the surrounding environment, their aim is to create longer lasting artifacts benefiting the environment and the human mutually. The *Berro House* is described to be an oasis in the city center of the capital of Spain, Madrid. Originally the house was built by the end of the 1920s. The need of reconstructing the house in its original structure was of fundamental importance to the architects.

Figure 82 Berro House, Madrid, Spain

[104] Leeb (2018)

For an instance, to be able to restore the character of the house, a thorough research of the “Archivo de la Villa de Madrid” archives was needed. This provided the architects with the original planes of the house, which contributed in being able to restore the original image of the building - a white volume with grand windows on the outside and roman roof tiles - Tegulae and Imbrices - components of the roman lay on the roof of fired clay - a ceramic building material (Ancient Roman, n.d.).

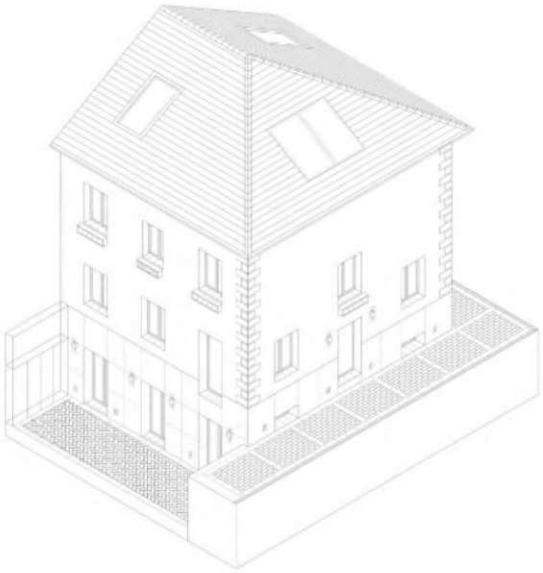


Figure 83 Entrance, Berro House

A little yard is placed at the main entrance hall of the house, surrounding the interior spaces, creating an interesting game between light and shadow. The conservation of the facades was of major importance, as the interior was being concepted and reconstructed, for better connected, open and bright, adapting to different usages and users.

The house has four different floorplans, where each floor is thought to incorporate the courtyard visually to the interior of the house, opening spaces towards it. Needing to implement the courtyard element, being present in every floor, be it physically or visually - this tradition-based element, creates a beautiful authentic space providing the house with shadow - fresh air - and beautiful views and feels in the space.

Considering the relation the individuals have with tradition, culture and environment - the architects decided to deepen further the tradition-based element implementation, by taking reference to traditionally used building materials, impacting negatively the environment, as less as possible.

Figure 84 Limewashed Yard-Walls

Figure 85 Water Element

Figure 86 Piedra Paloma

Limewashing was used on the outside to cover the façade, by implementing a traditionally used building material - which contributes in the wellbeing of the façade and building structure, allowing it to breath and act as a sustainable material in terms of protection against mold and bacteria, sucking in the carbon dioxide and regulating the temperatures in the interior.

Limewashing makes an all-rounder in the situation we are facing with huge amounts of energy consumption. Furthermore, the natural Limestone locally available was implemented, from *Piedra Paloma* located in Seville, South Spain - together with tiles mostly located in floors, like in the courtyard floor - artisanal produced in the city of Granada South Spain (Jimenez & Linares, 2021).

The consideration between the relationship the individual has with tradition, culture and sustainability aimed to be displayed in this project - describes best the efforts of contemporary architects to include tradition into their designs, creating organic and authentic spaces, which offer the much wanted and sometimes neglected connection of the individual with the natural environment.

Figure 87 Rivera House

Another Project, where we can see the implementation of traditional building elements is the *Rivera House* located in the historical Colonia de Primo de Rivera in the city of Madrid. Originally the house was designed in the 1925, and planned according the third law regulating affordable housing in 1922, together with *Ciudad Jardin* in English called

"Garden City"- an urban planning program regulating affordable housing where the dwellings are connected with the working fields in the countryside, providing a healthy and comfortable life for the workers. [105]

Implementing the courtyard in the building was essential in preserving the character of the house itself. The courtyard in this case is not centering the house, yet it divides in two areas between the frontal space when entering the house - and the back yard for a more private and secluded type of space.

Creating open spaces, easily adaptable to usages and users, is important in defining the fluidity and the connection of the interior and exterior spaces. Therefore, the courtyard in the back, is connected to the kitchen allowing good ventilation in the area, providing quality spaces during summer times of the year. The implementation of arches and high ceilings contributed in opening spaces in the house not only for structural purposes, but as well in creating organic opened and comfortable spaces, reflecting tradition and connecting to the historical character of the city (Jimenez & Linares, 2023).

The water pool located in the back Courtyard, has been sunken in helping the basement windows appear bigger - allowing larger amounts of light enter the basement, lighting up the space naturally. The courtyard elements - greenery - water pool - create a micro-oasis in the house, helping with temperature regulation in the house and creating senses of comfort for

[105] Caves (2005)

its residents. Increasing the sustainable character of the house, the façade has been treated with limewash - allowing the building to breathe and contribute in regulation temperature inside, besides offering an original and nature-linked type of façade.

Figure 88 Ground-Floor of Rivera House

A set of added elements implemented in the above-mentioned projects, show the architects willingness and ability to bound to the architectural identity of the country. Considering that the buildings impact the environment, they seek lowering this impact, by creating tradition-based contemporary architecture leading towards sustainability. Their approach to the topic of sustainable tradition-based architecture is embodied in their projects, showcasing possible ways, of implementing small simple elements designing longer lasting artifacts in harmony with its surrounding environment.

Figure 89 Interior of Rivera House, Arches

Figure 90 Limewash Walls

Affordability of Tradition-Based Architecture

Costs of Cultural Identity

Traditionally and culturally, architecture was developed as a responsive system to climate conditions, cultural norms and religious beliefs. The climate would not only influence the house styles, but would define even the urban structure of a city. Iran is mostly characterized by arid and semi-arid climate, therefore there was a constant exposure to severe sunlight and hot temperatures. As a response to such conditions, the cities would develop small and narrow streets, allowing pedestrians to walk in shade for as long as possible during the day. The streets even created a certain ventilation in the city which benefited the houses around it too.

Being defined by climate, architecture or even culture in the region - means that no matter how modernized technologies shall change, it is crucial that such adaptation should always be in harmony with thousand years of tradition and practices. The respect toward the nature and the relation the human developed, was undoubtably beneficial to the human and the environment too. For the human meant comfort and quality of life with affordable means, making it adaptable throughout the community. In light of this, the environment had the least negative impact possible, as it was a relationship in which both interests were at stake.

Contemporary architecture, facing the problematic of climate change, is in need of such smart, simple and low-cost strategies - to lessen the negative environmental impact the human caused with building without considering the environmental impact as much as it should.

Considering that building field eats up most of our planet's resources, an immediate reasoning as well as implementation of such architecture is required.

"Building's sector account for more than 40% of the total world's energy consumption". [106]

"The fact is that energy used in our buildings, including ventilation, heating, and cooling systems, accounts for more than 60% of total buildings energy consumption". [107]

The integration of Cultural Identity in contemporary architecture, seem to have regained importance when dealing with issues of sustainability as a responsive system to the climate change. As some might say, tradition in modern architecture is an illusion or an outdated practice, it has become an incentive and is leading architects nowadays in search of such

[106] Masoso & Grobler (2010) p. 173-177

[107] Chan et al. (2010) p. 781- 789

identity, as it always was about what worked and was available, and not about implementing a certain element as a wish without a purpose.

"Vernacular building, can be defined as a building culture adapted to the existing environment and available resources, producing houses with the help of traditional techniques which have a certain purpose and represent values, economic conditions, and the lifestyle of the builders".[108]

Consequently, tradition-based architecture offers solutions to contemporary sustainable architecture, meaning to reach levels of functionality according to the region by lowering the negative impact.

Considering vernacular architectural advantages proving to be affordable and available on site, components like, *energy efficiency, indoor environmental quality, locally available materials, water efficiency* all contribute to lowering energy consumption, empowering contemporary tradition-based architecture, as a tool in creating low-energy architecture without neglecting Architectural Identity in the region.

When talking about affordability of tradition-based contemporary architecture, with the architects operating on field familiar with this type of architecture, architects mention: from one client to the other, it is not about the costs when it comes to functional and efficient building, vernacular architecture proposes solutions rooted in the circumstances like material availability, craftsmen-labor force, and climate conditions. The aim is to build with that concept in mind, making good *use of local services*, *materials* with focus on impacting negatively the environment the least possible. Creating architecture which is simple, functional, efficient and affordable - is the type of architecture fulfilling the concept of architecture built - from people to people.

Although we might not find the concept as often used as we would want to, does not mean it is not there. In the field of architecture and construction, there are efforts being made for a more sustainable way of building, even when minimizing the amount of building energy cost on construction site. In the surrounding environment. But does reducing construction costs, during a sustainable building process make the building more expensive - contradicting the nature of such designs - meant to be actually affordable?

In fact, referring to the report done by European, Danish BUUS CONSULT the results have shown, that construction costs, do influence - in terms of costs - the whole process, yet efficiency can still be attained while reducing construction costs.

[108] Oliver (1997)

"*It is noticeable that several of the buildings with high scores are among the buildings with the lowest construction costs*" [109] - although it is not a basis to support the theory that is cheaper to build sustainable - as the report applies only to DGNB - certified buildings, - but it shows a possibility in reaching higher scores in sustainable certification and keeping construction costs low.

Comparing the relation between construction costs and climate impact, turns out that it is not more expensive, when the aim is to achieve a lower climate impact. It is worth understanding though that buildings with both high or low climate impact, are built for similar costs per square meter (BUUS Consult, 2020).

Although not on a large scale, it still a valuable point for architects and projects no matter where they are located - to consider and explore every possible way in making sustainable designs affordable, without losing quality of space and life. Taking into account the beginning of the building process, the core concept of the design is the project's sustainability, and in fact its affordability, completes the sustainable character of such. It is a close relation that our ancestors had with sustainability, thus they referred to the process without leaving behind the start of it.

"*In principle, the earlier relevant aspects are considered in the planning process, the greater the influence and the lower the costs. Those who want to build sustainable should think about sustainability from the very beginning*" [110]

Due to the climate conditions and natural resources in Iran as in the rest of the Middle East, it is worth mentioning that many of the existing buildings are full of lessons of sustainability, which are being reconsidered as powerful weapons in leading towards a more sustainable and affordable type of architecture.

"Vernacular architecture, in the Arab World, is a model for sustainability: it embodies different cultural values, which may be applied in the conceptual design of building today" [111]

Sustainability and Vernacular Architecture together with Cultural Identity, are seen as one of the essential aspects of architecture, which surpasses visual interpretation and perception of this superficially "spoken" language. When referring to sustainable architecture in relation to

[109] BUUS Consult (2020) p. 8

[110] Kehl (2020)

[111] Salman (2018) p. 6

the traditional one, we find that the relationship between the environment and the human stood at foremost.

Investigating the cause of a problem to later try to find and implement the best of solutions in terms of architecture, led traditionally to sustainability. For an instant, in the arid region of the Middle East, the severe sunlight and harsh temperatures inspired ways of protection from the heat, by relying in natural passive cooling processes which count only on natural resources without further energy consumption (Al-Sallal & Rahmani, 2019, p. 34). From the structure, to windows and the material usage, it all aimed one thing: The comfort indoor and quality of life while respecting the environment.

"*Sustainability means meeting the needs of the present without compromising the capacity of future generations to satisfy their own needs*" [112]

Although building in accordance to the climate and environment - the vicinity does influence the process as a whole. While passive cooling is created and implemented, undeniably the nature fact influences substantively the process: *with vegetation*, *water ponds* and *fountains*, which are crucial for effective cooling methods.

"The most characteristic of passive solar design is that it relies on the integration of a building's architecture, materials selection, and construction methods to reduce heating and cooling loads. It takes into consideration local climate conditions, such as temperature, solar radiation and wind: to create climate-responsive, energy conserving structures that can be powered with renewable energy resources" [113]

Affordability – One for All Design Affordable?

With reference to the gathered information from the Interviews conducted with the architects implementing such type of architecture, the outcome about solutions and suggestions of the architects in reducing costs during the design and implementation- emerged different points of views on the matter. Depending on the definition of affordability, being perceived differently from community to community, influenced by cultural and social practices, different results rose.

[112] WCDE (n.d.)

[113] Almatarneh Tawfiq (2013) p. 101

Affordability, its meaning as the Oxford Dictionary suggests - *"is the state of being cheap enough for people to be able to buy".* [114]

As sustainability suggests, using and reusing concept goes a long way, whereas affordability can be considered to be an issue, when observed in a short-term timeframe - yet it does not seem to be an issue for long-term timeframes. Even though referred to as primitive, traditional architecture, stands as a field of research for architects and researches to take reference to social, cultural, sustainable and affordable studies (Almatarneh Tawfiq, 2013, p. 100).

"Regardless of where an architect and a home builder is based, our ancestors around the world have provided us with plenty of past examples to build for a more sustainable and comfortable present". [115]

Learning from the past experiences, does not mean copying styles and shapes, but understanding by investigating the concept and functionality of such implemented architectural elements or materials.

The definition of traditional architecture, does not only include the fact of what is built, it rather stands for the reason why is built that particular way - the concept and logic behind such building methods and styles. Being able to withstand the test of time, this type of architecture carries within, simple solutions to long-term problems, especially for contemporary architects and architecture. Due to the simple logic of these solutions found in traditional architecture, it passed easily over and over from generation to generation throughout the communities.

"…sustainability was a necessity and a "way of life": not just a concept". [116]

It is this concept what makes vernacular architecture so inspiring for contemporary sustainable designs - being able to implement practices that are environment friendly, while implementing the sustainable practice. Learning from the past, goes beyond shapes, geometric patterns or calculations, it is about discovering more about the relationship, man

[114] Cambridge Dictionary (n.d.)

[115] Almatarneh Tawfiq (2013) p. 101

[116] Almatarneh Tawfiq (2013) p. 108

has with nature and its surroundings, without neglecting the fact of environment protection, preservation and sustainable development.

From this point of view, tradition-based architectural elements included in contemporary architecture should be for the mere purpose of improving the energy efficiency of a particular building, where implemented.

"Architects and designers shall understand traditional elements of design and techniques of construction to function them in their projects without reinventing construction methods". [117]

The Austro-Iranian architect Daneshgar, confessed during our talk in his office - tradition-based architecture, is affordable, even if that means investing today in terms of monetary investment more than investing in conventional designs, as that would mean affordable for the tomorrow's reality situation in terms of sustainability, being a relief to the whole climate change situation we are facing now.

On the other side, traditional-based architecture should be affordable as means in leading toward Sustainability, as per its costs, it proves to be very affordable today and tomorrow, future existing artifacts, offering low-cost solutions for longer lasting problems.

"The magic of tradition-based contemporary architecture lies in the smart solutions taken influence from the thousands of years building experience and implementation of materials in contemporary architecture" (Tadayon, Davarpanah & Fresku, 2024, Online Zoom Personal Interview).

To start the design, the architects gather information, continuing with designing to later be able to follow up with the construction. Of course, in the process, the client's requirements, are as important as the design itself. Anyhow by researching the location of the desired project, with possible ideas and planning, it ends up by discussing and finalizing the process with the last of them all: costs (Archisoup, 2024).

Based on this simple yet vague example, can we talk about the differentiation on how the architect designs and plans for the middle-class client, in comparison to elite? How affordable is sustainable architecture? What is the right approach to this situation?

[117] Almatarneh Tawfiq (2013) p. 109

Talking about it with the well-known Iranian Architect Tadayon, H., turned out that the tradition-based type of architecture, targets the needs of the society and the traditionally inflicted cultural practices, therefore this type of architecture requires functionality above all, resulting to be on the affordable side, making tradition and cultural identity building implementation sustainable in terms of costs too (Tadayon, Davarpanah & Fresku, 2024, Online Zoom Personal Interview).

Another interpretation of this matter from the Austrian Architect Kahr Fabian, of Querkraft Architects located in Vienna, when talking about the affordability of sustainable designs, followed:

"I think it is an expensive type of architecture, that requires the combination of many Institutes and elements, it is not solely in our hands, though architects are the generators of innovative and effective developed designs, making people think, thus this is our power".

But what is the reason behind it making such an architecture so expensive? A beautiful explanatory example Mr. Kahr shared with me - the implementation of well isolated windows in a building facing a highroad, where cars are constantly on a move - "*Instead of implementing triple glass for good sound isolation, we can cooperate with the responsible institution and just reduce the number of the cars passing, regulating the noise and pollution, makes more sense to me than just putting the whole responsibility on architects and architecture*". [118]

Although tradition-based architecture offers many solutions to the nowadays problems - related to sustainability - which architects aim to re-discover and implement, it is a case resting not only in the hands of the architects and planners only, it is rather a larger picture that needs to be drawn and definitely architects are not the only players in the game (Querkraft Architects: Kahr & Fresku, 2024, Personal Interview).

The way tradition is embodied in the concept of sustainability, speaks of the way Europe and Middle East, used architecture as a responsive tool to the environment, from a climatic point of view, cultural and social. The implementation of sustainable building elements is somehow linked to tradition combining the use and reuse concept, representing a qualitative life matching all cultural, social and environmental norms.

Although sometimes affordable sometimes expensive, we conclude that, tradition-based type of architecture cannot be defined that easy when referring to the affordability of such architecture. It indeed proposes many solutions to today's issue of climate change, anyhow

[118] Querkraft Architects: Kahr & Fresku (2024) Personal Interview

another theory about it, would be - as many of the architects operating in this field defined, - as not expensive in terms of longer lasting artifacts, - what is today expensive it is affordable on the long-run for the well-being of the human and the environment.

Creating spaces where the human senses the *belonging-feel,* followed by the building belonging to the environment, reflecting Identity and sustainability in contemporary architecture. This approach showcases the main concern of Iranian contemporary architects, in willing to bring traditional knowledge to modern contemporary architecture (Masoud Bani, 2020).

"The concept of "sustainable city", on the other hand, probably faces the heart of the problem, but because it is impossible to precisely quantify the flows of energy, material, and momentum that take place in the city, present solutions are limited to "eco-districts", a sort of technological showcase where it is impossible today to analyze the physical impact or the real cost, and it is therefore misleading to imagine a generalization to the entire city". [119]

Different Interpretation and solution suggestions came from ZAV-Architects, when talking about affordability in contemporary tradition-based architecture, Ghodousi, M.,- founder of ZAV-Architects - argues that investing in this type of architecture does not only include the building itself, but is rather about the process of including the community these buildings are concepted for, - the labor force, together with architecture staying loyal to the context and time, it should all be serving the purpose of the people's well-being by creating for people with people.

The affordability concept was effectively implemented in the Project the *Majara Residential* in Hormuz Island. To complete the construction of the project, the architect and his designing team included in the project not only craftsmen but as well as locals with not great constructing skills, this was possible thanks to the construction method applied the Superadobe system.

Roughly estimated, when compared to a conventional project constructing 200 domes in 200mq, the architects managed to invest only 35% of the budget in material costs, leaving 65% of the budget for labor costs. Usually in a conventional project, 20% of the budget is invested in labor cost, with 80% being invested in non-affordable and non-sustainable construction materials.

[119] Beckers & Garcia-Nevado (2019) p. 170

Figure 91 The Majara Residential, Presence in Hormuz Island

In determining a sustainable affordable designing process, is crucial for the designing team to fully be integrated in every step of it, knowing the implemented technology and materials, thus an advanced expertise, skilled and experienced integrated design team with the right decision-making, influences the affordability of the building (Hu, 2023, p. 3).

"…early decisions have a large impact on the final construction cost". [120]

Inclusion should be happening in all stages of the process, and affecting all involved parties. If we are able to manage a harmonious process happening in a certain community, we have done good sustainable affordable architecture, connected to the past yet innovative and pleasing to the inhabitants, environment and society.

[120] Hu (2023) p. 12

Discussions and Conclusion

Affordability when it comes to sustainable buildings, being energy efficient among many other features - it is perceived as expensive - making it accessible only to a certain group of people or in other words the elite. Having collected information regarding the matter, through research and conduction of one-on-one Interviews, proved to be practical and in a way convenient too - though it made it difficult for me in terms of reaching a consolidated result. Using such method, the outcome tends to be somehow subjective, therefore a variation on information emerged. But is that the case - or are we dealing with a misconception?

"The perceived high cost and market pursuit may further advance the reputation of sustainable building as an elite, eventually resulting in environmental injustice through pushing green building prices out of reach for low-income families and even middle-class families". [121]

There is, no one-size fits all answer to affordable tradition-based contemporary architecture. Maybe the Definition for one-size fits all can be of different dimensions depending on what type of buildings we are talking about. Is it a residential building for a targeted group of people, or the community? This raises many questions and maybe other issues worthy of discussion. Designing for a targeted group of people of a certain community and region, facilitates the process of designing in a sustainable and affordable way, as different parties are included in all levels of planning.

This inclusion as M. Ghodousi suggests, does define the level of affordability and sustainability of a design, as the combination of a well-thought in context design, favoring the location in terms of cultural identity, the locally available natural resources and the skilled labor force of the region - defines the affordable character of tradition-based contemporary architecture.

The expected biased outcome stating: that the contemporary tradition-based architecture has as a backbone - Sustainability, but affordability seems to be a problem. Misconception? Maybe, but as some of the Interviews with architects showed that designing such building can be affordable by a selected group of people. Although going down this path, Iranian Architect A. Taghaboni suggests - there are more and more middle-class people that are in search of good stuff too, contributing in changing the misconception created about efficient architecture being expensive to attain.

[121] Hu (2023) p. 5

The perception of tradition-based architecture can be expensive or inexpensive in terms of affordability, but the inclusion of exactly this traditional knowledge which taught us valuable lessons when it comes to sustainability, it is affordable when implemented right - as in terms of todays investments for a better tomorrow with less energy consumption it is sustainable and affordable.

The definition of affordability varies from region to region and it shares a bond with cultural and social norms, depicting the whole situation about sustainable tradition-based architecture. Indeed, many traditional building elements do contribute to less energy consumption in the buildings where implemented, making it sustainable, while having roots in the good old traditional architecture, making it affordable too.

Suggesting that the costs of sustainable architecture, are not really fundamental in defining the level of sustainability, but does mostly refer to the performance of the building in terms of efficiency and reduction of energy consumption (Hu, 2023, p. 9).

Austrian Architect F. Kahr, on the other hand, does support the idea of sustainable architecture not really laying on the light side of the balance - arguing that in making a design affordable it is an issue regarding additional involved parties and it is a lot to be laying on the shoulders of the designing team only.

It is a fact that with the implementation of the valuable experience brought to us through tradition - sustainable tradition-based architecture, offers many possibilities with affordable character. Making use of the logic that architecture it is made by people to people, implementing easy and effective elements into contemporary architecture, help not only reduce building costs but can contribute in lowering energy consumption levels, benefiting both the human and the environment, economically, socially and culturally speaking.

"…vernacular structures are usually constructed in a manner that is harmonious with the local weather conditions, thereby reducing their ecological print, being cost-effective, recyclable and generate less construction waste than modern building". [122]

Architects occupying themselves with the thought of relying on tradition, culture and traditional architecture not only for representational purposes, but instead developing from this lived process through many years of experience by taking a chance in innovating the old, adapting their sustainable qualities, combined with the advanced technology - makes wonders for our environment and its individuals, giving them a feeling of belonging right there where they are.

[122] Hosseinian et al. (2023)

Diskussionen und Konklusion

Wenn es um nachhaltige Gebäude geht, wird die Leistbarkeit, die Energieeffizienz und viele andere Merkmale als teuer empfunden, so dass sie nur einer bestimmten Gruppe von Menschen, mit anderen Worten der Elite, zugänglich sind. Das Sammeln von Informationen zu diesem Thema durch Recherche und die Durchführung von Einzelinterviews erwies sich als praktisch - obwohl es für mich schwierig war, ein konsolidiertes Ergebnis zu erzielen. Bei Verwendung einer solchen Methode ist das Ergebnis in der Regel irgendwie subjektiv, weshalb es zu unterschiedlichen Informationen kam. Aber ist das so - oder haben wir es mit einem Missverständnis zu tun?

„Die vermeintlich hohen Kosten und die Verfolgung durch den Markt könnten den Ruf des nachhaltigen Bauens als Elite weiter stärken und schließlich zu Umweltungerechtigkeit führen, indem die Preise für umweltfreundliches Bauen für Familien mit niedrigem Einkommen und sogar Familien aus der Mittelschicht außer Reichweite geraten“. [123]

Es gibt keine allgemeingültige Antwort auf leistbare, traditionsbasierte zeitgenössische Architektur. Möglicherweise kann die Definition für eine Einheitsgröße - One-size fits all unterschiedlich dimensioniert sein, je nachdem, um welche Art von Gebäuden es sich handelt. Handelt es sich um ein Wohngebäude für eine bestimmte Personengruppe oder die Gemeinschaft? Dies wirft viele Fragen und vielleicht auch andere Themen auf, die einer Diskussion wert sind. Das Entwerfen für eine gezielte Gruppe von Menschen einer bestimmten Gemeinde und Region erleichtert den Entwurfsprozess auf nachhaltige und erschwingliche Weise, da verschiedene Parteien in alle Planungsebenen einbezogen werden.

Diese Einbeziehung definiert, wie M. Ghodousi vorschlägt, den Grad der Leistbarkeit und Nachhaltigkeit eines Entwurfs als Kombination aus einem gut durchdachten, kontextbezogenen Entwurf, der den Standort im Hinblick auf die kulturelle Identität hält, den lokal verfügbaren natürlichen Ressourcen und den qualifizierten Arbeitskräften in der Region bevorzugt - definiert den erschwinglichen Charakter traditionsbasierter zeitgenössischer Architektur.

Das erwartete voreingenommene Ergebnis besagt, dass die zeitgenössische, auf traditionsbasierte Architektur Nachhaltigkeit als Rückgrat hat, aber die Erschwinglichkeit scheint ein Problem zu sein. Missverständnis? Vielleicht, aber wie einige der Interviews mit Architekten zeigten, kann der Entwurf eines solchen Gebäudes für eine ausgewählte Gruppe von Menschen leistbar sein.

[123] Hu (2023) p. 5

Der iranische Architekt A. Taghaboni geht zwar diesen Weg ein, - es gibt auch immer mehr Menschen aus der Mittelschicht, die auf der Suche nach guten Dingen sind, - was dazu beiträgt, das Missverständnis zu ändern, dass effiziente Architektur teuer in der Anschaffung sei.

Die Wahrnehmung einer auf traditionsbasierte Architektur kann im Hinblick auf die Erschwinglichkeit teuer oder kostengünstig sein, aber die Einbeziehung genau dieses traditionellen Wissens, dass uns wertvolle Lektionen in Bezug auf Nachhaltigkeit gelehrt hat, ist leistbar, wenn es richtig umgesetzt wird - was die heutigen Investitionen betrifft eine bessere Zukunft mit weniger Energieverbrauch - es ist nachhaltig und erschwinglich.

Die Definition von Erschwinglichkeit ist von Region zu Region unterschiedlich und weist eine Verbindung zu kulturellen und sozialen Normen auf, was die gesamte Situation nachhaltiger, auf traditionsbasierte Architektur abbildet. Tatsächlich tragen viele traditionelle Bauelemente zu einem geringeren Energieverbrauch in den Gebäuden bei, in denen sie eingesetzt werden, was sie nachhaltig macht, während ihre Wurzeln in der guten alten traditionellen Architektur sie auch leistbar machen.

Dies deutet darauf hin, dass die Kosten nachhaltiger Architektur nicht wirklich ausschlaggebend für die Definition des Nachhaltigkeitsniveaus sind, sich aber hauptsächlich auf die Leistung des Gebäudes in Bezug auf Effizienz und Reduzierung des Energieverbrauchs beziehen (Hu, 2023, p. 9).

Der österreichische Architekt F. Kahr hingegen unterstützt die Idee, dass nachhaltige Architektur nicht wirklich auf der hellen Seite der Waage steht - und argumentiert, dass die Leistbarkeit eines Entwurfs ein Problem für weitere beteiligte Parteien sei und dass es viel zu tun sei, liegen nicht nur auf den Schultern des Designteams.

Es ist eine Tatsache, dass mit der Umsetzung der wertvollen Erfahrungen, die uns die Tradition vermittelt, eine nachhaltige, auf traditionsbasierte Architektur viele Möglichkeiten mit leistbarem Charakter bietet.

Die Nutzung der Logik, dass Architektur von Menschen für Menschen gemacht wird, und die Implementierung einfacher und effektiver Elemente in die zeitgenössische Architektur tragen nicht nur zur Senkung der Baukosten bei, sondern können auch zur Senkung des Energieverbrauchs beitragen, was sowohl dem Menschen als auch der Umwelt wirtschaftlich, sozial und kulturell gesehen, zugutekommt.

„...einheimische Bauwerke werden in der Regel so gebaut, dass sie mit den örtlichen Wetterbedingungen harmonieren, wodurch ihr ökologischer Fußabdruck verringert wird, sie

kostengünstig und recycelbar sind und erzeugen weniger Bauschutt als moderne Gebäude“ [124]

Architekten, die sich mit dem Gedanken beschäftigen, sich nicht nur zu Repräsentationszwecken auf Tradition, Kultur und traditionelle Architektur zu verlassen, sondern sich aus diesem gelebten Prozess durch langjährige Erfahrung zu entwickeln, indem sie die Chance nutzen, Altes zu erneuern und die damit verbundenen nachhaltigen Qualitäten zu adaptieren, die fortschrittliche Technologie bewirkt Wunder für unsere Umwelt und ihre Menschen und gibt ihnen ein Gefühl der Zugehörigkeit genau dort, wo sie sind.

[124] Hosseinian et al. (2023)

References

12Características. (n.d.). *Yeso (Características, concepto y origen).* https://www.12caracteristicas.com/yeso/

Abbas, W. (2020, May 5). *Dubai Expo Confirms New Dates: Oct 1, 2021 until Mar 31, 2022.* Khaleej Times. https://www.khaleejtimes.com/expo/dubai-expo-confirms-new-dates-oct-1-2021-until-mar-31-2022

Abdel, H. (2020, December 1). *Presence in Hormuz 2 / ZAV Architects*. ArchDaily. https://www.archdaily.com/952361/presence-in-hormuz-2-zav-architects

Afyouni Hakim, N. (2015). *Mohammad Reza Ghaneei, Modern Architecture in Iran*, 167.

Ahsannezhad, A. (2022, August 1). *Creativity and Architecture Center - Safavi House of History*. Tubadzin Design Community. https://tubadzincommunity.com/en/ethno-culture-and-identity-multicultural-inspirations/

Almatarneh Tawfiq, R. (2013). *Sustainability Lessons Learnt from Traditional Architecture: A case study of the old city of As-Salt, Jordan,* 100-109.

Aloiz, E., & Douglas, G. J., & Nagel, A. (2016). Painted Plaster and Glazed Brick Fragments. *Achaemenid Pasargadae and Persepolis, Iran*. https://doi.org/10.1186/s40494-016-0072-7

Alothman, H. (2016). *Common Traditional Places for Mashrabiya*. Abiya Mashrabiya. https://www.abiya.ae/knowlegde-hiba/common-traditional-places-for-mashrabiya

Ancient Roman Tile History and Inspiration. (n.d.). Why Tile. https://whytile.com/tile-history/ancient-roman-tile-history-and-inspiration/#:~:text=The%20exquisite%20use%20of%20tile,Mosaic%20(circa%20100%20B.C.).

Akhbare Koohpaye. (n.d.). *The Eight Paradises of the Field were Awarded by UNESCO*. Akhbarekoohpaye.ir/1966/بایگانی?print=1

Apochi. (n.d.). *Kashan Attractions: Borujerdi House*. https://apochi.com/attractions/kashan/borujerdi-house/

Arch20. (n.d.). *Amir Villa - Nextoffice, Alireza Taghaboni*. https://www.arch2o.com/amir-villa-nextoffice-alireza-taghaboni/

ArchDaily. (2012, July 10). *Amir Villa / Next Office - Alireza Taghaboni*. https://www.archdaily.com/252663/amir-villa-nextoffice-alireza-taghaboni

Archisoup. (2024, February 15). *Architecture Design Process: The 7 phases.* https://www.archisoup.com/architecture-design-process

Architecture & Design. (2021, September 7). *300-year-old Home Restored and Turned Into Architecture Studio.* https://www.architectureanddesign.com.au/news/300-year-old-iranian-home-restored

ArtenCórdoba. (n.d.). *Courtyards in Córdoba.* https://www.artencordoba.com/en/courtyards-cordoba/history-patio-courtyard-origin-evolution/

Ayoubi, A. (2018, July 6). *Iranian Architect Alireza Taghaboni Receives the First Royal Academy Dorfman Award.* Architect Magazine. https://www.architectmagazine.com/awards/iranian-architect-alireza-taghaboni-receives-the-first-royal-academy-dorfman-award_o

Azarpay, G. (2012, December 30). Brick, *Encyclopaedia Iranica*, *4-5*, 447-449. http://www.iranicaonline.org/articles/brick-blocks-of-tempered-mud

Bel-Anzué, P. & Elert, K. (2021, September 30). Changes in Traditional Building Materials: The Case of Gypsum in Northern Spain. *Archaeological and Anthropological Sciences, 13*, 4-17. https://doi.org/10.1007/s12520-021-01438-6

Block, I. (2018, August 16). *ZAV Architects Completes Home with Veiled Balconies for Orphaned Iranian Girls.* Dezeen. https://www.dezeen.com/201808/16/zav-architects-habitat-orphan-girls-khansar-iran-architecture/

Bouchahm, Y., Bourbia, F., & Belhamri, A. (2010, March). Performance Analysis and Improvement of the Use of Wind Tower in Hot Dry Climate. *Renewable Energy, 36*(3), 898-906. https://doi.org/10.1016/j.renene.2010.08.030

Bronner, J. S. (2000). The Meaning of Tradition: An Introduction. *Western Folklore, 59*(2), 87-104.

BUUS Consult. (2020, July). *Is it Expensive to Build Sustainable.*

https://www.netzwerk-nachhaltige-unterrichtsgebaeude.de/dateien/Arbeitsgruppen/Arbeitsdokumente/Interne_Dokumente/Is_it_expensive_to_build_sustainable.pdf

Cao, L. (2023, December 26). *How Rammed Earth Walls are Built*. ArchDaily. https://www.archdaily.com/933353/how-rammed-earth-walls-are-built

Cambridge Dictionary. (n.d.). *Affordability.* https://dictionary.cambridge.org/dictionary/emglish/affordability

Castro, F. (2018, January 25). *Habitat for Orphan Girls / ZAV Architects*. ArchDaily. https://www.archdaily.com/887653/habitat-for-orphan-girls-zav-architects

Caves, W. R. (2005). Garden City. *Encyclopedia of the City,* 281-282.

Chan, HY., Riffat, B. S., & Zhu, J. (2010, February). Review of Passive Solar Heating and Cooling Technologies. *Renewable and Sustainable Energy Reviews, 14*(2), 781-789. https://doi.org/10.1016/j.rser.2009.10.030

Cheng, L. (2022, June 10). What Is Limewash Paint: Four Places to Use It in Your Home. Architectural Digest. https://www.architecturaldigest.com/story/how-to-paint-limewash-paint

Contemporary Architecture of Iran CAOI. (2020, March 21). *Amir Villa.* https://www.caoi.ir/en/projects/item/302-amir-villa-in-mohammadshahr-karaj-by-next-office.html#description

Contemporary Architecture of Iran CAOI. (2021, January 20). *Ghaneei House*. https://www.caoi.ir/en/projects/item/406-ghaneei-house-isfahan-polsheer-architects.html#description

Contemporary Architecture of Iran CAOI. (2019, July 9). *Pomegranate Garden House of Grandfather.* https://www.caoi.ir/en/projects/itemlist/category/16.html

Coulleri, A. (2022, March 7). *Berro House / Jimenez Linares*. ArchDaily. https://www.archdaily.com/978161/berro-house-jimenez-linares

Craven, J. (2018, November 26). *The Amazing Architecture of Spain's Alhambra*. ThoughtCo. https://www.thoughtco.com/the-alhambra-4138628

Cvetković, D. (2024, January 11). *The Pathway of Modern Architecture Through History*. How to Rhino. https://howtorhino.com/blog/architecture-styles/modern-architecture/

Daneshgar, A. & Fresku, L. (2024, February 27). *Personal Interview.*

Daneshgar, A. & Rademacher, C. (2019). *Armin Daneshgar: Leben und Bauen,* 168.

Elias, J. (2015, April 20). *O que é Bâgdir, ou "torre de vento"?* https://chadelimadapersia.com/arquitectura/o-que-e-bagdir-ou-torre-de-vento/

El Semary Mounir, Y. (2017, October). Modern Mashrabiyas with High-tech Daylight Responsive Systems. *Proceedings of the first international conference on: Cities' Identity through Architecture and Arts, 1*(1). https://doi.org/10.21625/archive.v1i1.113

European Commission. (2014). *The European Construction Sector - A Global Partner*, 1-14. https://eurocodes.jrc.ec.europa.eu/sites/default/files/2021-12/The%20European%20construction%20sector%20-%20a%20global%20partner.pdf

Eventourcordoba. (2023). Patios de Córdoba, ¿Cuándo se celebran los Patios en 2023? eventourcordoba.es/blog/patios-de-cordoba-cuando-se-celebran-los-patios-en-2023/

Fathy, H. (1986). *Natural Energies and Vernacular Architecture Mashrabiya*, 195.

Ferrari, P. E. (2021, August 3). *From Soil to Domes: Vernacular Architecture and Construction Techniques in Esfahak, South Khurasan*, 24. Journal of the British Institute of Persian Studies. https://doi.org/10.1080/05786967.2021.1960883

Fresku, L. (2023, September). Photos: Sekirn, Klagenfurt, Österreich.

Gabbatiss, J. (2020, February 20). *The Carbon Brief Profile: Iran*. Carbon Brief. https://www.carbonbrief.org/the-carbon-brief-profile-iran/

Gadeva Vasileva, G. (n.d.). *Rokoko.* Pinterest. https://www.pinterest.com/pin/schnbrunn-palace-is-a-former-imperial-1441room-rococo-summer-residence-in-modern-vienna-austria-one-of-the-mo--487585097130374267/

Ghiaus, C. & Allard, F. (2005). *Natural Ventilation in the Urban Environment: Assessment and Design, 1,* 266. https://doi.org/10.4324/9781849772068

Gillman, D. (2010). *The Idea of Cultural Heritage: Revised Edition,* 201.

Golden Trezzini Awards. (n.d.). *Architecture and Creation Museum of Safavi Historical House (Isfahan, Iran).* https://www.goldtrezzini.ru/en/nominees/safavi-historical-house/

González, F. M. (2021, February 24). *GHANEEI HOUSE / Polsheer Architects*. ArchDaily. https://www.archdaily.com/95119/ghaneei-house-polsheer-architects

González, F. M. (2018, July 9). *Kharand-House / Hamed Tadayon, Mohammad Amin Davarpanah, Javad Roholoullahi.* ArchDaily. https://www.archdaily.com/897582/kharand-house-hamed-tadayon-mohammad-amin-davarpanah

González, F. M. (2020, April 4). *Saadat Abad Residential Building / Mohsen Kazemianfard - Fundamental Approach Architects.* ArchDaily. https://www.archdaily.com/907202/saadat-abad-residential-building-mohsen-kazemianfard-fundamental-approach-architects

González, S. M. (2022, November 29). *It took a village to build Europe's Gothic cathedrals*. Nationalgeographic. https://www.nationalgeographic.com/history/history-magazine/article/gothic-cathedrals-architecture-medieval-europe

Government of the Islamic Republic of Iran. (2019, June 16). *Arab States Obstructing Registration of Iranian Windcatcher at UNESCO.* https://irangov.ir/detail/326151

Gründerzeit Museum. (n.d.). *Gründerzeit Architektur*. https://gruenderzeitmuseum.de/gruenderzeit-architektur/

Heathcote, E. (2019, May 22*). Alireza Taghaboni: 'Architects have to be optimistic - it is our fate!'.* Financial Times. https://www.ft.com/content/33507fbe-7baf-11e9-81d2-f785092ab560

Heidarinejad, G., Heidarinejad, M., Delfani, Sh., & Esmaeelian, J. (2008, December). Feasibility of Using Various Kinds of Cooling Systems in A Multi-Climates Country. *Energy and Buildings, 40*(10), 1946-1953. https://doi.org/10.1016/j.enbuild.2008.04.016

Henderson, S. (2019, May 9). *The Alhambra: Layers of Beauty and Architectural History.* Slow Space. https://www.slowspace.org/the-alhambra-layers-of-beauty-and-architectural-history/

Hewitt, A. M. (2018, November 20). *Modernism: The International Style that Wasn't.* ArchDaily. https://www.archdaily.com/906063/modernism-the-international-style-that-wasnt

Holland, O. (2017, December 27). *What Traditional Buildings Can Teach Architects About Sustainability?* CNN. https://edition.cnn.com/style/article/vernacular-architecture-sustainability/index.html#:~:text=Alternatively%2C%20so%2Dcalled%20%E2%80%9Cvernacular,are%20made%20from%20local%20materials.

Hosseinian Mahdi, S., Sabouri, G.A. A., & Carmichael, G. D. (2023, August 15). Sustainable Production of Buildings Based on Iranian Vernacular Patterns: A Water Footprint Analysis. *Building and Environment, 242*. https://doi.org/10.1016/j.buildenv.2023.110605

Hotel am Brillanten Grund. (n.d.). *Come as a Guest, leave as a friend.* https://ukulele-indigo-mkkw.squarespace.com

Hwang, I. (2019, May 9). *The Alhambra: Layers of Beauty and Architectural History*. Slow Space. https://www.slowspace.org./the-alhambra-layers-of-beauty-and-architectural-history/

Iran Front Page. (2019, June 16). *Arab States Obstructing Registration of Iranian Windcatcher at UNESCO.* https://ifpnews.com/arab-states-obstructing-registration-of-iranian-windcatcher-at-unesco/

Ivanova, A. & Marinova, I. (2020, May 27). *Role of colors in historical buildings preservation,* 1-9. Researchgate. https://www.researchgate.net/publication/348437611_Role_of_colors_in_historical_buildings_preservation

Jäger, A. (2022, October 12). The Answer to Climate Change: Brick as a Building Material. Wienerberger. https://www.wienerberger.com/en/stories/2022/20221012-The-Answer-to-Climate-Change-Brick-as-a-Building-Material.html

Jimenez & Linares Architects: Linares, A. & Fresku, L. (2024, March 22). *Online Zoom Personal Interview*.

Jimenez & Linares. (2021). *Casa Del Berro: Vivienda Unifamiliar en Fuente del Berro.* https://www.jimenezlinares.com/proyectos/reforma-lujo-madrid-casa-berro/

Jimenez & Linares. (2023). *Casa Rivera: Reforma Integral de Vivienda Unifamiliar en Madrid.* https://www.jimenezlinares.com/proyectos/casa-rivera/

Kaminer, M. (2022, May 30). *Sustainability and Luxury Are Made for Each-Other, Says Eco-Focused Designer.* Mansion Global. https://www.mansionglobal.com/articles/sustainability-and-luxury-are-made-for-each-other-says-eco-focused-designer-01653906068

Kammeter, M. (n.d.). *Daneshgar Architects, Amtshausgasse, Wien.* Architekturfotografie. architekturfotografie.kammeter.de/portfolio/architektur/amtshaus/

Kapfinger, O. & Fechner, J. (2006, October 10). *Wohnanlage Obere Amtshausgasse*. Nextroom. https://www.nextroom.at/building.php?id=33686

Karava, P., Stathopoulos, T., & Athienitis, K. A. (2007). Wind-induced Natural Ventilation Analysis. *Solar Energy, 81*(1), 20-30. https://doi.org/10.1016/j.solener.2006.06.013

Kassir, M. R. (2015, September). Passive Downdraught Evaporative Cooling Wind-Towers: A case study using simulation with field-corroborated results. *Building Services Engineering Research and Technology, 37*(1). https://doi.org/10.1177/0143624415603281

Kateb, F. (2018, March). Window in Iran Islamic Architecture with Emphasis on Role of Light. *Journal of History Culture and Art Research, 7*(1), 215-222. http://dx.doi.org/10.7596/taksad.v7i1.1454

Kehl, M. L. (2020, October 23). *The Myth of Increased Costs in Sustainable Building*. Deutsche Gesellschaft für Nachhaltiges Bauen - DGNB. https://blog.dgnb.de/en/myth-of-increased-costs-in-sustainable-building/

Khalili, R. (2019, April 15). *The Role of Color in Sense of Place: Tajrish and Hassan Abad Squares - Tehran*, 119.

Kimutai, G. (2019, June 13). Examples And Characteristics of Gothic Architecture. WorldAtlas. https://www.worldatlas.com/articles/what-is-gothic-architecture.html

Kolokotroni, M., Ayimomitis, A., & Ge, T. Y. (2002). *The Suitability of Wind Driven Natural Ventilation Towers for Modern Offices in the UK.* World Renewable Energy Congress.

Kospach, J. (n.d.). *Traditionelle Österreichische Baukultur*. Servus. https://www.servus.com/a/w/traditionelle-oesterreichische-baukultur

Kröger, J. (2005, July 20). *Stucco Decoration*. Encyclopaedia Iranica. https://iranicaonline.org/articles/stucco-decoration-in-iranian-architecture

Kuiper, K. (2024, March 18). *Vernacular Architecture*. Britannica. https://www.britannica.com/technology/vernacular-architecture

Leeb, F. (2018, October 8). *Österreich-Pavillon auf der EXPO 2020 Dubai. Architektur Aktuell.* https://www.architektur-aktuell.at/projekte/oesterreich-pavillon-auf-der-expo-2020-dubai

Lime Tec. (2018). *Inspiration*. Pinterest. https://www.pinterest.com/pin/742882901005205872/

Lushnikova, N. & Dvorkin, L. (2016). Sustainability of Gypsum Products as a Construction Material. *Sustainability of Construction Materials*, (2), 643-681. https://doi.org/10.1016/B978-0-08-100370-1.00025-1

Lynch, P. (2015, October 7). Is There a European Identity in Architecture? ArchDaily. https://www.archdaily.com/774782/is-there-a-european-identity-in-architecture

Madan Singh, B. & Saxena, Sh. (2021, May 1). Islamic Architectural Heritage: Mashrabiya, from Tradition to Innovation. *Research & Reviews: Journal of Architectural Designing, 3*(1), 1-13. doi:10.5281/zenodo.4731924

Erich Mendelsohn Preis. (2023). *Neue Heimat Für Waisenkinder*. https://erich-mendelsohn-preis.com/de/backstein-bauten/waisenhaus-zav-architects

Manzini, E. (2003, September). *Sustainable Everyday: Scenarios of Urban Life*, 264.

Masoso, T. O. & Grobler, J. L. (2010, February). The Dark Side of Occupants' Behavior on Building Energy Use. *Energy and Buildings, 42*(2), 173-177. https://doi.org/10.1016/j.enbuild.2009.08.009

Masoud Bani, A. (2020). *Contemporary Architecture in Iran, from 1925 to the present*, 150.
Mazzetto, S. (2021, March 17). *Sustainable Reuse of Heritage in the Middle East Constrained Environments,* 63-91. https://doi.org//10.1007/978-981-33-4631-4_5

McLennan, F. J. (2006). *The Philosophy of Sustainable Design: The Future of Architecture,* 281.

Merlino Rogers, K. (2018). The future of Existing Buildings. *Building Reuse: Sustainability, Preservation, and the Value of Design,* 224.

Memarian, G. (1998). House Typology in Iran - with Special Reference to Shiraz. *School of Architecture, 1.*

Mingren, W. (2020, June 2). *Deciphering the Truth Behind the Moors in Spain*. Ancient Origins. https://www.ancient-origins.net/history-important-events/moors-spain-0013798

Nabas, B. (n.d.). *Cordoba.* Pinterest. https://www.pinterest.com/pin/40391727880174170/

Nasr, H. S. (1997). *Viewpoint: Islamic Unity- The Ideal and Obstacles in the Way of Its Realization, 36*(4), 657-662. https://www.jstor.org/stable/23076035?seq=1

Next Office Architects: Taghaboni, A. & Fresku, L. (2024, April 14). *Online Zoom Personal Interview.*

Next Office. (n.d.). *Sadra Civic Center*. https://nextoffice.ir/#!/project/sadra-civic-center/

Nooraddin, H. (2012). *Architectural Identity in an Era of Change, 2*(10), 81-96. https://core.ac.uk/download/pdf/234680895.pdf

Novotny, M. (2020, August 15). *Warum so viele Häuser in Österreich gelb sind.* Der Standard. https://www.derstandard.at/story/2000119333454/warum-so-viele-haeuser-in-oesterreich-gelb-sind

Owuor, S. (2019, June 20). *What Type of Climate Does Iran Have?* World Atlas. https://www.worldatlas.com/articles/what-type-of-climate-does-iran-have.html

Oxford Learner's Dictionaries. (2023). *Identity.* https://en.oxfordditionaries.com/definition/us/identity/identity

Oxford Learner's Dictionaries. (2023). *Sustainability*. https://www.oxfordlearnersdictionaries.com/definition/english/sustainability#:~:text=sustainability-,noun,does%20not%20harm%20the%20environment

Oxford Learner's Dictionaries. (2023). *Tradition.* https://www.oxfordlearnersdictionaries.com/definition/american_english/tradition

Pagliacolo, E. (2021, April 29). *ZAV Architects Unveil a Community Regeneration Scheme's Colorful Second Phase.* Azure Magazine. https://www.azuremagazine.com/article/zav-architects-presence-hormuz-iran/

Periš, D. (n.d.). *Siti UNESCO in Spagna.* GetbyBus. https://getbybus.com/it/blog/siti-unesco-in-spagna/

Polsheer Architects: Ghaneei, R. M. & Fresku, L. (2021). *Online Zoom Personal Interview*.

Polsheer Architects. (n.d.). *Safavi House*. https://polsheer.org/en/portfolio-item/safavi-house/

Preston, Ch. (2024, March 24). *Nowruz*. Britannica. https://www.britannica.com/topic/Nowruz

Querkraft Architects: Kahr, F. & Fresku, L. (2024, March 15). *Personal Interview.*

Querkraft Architects. (2021). *EXPO Österreichischer Pavillon Dubai*. https://www.querkraft.at/projekte/expo-pavillon

Querkraft Architects. (n.d.). *U31 Wohngebäude*. https://www.querkraft.at/projekte/u31-wohnbau

Ravenscroft, T. (2020, December 15). *ZAV Architects Creates Colorful Domed Cultural Retreat on Iranian Island of Hormuz*. Dezeen. https: //www.dezeen.com/2020/12/15/zav-architects-holiday-accomodation-hormuz-iran/

Rudofsky, B. (1964). Architecture without architects: An introduction to Non-Pedigreed Architecture. *University of New Mexico Press.* https://www.moma.org/documents/moma_catalogue_3459_300062280.pdf

S., L. (2024). *Discover the Magic of the Córdoba Patio Festival 2 to 12 May 2024.* Visit Andalucia. https://www.visit-andalucia.com/fiesta-de-los-patios-cordoba/?utm_content=cmp-true

Saadatian, O., Haw, C. L., Sopian, K., & Sulaiman, Y. M. (2012, April). Review of Windcatcher Technologies. *Renewable and Sustainable Energy Reviews 16*(3), 1477-1495. https://doi.org/10.1016/j.rser.2011.11.037

Sacchetti, V. (2021, May 5). *ZAV Architects Creates an Environmentally-Sensitive Complex on the Island of Hormuz.* Interior Design. https://interiordesign.net/projects/zav-architects-creates-an-environmetally-sensitive-complex-on-the-island-of-hormuz/

Salman, M. (2018). *Sustainability and Vernacular Architecture: Rethinking What Identity Is,* 1-16. http://dx.doi.org/10.5772/intechopen.82025

Sarda, R. (2023). *Gothic architecture and its influence on medieval Europe.* Architectural Community. https://www.re-thinkingthefuture.com/architectural-community/a10267-gothic-architecture-and-its-influence-on-medieval-europe/

Schielke, Th. (2014, May 29). *Light Matters: Mashrabiyas - Translating Tradition into Dynamic Facades.* ArchDaily. https://www.archdaily.com/510226/light-matters-mashrabiyas-translating-tradition-into-dynamic-facades

Shiran, Sh. H., Montesheri, M., Nia Hosseni, M. S., & Farsani Mohammadian, Z. (2019, June 1). The Development of Bricks Ornamentation from the early Islamic Centuries to the End of Kharazmshahian Period in the Architecture of Mosques in Iran. *International Journal of Architecture and Urban Development, 9*(2), 61-72.

Silk Road Iran. (n.d.). *Masjed-e Jame Isfahan*. Visit World Heritage. https://visitworldheritage.com/en/eu/masjed-e-jame-isfahan/13302554-f42c-4c57-8a65-09fbbbdafc03

Singhal, S. (2013, March 29). *Embassy of Islamic Republic of Iran in London by Daneshgar Architects.* AECCAFE.

https://www10.aeccafe.com/blogs/arch-showcase/2013/03/29/embassy-of-islamic-republic-of-iran-in-london-by-daneshgar-architects/

Sizan Architects: Jafarbeigy, P., Jafarbeigy, N., & Fresku, L. (2021). *Online Zoom Personal Interview.*

Skyscanner. (2017, March 3). *10 Cose da Vedere a Vienna, i Musei e le Attrazioni piu Importanti.* https://www.skyscanner.it/notizie/vienna-cosa-vedere-i-musei-e-le-attrazioni-piu-importanti

Smith Delano, C. & Rodriguez, V. (2024). *Climate of Spain- Mediterranean, Arid, Temperate.* Britannica. https://www.britannica.com/place/Spain/Castilan

Soutullo, S., Olmedo, R., Sanchez, M. N., & Heras, R. M. (2011, December). Thermal Conditioning for Urban Outdoor Spaces Through the Use of Evaporative Wind Towers. *Building and Environment, 46*(12), 2520-2528. https://doi.org/10.1016/j.buildenv.2011.06.003

Souza, E. (2021, November 18). *Colors of the Earth: Ghana's Incredible, Rammed Earth Walls.* ArchDaily. https://www.archdaily.com/914736/colors-of-the-earth-the-incredible-designs-of-rammed-earth-walls-in-ghana

Sterlin, H. (1976). *Isfahan, Spiegel des Paradieses, 208.*

Stevens, P. (2020, December 7). *ZAV Architects Builds Colorful Village of Rammed Earth Domes on Iran's Hormuz Island.* DesignBoom. https://www.designboom.com/architecture/zav-architects-colorful-village-rammed-earth-domes-iran-hormuz-island-12-07-2020/

Stouhi, D. (2019, June 27). A Town within a Town for Sadra's Civic Center. ArchDaily. https://www.archdaily.com/919647/a-town-within-a-town-for-sadras-civic-center

Subhedar, M. N. (n.d.). *The Role of Traditional Architecture and People in Shaping Perceptions of Public Spaces.* Rethinking The Future. https://www-re-thinkingthefuture.com/rtf-fresh-perspectives/a11218-the-role-of-traditional-architecture-and-people-in-shaping-perceptions-of-public-spaces/

Tadayon, H., Davarpanah, A., & Fresku, L. (2024, March 3). *Online Zoom Personal Interview*.

Taki, A. & Kumari, H. (2023, 17 July). Mashrabiya's Impact on Energy Efficiency and Cultural Aspects. *Sustainability 2023, 15*(13). https://doi.org/10.3390/su151310131

Tehran Times. (2017, July 9). *Iran's Historic Yazd City Inscribed on UNESCO World Heritage List.* https://www.tehrantimes.com/news/414940/Iran-s-historic-Yazd-city-inscribed-on-UNESCO-World-Heritage

Times of Malta. (2015, September 30). *Looking At the World Outside.* https://timesofmalta.com/article/looking-at-the-world-outside.586429.

Torlin, I. *(n.d.).* Iran Photos*. Ilia Torlin Travel Photography*. https://iliatorlin.com/travel-photography/iran-photos/

Trombadore, A. & Visone, F. (2019, March 30). Vernacular Architecture as Model to Design a Prototype for Affordable Housing in Mosul. *Sustainable Vernacular Architecture*, 181-205.

https://doi.org/10.1007/978-3-030-06185-2_10

Ulreich Bauträger GmbH. (n.d.). *Favorite Spring Wohnhaus*. Openhouse Wien. https://openhouse-wien.at/plan/2023-favorite-spring-kopie

United Nations. (2016, January 29). Report of the Conference of the Parties on its twenty-first session, held in Paris from 30 November to 13 December 2015. *Conference of the Parties,* 42. https://unfccc.int/resource/docs/2015/cop21/eng/10.pdf

United Nations. (2016). The Paris Agreement. *United Nations Framework Convention on Climate Change (UNFCCC),* 54. https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf

UNESCO The World Heritage Convention. (n.d.). *Alhambra, Generalife and Albayzín, Granada.* https://whc.unesco.org/en/list/314

UNESCO The World Heritage Convention. (n.d.). *Historic City of Vienna.* https://whc.unesco.org/en/list/1033/

UNESCO The World Heritage Convention. (n.d.). *Historic City of Yazd*. https://whc.unesco.org/en/list/1544

UNESCO The World Heritage Convention. (n.d.). *Masjed-e Jāmé of Isfahan.* https://whc.unesco.org/en/list/1397

Vale, J. L. (2008, April 3). *Architecture, Power and National Identity* (2), 400.

Vergas, F., Mileto, C., Soriano García, L., & Cristini, V. (2014, September 8). Vernacular Responses to Climate across the European Continent. *Architecture: Towards a Sustainable Future* (1), 804. https://doi.org/10.1201/b17393

Vienna Unwrapped. (n.d.). *Wien Stadtpaziergang: Innenhöfe*. https://www.vienna-unwrapped.com/de/vienna-insider-walk/

Vorna International Trading. (n.d.). *Gypsum.* Vornaco. https://vornaco.com/product/gypsum/

Waziri, Y. (2004). Islamic Architecture and the Environment: The Tributaries that Formed the Islamic Development - The National Council for Culture, Arts and Letters - Kuwait.

WCDE. (2014). *El Decenio de Los Ochenta: Definición del Desarrollo Sostenible.* http://www.unep.org/geo/GEO3/spanish/050.htm

Yazdanpanah, P. (2010, May). *The Traditional Iranian Courtyard: An Enduring Example of Design for Sustainability,* 269.