

Vernacular architecture as heritage and its materials

Arquitectura vernácula como patrimonio y sus materiales

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DOI: 10.35429/JAD.2022.16.6.29.

Received July 25, 2022; Accepted December 30, 2022

Abstract

The objective of this research is to recognize vernacular architecture as heritage architecture from the cultural approach developed as a constructive knowledge. The method applied to this research is qualitative-inductive, whose objective is the description of the characteristics of the object of study. The work has been developed for at least 4 years and has been done in a study is on a small scale and through proximity to empirical reality. The research exposes examples that were made through interaction with the inhabitants and as a result of direct observation. The stages of the research were: fieldwork relating access in the Sierra del Estado de Puebla, Chietla and Teziutlán where productive data collection was carried out; the analysis consisted of reducing the information, disposition, transformation and obtaining results and verifying them to reach conclusions. The contribution of this work is that it allows the dissemination of the concept of vernacular architecture as heritage with its antecedents that facilitate the understanding of the transformation of this concept.

Resumen

El objetivo de esta investigación es reconocer a la arquitectura vernácula como arquitectura patrimonial desde el enfoque cultural desarrollado como un saber constructivo. El método aplicado a esta investigación es de carácter cualitativo-inductivo, cuyo objetivo es la descripción de las características del objeto de estudio. El trabajo se ha desarrollado durante al menos 4 años y se ha hecho en un estudio es en pequeña escala y a través de la proximidad a la realidad empírica. La investigación expone ejemplos que se hicieron a través de la interacción con los habitantes y como resultado de la observación directa. Las etapas de la investigación fueron: el trabajo de campo relacionando el acceso en la Sierra del Estado de Puebla, Chietla y Teziutlán donde se procedió a la recolección productiva de datos; el análisis consistió en reducir la información, disposición, transformación y la obtención de resultados y verificación de estos para llegar a conclusiones. La contribución de este trabajo es que permite la divulgación del concepto de la arquitectura vernácula como patrimonio con sus antecedentes que facilitan la comprensión de la transformación de este concepto.

Background, Cultural asset, Materials

Antecedentes, Bien cultural, Materiales

Citation: CASTILLO-REYES, Alberto Rosendo, VÁZQUEZ-TORRES, María del Rayo, MARTÍNEZ-LÓPEZ, Víctor Manuel and OLMOS-CRUZ, Liliana. Vernacular architecture as heritage and its materials. Journal Architecture and Design. 2022. 6-16:29-.

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Introduction

This architecture has had many names such as folk, autochthonous, popular, traditional, picturesque, folkloric or architectural heritage. The concept of heritage has changed, initially conceived as a right of the elite to express their power, to become part of culture under an anthropological approach where tradition and heritage interact. This fact favoured the inclusion of vernacular architecture as heritage, considered as that architecture that is produced by the people and for the people, which corresponds to its contextual and environmental situation, as it uses materials from the region, takes into account the climatic conditions and is based on traditional knowledge.

The theme is important because it is part of the constructive identity and the cultural past that reinforces the current culture. It is important to preserve construction know-how and to recognise vernacular dwellings as cultural heritage. The problem facing vernacular architecture is its gradual disappearance for various reasons, one of which is the lack of knowledge of the value of this architecture by users and architects. For this reason, it is considered that one of the strategies to preserve vernacular architecture is to disseminate and recognise its value as heritage architecture.

The sections included in this work are: the background where concepts that will be used throughout this work are defined. The second section is called cultural property, this section defines concepts that form the concept of heritage, its approach and the condition in which vernacular architecture is found. The third section attempts to describe some of the materials most commonly used in vernacular architecture.

Background

The origin of the word "vernacular" comes from the Latin word *vernaculus*, which refers to "native" or "slave". The "Charter of Built Vernacular Heritage" of 1999 describes its characteristics, where it emerges from the community itself, under a regional nuance as it relates and responds to the conditions of the environment, coherence of form, style, and appearance, with architectural types arising from the building tradition transmitted in an informal way.

From social anthropology and ethnography, a definition of the term vernacular related to rural or semi-rural communities and community production was developed, Amos Rapoport (1969) relates it to socio-cultural and environmental factors. Early work on vernacular architecture was initially opposed to modern architecture and the concept of modernity. This is because vernacular housing represents building tradition, which is handcrafted as opposed to modern materials whose production is industrial (R. Ettinger, 2010).

Vernacular architecture, as already mentioned, has been assigned different names, the most common terms being "popular" or "traditional" with a difficult precision in its contents and meanings, as the term popular is determined by the use assigned to it and not by its origin. The ambiguous term "popular" emerged with the romantic-folklore approaches of the late 19th century. As for the term "tradition", it is a concept that refers to the cultural values that are integrated through the variable "time" and is seen as a dominant reference value, knowledge inherited from the past and which remains in the present (Martín Galindo, 2006).

However, there is a term for vernacular architecture that is a relative of the popular term and is called picturesque, which is used to define cultural elements of little value or things that cannot be defined. The origin of the word picturesque derives from the Italian word *pittore*, which in English means painter. In England it was associated with paintings depicting nature or views of growing cities. It is located, the term picturesque arises in romanticism and costumbrismo, and it can be said that its beginning can be found in the books of William Gilpin, and the thought developed by the English empiricism of the early nineteenth century (Calderón, 2010).

Although the concept of picturesque begins in painting, it transcended to attitudes, popular customs, activities or clothing; nowadays it is an emotional concept to which a value is inferred. In the case of architecture, picturesque is the use of everyday or common constructive forms and elements for a community, which has also been called traditional, to which Calderón (2010) mentions that it is a spiral of links established between place-individual-community where social activity defines the space where architecture arises.

Later, in the second half of the 18th century, the archaeological approach appeared, in this approach the ancient monument is valued and this aspect will be in force for at least a hundred years; it will be transformed by the discoveries of new civilisations and the notion of artisticity is developed, it is the historical and artistic values. From the 19th century onwards, the national monument is considered as a common heritage, which is considered for its value of antiquity, however, in this same century, important destructions of the heritage took place. The 20th century saw the creation of the League of Nations, which came into being at the Paris Conference on 24 April 1919, based on the Treaty of Versailles, which put an end to the First World War, where heritage ceased to be a matter for individual states and became a universal heritage. The Second World War produced a devastating destruction of European historical heritage, destroying urban centres and historical architectural monuments, provoking a crisis in the value of monuments due to their antiquity and rethinking approaches to the concept of heritage (García, 2012).

The concept of cultural heritage of vernacular architecture is based on the International Charters and specifically with the Charter of Venice in 1964, which is still in force today and which synthesises the conclusions drawn at the 2nd International Congress of Technical Architects of Historic Monuments and led to the foundation of ICOMOS (International Council on Monuments and Sites).

"It is also understood that a historic monument is more than a testimony with documentary value and that cultural property is not only of artistic and historical value, but also of cultural value, so that the idea of cultural property and cultural heritage is assumed". (García, 2012, p.30)

Within this framework, in the 1980s, efforts were made to recognise vernacular architecture as heritage, and despite not being endorsed by any international body, the Charter of Cuba, the product of the First Meeting on Vernacular Architecture in 1988, stands out.

"We define vernacular architecture as a spontaneous product that symbolises and crystallises the idea of the world held by the group that produced it. The elements that define it are precisely its manufacture - without the intervention of professionals - and the fact that the structures, forms and materials it uses are determined by the local climate, geography, geology, economy and culture, as well as the fact that it is highly integrated with the context and the surrounding landscape, while fully maintaining its identity. Vernacular architecture is either isolated or forms ensembles in historic centres and in urban and rural settlements" (Martín Galindo, 2006, p. 43-44).

This approach and the concepts of the Athens Charter were taken up by the 1999 ICOMOS General Assembly in Mexico, where the Charter of Built Vernacular Heritage was ratified in relation to vernacular/traditional architecture and heritage and identities. In this document vernacular architecture ceases to be "modest architecture" or "picturesque architecture".

It is introduced as part of the ethnological heritage which is based on tradition, and therefore becomes heritage in use and tangible heritage which is the construction itself and ways of life or intangible heritage as it responds to the way in which housing arises and the way it is used (Martín Galindo, 2006).

Cultural property

According to Molano (2007), the concept of culture originated in Europe in the 18th century, as an expression of superiority that sought to explain the political and social order where everything that did not fit into the canons established by the dominant sectors was excluded. Anything that did not fit into the dominant parameters of the time was considered rustic, popular or picturesque.

"The term culture comes from the Latin term *cultus* and although it initially referred to agricultural activity, we now understand it as the cultivation of the human spirit, of man's intellectual faculties, and its definition has changed throughout history" (García, 2012, p.13).

With the advent of the Enlightenment, European philosophy focused on the idea that nature and culture were opposites, so the further away communities were from the cities, the more uneducated they were considered, as they did not have the benefits of culture.

Thus, Europe was the cradle of culture and civilisation, and only its products were valid. Nowadays, the concept of culture is broader and depends on the area of knowledge or approach, but culture is defined as all the information and skills that human beings develop and that allow them to form collectives. According to the UNESCO Declaration of Mexico (1982), culture is defined as the instrument that allows human beings to reflect on themselves, to discern values, to seek new meanings and to create. Culture also has a symbolic code called language, there are no rules that force people to choose a model, they are learned, not genetic or instinctive (García, 2012).

UNESCO has defined cultural property as movable, immovable, works of art, manuscripts, books and other objects of historical, artistic or archaeological interest, scientific collections and important collections of books, archives or reproductions of property that are of great importance for the cultural heritage of peoples. Culture is seen as the body of knowledge, ideas, traditions and customs that characterise a community.

"UNESCO first used the expression "cultural property", with the intention of giving a broader and more updated vision to the concept of historic and artistic heritage, including in this category both movable and immovable property of great cultural importance, as well as buildings whose purpose is to conserve or exhibit this movable property, and monumental centres that include a considerable number of the above elements" (Llull, 2005, p. 197).

Based on Josep Ballart's (1997) classification, the types of values that can be attributed to cultural assets are divided into three categories: use value, formal value and symbolic-significant value; this is one of the most widely accepted, as there are many classifications according to the place from which they originate.

"Public institutions at both regional and international level have proposed successive classifications and denominations, contained in laws that do not always coincide, for the elements that are considered to be part of cultural heritage" (Llull, 2005, p. 179).

In this way, objects are assigned superior characteristics that justify their conservation so that they can be observed by future generations. Institutions have had to modify their criteria throughout the twentieth century to be inclusive.

"The notion of cultural property has been progressively broadened to include not only historical monuments and works of art, but also folkloric, bibliographic, documentary, material elements, etc., whose significance need not be only historical or aesthetic, but which are valuable because they are manifestations of human activity in general, even if they are very recent" (Llull, 2005, p. 180).

It is striking that the population's notion of what a cultural good is, changes from one community to another, as the patrimonial is fused with the everyday and these communities downplay the value of their objects, however, it is precisely this everydayness that allows these cultural goods to remain with the subsequent hybridisations. The concept of cultural property is related to the concept of heritage.

The Diccionario de la Lengua Española defines patrimonio as follows: "From the Latin patrimonium, estate that a person has inherited from his ascendants" and also the Ideological Dictionary of the Spanish Language defines it as: "own goods acquired by any title" (García, 2012, p.17).

The current concept of Heritage begins in the Enlightenment in the 19th century, under a political-legal approach until it came to produce socio-political theories that lead to the definition of the Democratic Welfare State that lasted until the 1930s. In this decade it was strengthened in Europe until the 1930s with the emergence of International Architectural Conferences, the Athens Charter and the forums where the new international thinking was developed with a historiographical dialectic and the inclusion of new disciplines. This process was interrupted by the Second World War (Ruiz, 1997).

It is worth noting that the territory is related to the concept of heritage because it is the meeting point of man, since for his survival he required the resources that it provided him, which is why the territory is given a cultural value, since it influences the culture and its creative capacity, and therefore, its economic development. However, it has also been related to collecting, as for a long time the concept of heritage was linked to museology and the conservation of cultural goods. These objects and buildings were created to transmit ideas or feelings and were expected to be timeless, without considering that time modifies culture, therefore, these objects lose their symbolic value. Therefore, heritage conservation is fundamentally a cultural act, which has the conscious and voluntary intention of preserving that heritage and that it transcends through time (García, 2012).

As for the definition of "own property acquired by any title", it refers to the fact that heritage is currently as diverse as the number of communities that exist, since in a single country or municipality there are different notions and examples of cultural heritage.

"The cultural heritage of a people includes the works of its artists, architects, musicians, writers and scholars, as well as the anonymous creations, arising from the popular soul, and the set of values that give meaning to life, that is, the material and non-material works that express the creativity of that people; language, rites, beliefs, historical places and monuments, literature, works of art and archives and libraries" (García, 2012, p.17).

The concept of heritage emerged with a meaning of personal wealth, where war campaigns were initiated to appropriate precious objects as a way to show off prestige, luxury and power. No classification was established, the enjoyment of which was individual and private, which is why many of these objects were destined for grave goods. Later, the Romans gave heritage a pedagogical significance, as the Greek objects taken by the Romans and later used in the Renaissance became a reference model... "The monuments of the past began to be appreciated as testimonies of history, which visually explained the passing of the centuries, and also endorsed the information acquired from the written texts of ancient cultures" (Llull, 2005, p. 185).

However, at this time, the conservation and observation of historical heritage facilitated a critical look at the artistic historical past and some strategies were established to protect that heritage, among them the construction of museums. The French Revolution brought about a change in the valuation of historical heritage, as cultural property was technically and legally institutionalised with a public character. However, it was restricted to minorities who sought to find their identity in the past, which is why nationalism appeared in Romanticism, with the inclusion of historical models from the past (Llull, 2005).

Currently, the objective of heritage is to facilitate access to culture for all sectors of the population; this allows not only to preserve national identity, but also to support education by promoting knowledge and social identification. For this reason, laws have been established that allow for the care and conservation of cultural assets, as well as the creation of bodies that ensure compliance with these laws. The concept of heritage with a fundamentally aesthetic sense was affected by the massification of culture through adult literacy programmes, the creation of study centres and Universities and the inclusion of pedagogical models (Lull, 2005).

Therefore, new criteria are established considering the nature of cultural assets, the categorisation of Immovable Heritage, Movable Heritage, Intangible Heritage and the Law for the protection of Monumental and Archaeological Heritage, Bibliographic and Documentary Heritage and Ethnological Heritage. Thus, Historic Sites are defined not only as a unit, but also as the interaction of the homogeneous grouping of constructions defined under criteria of coherence. In the case of historic gardens it is restrictive, as other characteristics such as their origin, aesthetic, sensory or botanical values must be included. In the case of historic sites, they are those places as a place that has historical memory before the community, as well as cultural memory where its artistic, social, ethnological, natural or landscape values are included. It should be noted that the concept of heritage acquires an integrating approach of Cultural Anthropology in which beliefs, art, morals, customs, and human expression are circumscribed (Ruiz, 1997).

For all of the above, it can be said that the object of current Historical Heritage becomes Cultural Heritage, which is more totalising, in the sense that not only the object is observed, but also the conditions where this object arises or, in the case of architecture, the site where there are one or more buildings that have basic characteristics that group them together.

Cultural heritage is the result of human production, it is a historical heritage that forms the identity of a people (Lull, 2005) and the heritage object acquires a representative significance of the culture of a community. This is more tangible in objects such as monuments, because although they are only the creation of the dominant classes, they also reflect the predominant ideology (Ruiz, 1997).

This is why vernacular architecture, not being a monumental product of societies, was despised because it was seen as a vulgar product that did not need to be protected and is still seen today as synonymous with poverty. This was encouraged by the fact that for a long time heritage assets were taken as singular and monumental works: since vernacular housing is not monumental, it was not considered as heritage.

"Among the multiple models of character and destination with which factories are made is vernacular architecture, understood as: the projection and construction of buildings and installations in a specific area; with techniques that have crossed the threshold of time, or that have been acquired by the relationship with other cultures. And which arises as a response to a series of social and economic needs, to which it adapts and with which it relates, forming its own cultural landscape, understood as a physical and social space" (Martín Galindo, 2006, p. 801).

In Mexico there are 5 zones or regions, which are: Northern Mexico, the Pacific coast and the Gulf of Mexico, Central Mexico, the southern Mayan zone, and the cold and mountainous zones. In each zone different materials are produced and therefore vernacular dwellings will have some significant variations. It is common that in forested areas, wood is used as the main construction material for walls and roofs, in areas where there are no trees, mud, stone or reeds are used, and in areas where there are forested areas, stone and mud, there are combinations of these materials. Some materials are presented below.

Materials

In areas where there are not enough resources to build houses, it is more practical to use the materials of the region, elaborated through vernacular construction processes, generating spaces to live in that are not only economical and comfortable, but also use bioclimatic design. This makes vernacular architecture a strategy that favours sustainability, produces a homogeneous typology and allows the transmission of technical and social knowledge that strengthens the identity and cultural heritage of the communities where it exists.

Vernacular architecture has the particularity of using the materials of the region, selecting and elaborating them to create a habitat adapted to the socio-economic needs of its inhabitants.

"The first step in the construction process is the choice of the site where the house will be built. The materials must be ready and have been collected according to the projected dimensions of the house" (Sánchez, 2000, 84).

In vernacular housing, construction processes and the materials used in them were transmitted orally, explaining the process and doing it at the same time (Carranza, 2010, p. 17). Thus, the builder relied on his intuition and experimentation (Piralla, 2002).

As can be inferred, when the user observed a construction that resisted natural actions such as wind and earthquakes, the basic principles that have proven to be successful were generated (Carranza, 2010).

That is why in all cultures the preservation of the construction processes and materials that were best adapted to local conditions was encouraged; those that provided better conditions of habitability and use of available materials (Peñaranda, 2011).

In other words, the entire structure must respond to the climatological conditions and the functional conditions of the space, which is why it is necessary for the materials to be able to withstand seismic effects and for their deformations to produce a redistribution of forces in the structure (Carranza, 2010).

It should be noted that a large part of architectural theory has been based on the evolutionary idea of building culture, based on "trial and error". The foundations of architecture and the development of architecture have been based on a system of evaluation where it was determined that, when a construction element could no longer be part of the system, it was replaced by elements with more resistant forms and materials (Peñaranda, 2011).

In the case of vernacular architecture, this situation can be observed in the case of reed, wood, tile or tejamanil roofs replaced by metal sheets. Currently, metal sheets are replaced by reinforced concrete slabs that require the installation of reinforced concrete chains and castles. The combination of different materials and construction systems generates a physical and visual degradation of the construction.



Figure 1 Vernacular dwelling of adobe, stone, block with concrete frames in Tochimilco, Puebla
Source: (Vázquez, 2019)

It is also the case that another floor is built on top of the vernacular dwelling and has to be reinforced to support the weight of the building.



Figure 2 Vernacular housing transformed with prefabricated construction systems in Tochimilco, Puebla
Source: (Vázquez, 2019)

Most of the materials used in the construction industry come from the earth's crust and in the case of vernacular architecture the materials have the possibility of being reused and recycled from waste. Stone is a design element and construction material that has been used in vernacular and traditional architecture; the latter is predominant in the construction field in Mexico. This material extracted from nature can have a significant impact on people's quality of life, as it is an element that allows for the solidity of dwellings and when used in walls it integrates any urban architectural typology (Mendiola et al., 2014).

Stone is used in new or old buildings as it facilitates its use in architecture of good constructive quality due to its resistance and is aesthetic when integrated into different typologies, this is a material that is used to restore heritage or to develop contemporary architecture. Stone that is extracted from quarries using explosives also has great properties such as durability, fire resistance, thermal movement, structural strength and good appearance.

"It's aesthetics is capable of causing hermeneutic phenomena related to social identity, as well as connoting a superior value of constructive quality related to vernacular architecture" (Mendiola, 2007).



Figure 3 Vernacular house with stone walls, adobe and roofs of wooden beams and tiles in Teziutlán Puebla
Source: (Garate, 2016)

In areas where adobe is used, it is common to place an overlay that prevents subsoil moisture from deteriorating the adobe, which is why steps are observed in the access to the house.



Figure 4 Vernacular house with concrete frames and cement cladding in Tochimilco, Puebla
Source: (Vázquez, 2019)

Wood is a plant material, compact and fibrous, obtained from trees or woody plants, whose resistance is variable and depends not only on the type of tree it comes from, but also on the direction of the fibres. Wood is a hygroscopic material that always contains water, so moisture must be removed from felled trees in order to reach its maximum strength and prolong its useful life (Gallardo and Robles, 2011).

When wood is used outdoors, it is affected by weather conditions, its characteristics are modified and it suffers deformations, especially if the humidity of the element is not controlled and it is degraded by the biological elements that attack it. Climatic conditions affect its physical characteristics, and it is common for sudden changes in the environment to cause severe damage. For example, ultraviolet radiation affects the surface; infrared radiation heats the surface, causing cracks, but the humidity inside remains the same. It should be noted that the hardness of wood is a highly variable property and cannot be controlled (Gallardo and Robles, 2011).

In vernacular dwellings, wood deformation is visible, as when it is outdoors, it undergoes changes that affect its volume due to humidity, and when it withstands radiation, shrinkage occurs and, as it is flexible, it can change its shape and therefore its load-bearing capacity (Gallardo and Robles, 2011).



Figure 5 Rural vernacular wooden dwelling with morillos, no windows, wooden door frames with wooden beams and half-round roof tiles
Source: (Hernández, 2018)

Reed (*Phragmites australis*, Cav., Trin. ex Steud) is a naturally spreading, warm-season, wild plant that grows in temperate to tropical zones in the vicinity of wetlands, drainages and wet headwaters. Reed can be two to four metres tall, with smooth, flat leaf blades, 1 to 5 cm wide and 15 to 45 cm long.

"It is an ecological and sustainable material that is low cost, aesthetically acceptable, easy to obtain [...] frost resistant and a good thermal insulator due to the large number of air-filled hollows in the stems" (Withney, 2014, p. 2).

Its growing season is continuous and uninterrupted, making it a material that is constantly renewed. It thrives in places with optimum temperatures between 30 and 35° C. It is a resistant material that grows best in firm clayey soils with mineral content and tolerates moderate salinity, but it is possible to grow in very salty water. In Mexico it grows almost everywhere in the country, but mainly in Chihuahua, Jalisco and Michoacán (Gerritsen, Ortiz and González, 2009).

In the construction industry in Mexico, reed is used to make vernacular constructions where walls and roofs are woven with fibres and sometimes pieces of wood are added to give it greater solidity, it is also used as a mesh for walling and as reinforcements in the construction of adobe houses. However, it is commonly used to build windbreaks on their plots and at the same time reduce soil erosion.



Figure 6 Vernacular dwelling with reed walls and roof in Tochimilco, Puebla
Source: (Vázquez, 2018)

Adobe is a material that is found almost everywhere on the planet and this material predominates in vernacular constructions due to its easy acquisition of the material, it was used by different cultures at different times and without an apparent relationship between them. It is a material made from a mass of clay and sand, mixed with different elements that ferment and prevent cracking during drying, and natural fibres such as straw, grass, horsehair, dried hay, agave, and even synthetic fibres are added. The most commonly used mixture for adobe production contains 20 per cent clay and 80 per cent sand and water, with a drying time of 25 to 30 days.

Adobe has been "defined" in various ways, among the most common: (1) "earth that has been thoroughly stripped of all impurities"; (2) "clay mass" moulded into a brick shape and dried in the sun; (3) "brick formed from a mass of clayey earth, water and some additive, dried in the sun and air" (Gendrop, 2001, p. 238).

Adobe constructions in non-seismic zones can maintain their characteristics, but in seismic zones, being a massive material that works very well in compression, but weak in tension, it can be severely damaged when subjected to the action of earthquakes. Adobe is a material with a high thermal inertia, which is why it has been used in different climates, as it becomes a regulator of the internal temperature. However, it is susceptible to humidity, which is why it is recommended that exterior walls be plastered with two layers; the first layer with mortars based on slaked lime paste, clay and sand for the first layer, and in the second, a mortar of lime paste and sand. In the case of interiors, they can be left apparent or mortar can be applied with a mixture of clay, sand and water (Carranza, 2010).



Figure 7 Vernacular housing in Teziutlán, Puebla
Source: Garate, A. (2016)

One of the first sheet metal roofs was built in Warsaw, Poland in 1701, and since then they have been used to cover spaces in different parts of the world. In the case of Mexico, sheet metal roofing has lightened roofs, allowing families to protect themselves with a resistant and relatively low-cost element. Metal roofs are effective for heat conduction, so in very hot areas they are inoperative. However, in warmer areas, shingles are placed on top to protect against the temperature that can occur inside the space and to eliminate noise from rain or hail. The sheets also reflect the sun's rays and are painted or shingled over to reduce this.

Durability in low quality metals can last for more than 20 years.



Figure 8 Vernacular dwelling with adobe walls and tin roofs in Chietla, Puebla
Source: (Garate, 2017)



Figure 9 Adobe wall and roof with wooden beams and corrugated sheeting in Tochimilco, Puebla
Source: (Vázquez, 2019)

The tile is a material that is believed to have been developed in 640 BC for the Greek temple of Hera in Olympia and the first tiles were made from fired clay and in the form of arches. Different materials have been used to make them and in different shapes. In Mexico, it was introduced by the Spanish during the colonial period between the 16th and 18th centuries. The terracotta tile is a resistant material that is placed on top of the stringers that rest on wooden beams or morillos, supported and fastened to the walls. There are different types of roof tiles, although the most common is the half-round roof tile, which is combined in two positions so that they are fastened together and function as an overlap, which does not allow water to penetrate, as they function as channels that transport water out of the interior of the house (Cabrera, López, & López, 2015).

In the northern Sierra of the State of Puebla, the application of half-round clay tiles and wooden tiles can be observed in the houses. In the case of Puebla, the half-bed tile predominates, and currently flat and figured tiles are being applied, as shown in image 10.



Figure 10 Adobe wall and prefabricated clay tile roof in Tochimilco, Puebla
Source: (Vázquez, 2019)

Although the material does not determine the form, it does establish limitations, as some characteristics depend on the size of the materials used to build rooms. That is why, by changing the construction materials, some characteristics of the space are also modified, this situation is evident when restorations of the built heritage are made; because, the closer they are to the original materials, they have a better structural behaviour and therefore retain their value. It is common to favour the conservation of the material over the conservation of other values, as the material is linked to the value of antiquity and this is linked to authenticity. It should be noted that for it to be authentic, it is not related to antiquity but to its being regional and handmade, never industrial. This situation is in direct opposition to modernity, as vernacular architecture becomes an architecture of the past (R. Ettinger, 2010).

However, it should be noted that industrialised materials have permeated vernacular constructions, modifying not only their appearance, but also their structural behaviour. An example of this is the substitution of tejamanil by corrugated sheets, or the incorporation of castles, chains and/or concrete slabs to reinforce vernacular dwellings.

Conclusions

Vernacular architecture arises in different regions, because in a certain way it is an architecture that takes materials from the context, making it accessible to rural communities. In other words, it was born as a response to housing needs and each region or culture maintains its formal and constructive characteristics. The use of materials and construction systems within the region obeys the environmental or bioclimatic conditions; however, there are areas that obey socio-cultural conditions.

It can be said that vernacular architecture is the result of social participation, the product of its physical context and the knowledge of the community that makes up its building tradition.

It is common to confuse vernacular housing with housing that uses traditional materials. Vernacular architecture is that which is built by the inhabitants of the dwelling themselves, whose construction processes are the product of socialisation. In many places there is still the tequio, which is a group of family members who participate in the construction of the house, which is why it is called a social and environmentally friendly product, as most of its materials are taken from nature and once its usefulness is over, they can be returned to it. Therefore, it is important to focus on the preservation of this architecture as it is not only cultural heritage, but also addresses real needs and reduces environmental impact. On the other hand, traditions are preserved and this type of architecture can be enriched with new technologies that allow for a longer period of usefulness.

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