Proceedings of 10th IOE Graduate Conference
Peer Reviewed
ISSN: 2350-8914 (Online), 2350-8906 (Print)
Year: 2021 Month: October Volume: 10

Learning from User: Construction of High Altitude Vernacular Design - Case of Jhong, Mustang

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Abstract
Nepal is known as the "Mountain Kingdom." It is also an artistic and architecturally rich country. Nepal has a wide range of climatic zones, which allows for a wide range of architectural styles to be found throughout the country. In this thesis, the vernacular architecture of Mustang district, particularly Jhong, is examined from three overlapping perspectives: environment, culture, and modernism, in order to better understand its environmental adaptability and sustainability.
Architecture, culture, and settlement changes are all important aspects of any development. As the twenty-first century's intellectually aware and technologically advanced generation, we should now be able to develop or change in a more sustainable manner. This paper seeks to bridge the gap between past and present vernacular architecture in terms of design and construction, because the causes of architectural change can reveal why architecture changes, and this knowledge can be captured to prevent architecture knowledge vaporization and degeneration. Also tries to see if there is a way to understand the user's point of view and learn from them about the causes of architectural changes. The research follows Case Study, participatory design method, Observation and interview on the basis of literature review. Qualitative data were analyzed on the basis of the data collected during the Field visit and interview. The findings revealed that End user perception of their residence is very important and it can influence the design of building. Thus including end user as the design partner can be beneficial for the society in terms of sustainable design.

Keywords
User Participation, Users knowledge, Vernacular Design

1. Introduction

Each country has its own distinct identity, culture, and architectural style. Traditional structures are more connected to the environment, culture, and people of that location. Every area's vernacular and traditional buildings are the result of centuries of accumulated experience and practice, and they can serve as a continuous source of knowledge. Successful construction projects are designed, built, and equipped to meet users' needs. Whether it concerns the function and expression of an entire building or the design of a single space, users hold a unique knowledge, which should be integrated properly in the design to ensure a successful building project. [1]. A systematic and coherent approach to user involvement is required to extract this knowledge and translate it into a consistent design. Understanding the user's background, surroundings, and future use of the building is necessary, as is organizing a design process that incorporates the user's needs at the appropriate times during the design and construction process.

The current process of architecture design goes through the designer who plans and designs the structure, after which the phase moves towards construction. The process is one-sided in which the designer has the upper hand and the client does what the designer designs.But with changing landscape of the industry and for better after effect, there is the requirement of a platform for live interaction so that both the users of services and the designer can interact to create a better, sustainable design that meets the requirement of the stakeholders. This collaboration helps to create new knowledge as people develop and experiment with (new) ideas around a project when they are engaged in negotiations around the development of these ideas (Alexiou, 2018).

Also, the person who will be served at the end of the

design process is given the title of 'experts of their experience.' This will play a significant role in the designer's and client's knowledge development, idea generation, and concept development, as they will be the ones who will be using the design.

A design is defined as a plan or specification for the creation of an item or system, or the implementation of an activity or process, or the outcome of that plan or specification in the form of a prototype, product, or process. It differs from place to place depending on the climatic condition, local material availability, technology, and knowledge of the region. Such architecture can also be known as vernacular architecture. Vernacular architecture is defined as a type of local or regional construction, using traditional materials and resources from the area where the building is located. Consequently, this architecture is closely related to its context and is aware of the specific geographic features and cultural aspects of its surroundings, being strongly influenced by them [2].

In his book "Built to Meet Needs: Cultural Issues in Vernacular Architecture (2006)," part of the Encyclopedia of Vernacular Architecture of the World project, Paul Oliver discusses the necessity for a more precise definition of the word. His study led to the concept of vernacular architecture as "architecture that incorporates people's dwellings and other buildings in relation to their individual surroundings and resources, generally created by the owners or the community, using locally available materials"[3]

1.1 Rationale

How can architects support clients and users in identifying, expressing, and developing their requirements for their future environment, and preparing them and their new facilities for the challenges of tomorrow? [4].Front-end activities have been identified as an area needing improvement in the building sector, especially focusing on the user and client needs. In line with this, clients are becoming more demanding in terms of the quality, performance, and functionality of their buildings [4] .The main reason to listen to users' opinions or to involve them in decisions was' to have future users/ tenants/ customers at all'. The information gained from user communication helps identify how and where people want to live [4].

Research provides the user with the importance of public participation to design vernacular architecture. Nowadays architect is mostly working in modern architectural projects as the generation moves towards adoption of modern sleeker designs. There might come a situation when an architect will require to adopt contemporary and traditional designs, materials, etc. concerning the climate and various conditions of the location of the building. To dive into such new avenues, the architect will need to study and learn about various conditions of the location and adapt accordingly to move forward with their work. Local and experienced builders of a specific location who have been building such buildings would have a better idea regarding various architectural designs that have been adapted for specific conditions of the place. If the collaboration between modern architects and local builders could be achieved, they could be able to create better sustainable designs that could stand the test of time and be compatible and adaptive to the climatic and other various uncertain conditions of the location.

1.2 Problem Statement

We can see how traditional structures are being replaced by contemporary architecture in emerging or least developed nations like Nepal [5]. Traditional building methods are vanishing in modern structures as a result of technological advancements.

Each country has its own own character, culture, and architectural style. The distinctiveness of vernacular architecture in historic communities may be seen all across the world, from developed to developing countries. Traditional structures are more related to the nature, culture, and people of that location. Every area's vernacular and traditional structures are the result of decades of collected experience and practice, and they may serve as a continual source of information. However, as technology advances, we may expect modern concert architecture to take the place of these traditional structures. Traditional construction designs are being lost in most developing nations as the building sector modernizes.

It's a sad reality that architecture throughout the world is changing to the point that it no longer has any originality. One of the primary causes for building transformation is the difficulty of conventional building construction, as well as people's interest about new buildings.

People, society, technology, and the climate are all changing. The architecture, too, must change.

However, there should be a better and more sustainable manner of transforming so that we may be more environmentally conscious. Buildings should provide shelter and safety, not be the source of making our home (Earth) uninhabitable. Furthermore, it is extremely difficult for consumers, such as residents, to define and articulate their requirements for the product, i.e. the residential building.

These are the general problems faced by the people. Also, there is a research gap that is adding to the problems and not out breaking any solutions to these prevailing problems. There is a limited amount of research been carried out and the prevailing studies only focus on the impact of user involvement in the community sector but not in the residential sector.

1.3 Research Objective

MAIN OBJECTIVE

- To explore the ways of integrating context based knowledge embodied as user's knowledge through user participation in design process.

SPECIFIC OBJECTIVE

- To understand the context specific traditional materials and construction technology.
- To understand the way different user interpreted those technology and materials in terms of experience, social norms, comfort and cultural values

2. Literature Review

2.1 Who are user?

Architecture and users are two concepts, or actors if you like, constantly intertwined with each other. The architecture shapes the users' whereabouts, but the architecture itself is also shaped by its use [4].

Users could be defined as anyone who is using a building or an environment. It could be an employee working in a building or a person inhabiting an apartment or a house[4]. Users include individuals who maintain or work in a facility on a temporary basis, such as a cleaner, postman, or chimney sweeper. Furthermore, users are visitors or residents passing through who are also using a building or a constructed environment. design that includes users As a result, there are first-hand users, as well as second- and third-hand users. The users, being the primary users of a place, make it fascinating for architects, and architects have a long history of attempting to understand the users and their requirements. The user is both a customer and a consumer. A user becomes a stakeholder in a certain project.

Olander studied what constitutes a stakeholder and concludes that a stakeholder is "a person or a group of people with a vested interest in the success of a project and the environment within which the project operates" [4]. It is also implicated that "a stakeholder is any individual or group with the power to be a threat or a benefit".A stakeholder, according to this definition, might be anybody from a local politician, the government, or the media to a citizen, employee, or neighbor. Olander proposes a stakeholder analysis sorting group to help distinguish between these various groupings.

Architects are perhaps one of the building industry's players who works closest with consumers, or at least have the opportunity to do so. They utilize research techniques to be able to determine user demands. Architects conduct interviews, observe, and gather data to inform their design process. The idea is that if the architect can locate the needs, they will be included into their design and appropriate solutions will be found. Users and workers began to see themselves as information resources, and the framework of participatory design shifted. Users were seen as possessing critical information, knowledge that might improve the output quality. The architect was viewed as the information collector and translator, while the user was seen as a source of information. The architect returned to the user group with solutions after working with the material, despite the users' limited ability to decode the proposal and provide input. Users had a difficult time determining if the recommended design would work for them.

2.2 User participation

A User is one who is or will be directly affected by a particular set of design decisions. The two main interpretations of participation" are teleological and deontological. The first one is concerned with the use of the processes of user participation as a way to realize positive goals; the second is a statement of belief in the moral validity of persons to participate in decisions which affect their welfare(Dulgeroglu, 1977)

2.3 Vernacular Architecture

What do we mean by “Vernacular Architecture”? it is not an easy question to answer.

According to Paul Oliver ”Vernacular architecture as an architecture that encompasses the peoples’ dwellings and other constructions, relating to their respective environments and resources, usually built by the owners or the community, using traditional techniques”[6]. The word ‘vernacular’ derives from the Latin vernaculus, meaning ‘native’, so the definition ‘native science of building’ is really quite appropriate [6]. These structures represent what is native to a community or region, as well as what is common and shared. Buildings are identified as social representations in vernacular, and they are linked to cohesive cultural systems of values and ideas. Then term ‘vernacular’ is a linguistic cone, and when it is applied to architecture it becomes a part of the familiar linguistic analogy of ‘architecture as a language of form’, and vernacular architecture can be said to be ‘the architectural language of the people’ with its ethnic, regional and local ‘dialects’ [6].

3. Research Approach and methodology

The study is based on studies using a qualitative method in general. To understand why things are the way they are, a qualitative research design is used to uncover the causes and processes underlying a system or a situation. The research technique is inductive since it begins with the collecting of actual data. The research is designed to be descriptive and interpretive in nature, resulting in increased knowledge.

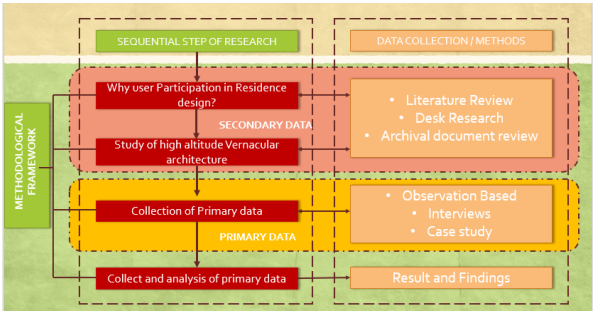

Figure 1: Design indicators

3.1 Methods Adopted

OBSERVATION BASED METHOD

It is aimed at obtaining an understanding of users’ actual environment and their needs by observing and interviewing them while they are doing their regular activities.

PARTICIPANT OBSERVATIONS

Participant observation becomes a valuable complement to the data collection process. Participant observation is used to get a firsthand sense of, or first-hand information, about a location, its people, and its conditions.

SEMI-STRUCTURED INTERVIEWS

Semi-structured in-depth interviews can be time consuming, highly demanding and a laborious method of data generation, but they allow the researcher freedom to direct the flow of interviews and to control their depth and focus [7]. The face-to-face contact helps generate rich data. The participant introduces ideas and places emphasis on topics of their choice [7].

4. Case Area

4.1 General Information

The ancient land of Mustang is located on the northern frontier of Nepal, bordering Tibet, an autonomous region of China [7]. Mustang is one of 75 districts of Nepal and is part of the country’s largest protected area system. Mustang is also known as Man thang (” sman thang”) ”plain of medicinal herbs,” and Mon thang (” smon thang ”), ”plain of aspiration” [5].

It is also known as the village behind the mountain. Caught in the rain shadow of Dhaulagiri Himal (8167m) to the west and the Annapurna massif to the east [5].The mustang environment has ochre earth spires and spectacular rock formations, as well as sandy flats and green plains encircled by undulating mountains, all of which are typical of the Central Asian plateau. The cliffs of Mustang are studded with prehistoric caves, some of which are used for meditation and retreat, and a few of which are still utilized for living purposes.

Historically, the current Mustang district was divided into four distinctive socio-political and cultural regions – the Lho-Tso-Dhium, the Baragau, Paachgau and Thaksatsai [7]. For this research Jhong Village of Baragaun region have been taken for the study which lies in the lower part of the Mustang.

4.2 Social - Cultural Context

4.2.1 Culture and Society

High mountains and deep valleys of Mustang have provided excellent refuge for pre-Buddhism tradition and culture. Mustang received immigrants particularly from the north (Tibet) bringing various pre-Buddhist cult, religion and tradition such as Shamanism and Bonism. For centuries, Mustang was heavily influenced by Tibetan civilization (Conservation).

The Gurung group is the original ethnic group of Jhong. In Jhong, around 84.19 people worship Shakya Buddhism, and various holy rituals like as puja and preying are part of their everyday lives. Many prayers and strong beliefs in gods and goddesses are offered in order to bring peace and prosperity to the home or town.

4.2.2 Lifestyle

People in the Jhong have a basic way of life. The entire hamlet is tight, and residents live together as a large family. Everyone is acquainted with one another. They gather together to celebrate holidays. The Yar-thong in summer, Da-chang in spring, Tse-gho in autumn and DyoKyap in winter are the famous festivals that bring people together.

4.3 Architecture

4.3.1 The House Typology

The house is the family's home, the "interior," and the primary unit of production, as well as the focal point for most social activities [8]. Because there were no other civil structures in Mustang, the home had become the focal point of life. It is where the major social gathering events such as births, marriages, and funerals take place. Furthermore, the home had served as the family's anchor, creating a direct link to the forefathers.

Dwellings are made up of a succession of rooms that are designed not only for family members, but also for the items stored and animals kept, a trait replicated in particular in older ones when residents relied only on farming. A single room, the fireplace room, was frequently shared by family members. Because space was limited and group life was typical owing to the cold weather, there were no separate rooms for each family member.

4.3.2 The House

A house is termed as khangba (tib. Khang-pa) in Mustang. Khangda literally mean "Main house". Houses are not only material construction but have important social and religious aspect, both with respect to the organization of their space as well as to the way in which they relate to the other houses that constitute a given community (Ramble).The house is further divided into 3 levels.The ground level is designates as animal quarters and storage. The store is used for the collection of the hay, woods and dried fodder. The floors above it are designated for kitchen and living space.They prefer to reside on the top level because it shields them from the ground's direct cold, and they feel that the heat loss from the animals below keeps the upper floor warm. During the long winters, the hearth is the focal point around which the family gathers.The top floor is associated to the gods.Prayer room is allocated on the top floor.

5. Framework

The project would hence focus on Social and personal factors of the user in building construction. Below table shows the indicators and elements of the frame work.

	INDICATORS
CONTEXT BASED TRADITIONAL KNOWLEDGE	1. Spatial arrangement 2. Construction Material 3. Construction technology 4. Human resources
USER INTERPRATION	1. Social norms 2. Comfort 3. Cultural values 4. Experience

Figure 2: Design framework

INDICATORS	ELEMENTS
SPATIAL ARRANGEMENT	1. Sizes of spaces 2. Arrangement of the interior space 3. Deciding numbers of rooms
CONSTRUCTION MATERIAL	1. Use of local materials 2. Human resources
CONSTRUCTION TECHNOLOGY	1. Use of available construction technology 2. Use of passive methods
HUMAN RESOURCE	1. Availability of human resources

Figure 3: Design indicators

	PURPOSE
Spatial arrangement	1. To capture the users understanding about context based architectural knowledge. 2. To capture the users understanding about traditional construction technology related to the area 3. To understand how and why the design changes occurred. 4. To learn from the user about the building relating it with their experience and Social norms
Construction Material	
Construction technology	
Human resources	

Figure 4: Design Purpose

	PURPOSE
Social norms	1. To understand how the elements of the context base architecture is defined from the social norms, comfort, cultural values and experience perspective of the user
Comfort	
Cultural values	
Experience	

Figure 5: Design Purpose

6. Analysis

6.1 Residence Building

To understand about the context base knowledge two case were taken. one residential building is 150 years old where the other is new construction and the comparative data was analyzed based on the frame work.

6.1.1 Case Study 1

One of the oldest vernacular architecture was taken as a case study and the detailed study was done. The building is located at Jhong. It was built more than 150 years ago. The exact age of the building is unknown to the owner. The owner name is Tsering Gurung. 8 people lived in the building.

Figure 6: side view of Residence

Constituent Parts of the House

The home is a large structure made up of numerous rooms that are connected by a number of sections that are occasionally added later during construction. The dwelling is divided vertically as per the use of the people living there. The case house is divided into 3 parts the ground floor is used as stables and the storage area which contain fodders.The animal shed has the different entry so that it does not cross the path of the people and their storage is also place in the attached room.

The first floor is divided into 2 parts one is used for the living and the bedroom purposes and the other as kitchen. The house consists of 2 kitchens summer and winter. On the first level, a sleeping room is adjacent to the fireplace room to keep it warm during the winter months. The top level is made up of storerooms and a prayer area. It is oriented toward the highest and most pristine place. The first and top floor consists of the open Verandah. The case home uses it as an interactive space or a space utilized for various housekeeping tasks.It has a tiny hand washing room that serves as a place for cleaning kitchen ware or functions as a basin.

House construction technology

The phases outlined below can be viewed as one component of a home construction process.

1. Gathering materials, deciding on a location, and consulting with the master mason.

2. Excavating and installing foundations or

constructing a wall basement.

3. Constructing superstructures with lintels and openings.

4. Installation of pillars, primary and secondary beams, and floor finishing for each story.

5. Window and door installation.

6. Plastering and finishing touches.

Foundation

The construction phase starts with digging the pit for the foundations. The plinth and foundations are made of stone rubble masonry with mud mortar. It is built in stone foundations, 2 feet wide, and up to a meter in superstructure. Since the site is sloped, the behind portion consists of additional new floor in first floor. The rubble masonry is elevated from the ground floor which stands 5'6" above the ground level to protect the dwelling during heavy snow fall.

Wall

The house consists of five types of walls, of which three are made mud type while one is in stone, and one in timber. Mud walls are Gyang-ka wall (rammed earth), Pop wall (adobe) and wattle and daub wall. The major load-bearing structure is the masonry, which also insulates the building due to its continuous thickening. Walls at the ground level are divided into 2 parts. The wall just above the ground is made of stone till 5'6" height and above Sun-Dried Mud Brick Walls known as Pop is constructed. The thickness of Pop on the ground floor is 21". The first-floor wall is 18" thick. The wall gradually tapered as it goes vertically upwards so the thickness of the wall on top floor is 14". The internal partition materials are constructed out of wood attached to a wooden frame. It can be observed that the house has been gone through additions in different phases of its life, since the walls are in mixed wall system. Rammed earth and adobe are the one that seems to be used in earlier times while the later one has been used for additions and extensions.

Roof and floor

Most of the roof in mustang is flat that follows in the case building as well. The case study residence consists of circular wooden post of 6" diameter. Over the post a wooden beam is placed after, circular Rafter. Willow sticks were utilized to finish the floor construction above the rafters. Above that lies a layer of Dholu, a non-rotting shrub that has been mixed with mud. A second layer of mud is thrown over the top and pushed down with the feet to level it out and allow it to dry. Finally, mud plaster is applied to guard against rain. The house's floor and roof are built in the same manner.

Openings

Windows and doors are referred to as openings. No windows are found on the ground floor for stables. The openings are seen in the first and second floor. The openings on the external walls are small which is only used as the ventilation. There are no openings on the north side of the building due to the weather conditions. Also the cold wind blow from the north side. Openings are seen on the south and the west side. It consist of only 2 openings one on the south side of the building and other in the west. The largest door in a house is the main entrance which is 5'6" high. The addition of an external stone staircase is seen just in front of the main door which enabled the connection of the first floor directly from the outside. Internal doors are 4' high which is smaller than the main entrance.

Plaster and painting

Mud plaster is used to finish houses. The homes must be painted, and the lime is used to whitewash them. The case study buildings are likewise lime whitewashed, with red enamel painted doors and windows.

6.1.2 Case Study 2

A case study of recently constructed architecture was used, and a thorough investigation was carried out. Jhong is the location of the structure. Nyima Gurung is the owner of the building. The building has a total of 5 residents.

Figure 7: 3D of building

Constituent Parts of the House

Building is vertically divided according to the requirement of the family and people moving towards modern ways of living. The case building is divided into 3 levels ground floor consist of living kitchen, living sun room and bathroom, first floor consist of bedroom, and bathroom and the top floor consist of Prayer room. Since now a day's people do not do animal husbandry the space for the animal shed is not separated on the building but if required it is placed outside the building. The traditional method of placing the hearth in the middle of the house is also modified. The hearth of the house is also placed according to the ease of the people. The kitchen is also facilitated with the modern equipment's like the kitchen cabinet, wash basin, gas stove and so on which makes is easy for the household activities.

Construction Phase

Foundation

The depth of the foundation is kept 5' and RCC is done. Further 5 feet stone wall is constructed above the ground. Similar to the traditional technique.

Wall

Mud-based wall materials include sun-dried mud bricks and rammed earth.The ground floor wall is divided into 2 parts. The wall just above the ground is constructed out of stone and Further above the stone wall rammed earth wall is constructed from the mud available in the area. The wall is also tapered as it goes upwards. The thickness of the wall is 21" in the ground floor similarly 18" on the upper floors.

Roof and floor

For the flooring it is slightly modified than the traditional method by the use of modern technology. The main supporting element of the building is its massive wall and also pillars are placed in the area where there is large span. 6" circular pillar is placed where there is necessary to support the floor. Further rafter is placed above it and then 1" plywood is placed and above the plywood thick layer of mud is placed which is finished with the mud plaster. The traditional staircase which is constructed by carving hole in the wood log known as Tewa is also replaced by the wooden staircase. In the new construction the staircase is placed as the permanent element and as a private element.

Openings

Now day's windows are completely different from the traditional windows which are small in size. Now days the windows are made bigger as people want the room to be brighter and also to maintain the antithetic of the building. But sill today they do not place windows in the north side of the building. The 4' by 5' windows are placed but only on the south, east and west side of the building.

Plaster and painting

The case study buildings are likewise lime whitewashed, with red enamel painted doors and windows.

6.2 People Perception

The data is collected through Field Observations, stakeholder interviews and interview of the Locals. A sample size of 25 people was surveyed. It is found that all the people have some idea about the traditional architecture of the place.

Dwelling Preferences

People commented that they prefer the dwelling which uses traditional and modern methods (63%). Traditional technology for the facade of the building where as RCC as the structural element. According to them the main reason to want this construction method is that the dwelling will be structurally stronger. People also want traditional materials as the exterior but want the interior facilities to meet the modern needs. The people believe that they prefer traditional dwellings because it's more comfortable regarding the weather. The materials used in the buildings are also locally available and also it helps to preserve the local architecture of the area. It is also found that people do not prefer fully modern dwellings. As the weather is very cold and RCC buildings are very cold in winter.The use of the space has also been change according to the requirement of the people. 80% of the people commented that they do not use the space according to the traditional ways. The ground floor has been completely changed according to the requirement of the people.Before it used to be the space allocated for the animals and the store for rich and poor but now stables are not placed on the ground floor.It is placed separate from the main house. 20% of the people's house still uses the spaces in the traditional ways.

Construction Technology

Survey shows that the first priority is given hybrid

types of building are seen in Jhong recently. In new constructions user construct the structure portion using the modern technology like RCC foundations, concrete pillars but at a same time they use mud for wall construction. As they want to give traditional outer looks. Second is the load bearing in which Gyanka (Rammed earth wall) is used as the structure element. Lastly, people do not prefer RCC structures as it is very cold to live in winters.

Spatial Planning

The planning of the dwelling is done on the basis of the sun direction and snow fall. Livable spaces such as living rooms, bedrooms are kept on the south side and mostly stores, toilets are placed on the north side of the residence.The placement of the windows are also defined by this characteristics as openings are placed on the south side and windows are not placed on the north side.

Material and Human resource

Majority of the people said that the materials are imported as well as extracted from local source. Materials like mud, stones and wood are extracted from the local source. Whereas the materials like cement, tiles are imported from nearby cities like Pokhara.

According to the stakeholders, locals are not into construction business they are mostly focused on tourism industry. Due to which construction workers are hired from outside mustang.T

Comfort

The main reason to main to maintain comfortable temperature in the building is through use of local materials like mud walls, wood flooring and also the use of local construction technology. 40% of people also commented that they use the metal “chulo“to keep themselves warm in winter. 10% people mentioned that the passive heating technology is also the medium to maintain the warm temperature inside the building. Windows on the south helps to gain maximum sunlight.

7. Findings

The findings are listed below:

ARCHITECTURE DESIGN

• This significant lifestyle change had a significant impact on the ground floor, which previously housed the stables in both poor and rich houses, as well as palaces. It has now been modified to meet the needs of the residence’s user.

• Kitchens have become significantly brighter places, with glass covering a whole wall in some cases. Excessive use of glass has diminished the kitchen’s insulating capabilities, allowing heat to escape fast from the window panes, especially in the winter, even if the kitchen is southern orientated.

• The functions once united in the fireplace room are getting more and more separated. But people are creating a living space where people can gather and interact. The separation and the increased number of sleeping rooms is therefore a recent feature

• The shift in the Prayer Room can also be visible in minute aspects. In conventional buildings, lamps are always lighted, which causes the room surfaces to become dark. As a result, it is now usual to see glass boxes installed in order to protect surfaces from damage; these boxes can also be found in monasteries.

• There was no particular way of removing the ground floor from the soil in the past because it was mostly utilized for keeping animals. The weight of the animals moving compressed the ground. As a result, only the walls had a foundation beneath the ground. In today’s well-designed constructions, a hole is dug for the entire building area, and the ground is filled with graded stones to provide a foundation when there are no structural barriers.

• Windows were installed with panes after glass was introduced. Larger openings are desired today not only because they let lighter and air into the structure, but also because they are more appealing to most residents. In this regard, it can be argued that, in terms of proportions, windows in modern buildings have frequently become

CONSTRUCTION DESIGN

• The major changes are seen in the foundation construction as it has been changed from Stone and mud to RCC construction.

• Human energy was used to perform construction, with help of tools. • Traditional house characters such as low ceiling height and opening height were altered, making it larger, in newly constructed house.

• The low maintenance of concrete floors, which would also not produce dust was said to be one of the pros of the new house type.

• In context of changing climatic conditions, selection of roofing techniques in recent constructions exhibit use of CGI sheets.

8. Conclusion and Recommendation

The research objectives of the ways of integrating context-based knowledge embodied as users' knowledge through user participation in design process are found by applying different methods that are discussed above. From this research, it can be concluded that there is direct and indirect relationship between user and architecture of the place. It is crucial to define how new construction shape people's daily lives. If construction of the buildings is not done carefully then it leads to unplanned urban planning. In doing this research, both positive and negative impacts were identified.

Two buildings were studies one is 200 years old and other is the recent construction. To understand the change in the architecture of the area. From case studies, it is found that the architecture of the place is changing little at a time. People are in cooperating modern technology according to their requirement.The usage of the building has also been changed according to the requirement of the people and also according to the modern needs. The ground floor has been completely changed according to the requirement of the people. In new constructions user construct the structure portion using the modern technology like RCC foundations, concrete pillars but at a same time they use mud for wall construction. As they want to give traditional outer looks.

8.1 Recommendations

Architects

• The material has a significant impact on the building's long-term viability. Local materials, such as stone and wood, are highly suggested for usage because their manufacture, transportation, and disposal do not require any additional energy. These materials are derived from nature and are readily available in the local area, requiring less energy and expense.

• It is advised that high thermal mass walls and roofs be designed to facilitate heat acquisition during the day, store heat, and release it at night.

• The building planning should also be done to maximize the south sun

Policy Makers

• Develop architectural design guidelines for construction of houses in Mustang and then apply them through flexible means such as building consensus among the local leaders, VDC and local government including community, providing incentives for guidelines followers and punishing defaulters.

• Maintain public education and community awareness through a variety of ways, including research and development, event management, public hearings, and information distribution.

• Resurrect the old way of building by forming a relationship with the concerned users. Recognize the economic importance of traditional structures and place an emphasis on local activities and culture.

Users

• Try to maintain the traditional essence during the construction of the residence.

• To be in contact with the policy makers related to the architectural guidelines

References

[1] Per Christiansson, Kjeld Svidt, K.B. Pedersen, and U. Dybro. User participation in the building process. *Electronic Journal of Information Technology in Construction*, 16:309–334, 02 2011.

[2] Henry Glassic. *Vernacular Architecture*, pages 17–21. Indiana University Press, 2000.

[3] Sarah Edwards. https://www.archdaily.com/155224/vernacular-architecture-and-the-21st-century. [Online; accessed 2019, Oct 15].

[4] JOHANNA ERIKSSON. Architects and users in collaborative design. 2013.

[5] Asmita Daha. An investigation on vernacular architecture of marpha, mustang, nepal and understanding the influences and changes in architecture and its sustainability. 2019.

[6] Paul Oliver. *Built to Meet Needs: Cultural Issues in Vernacular Architecture 1st Edition*. Addison-Wesley Professional, 1st edition, 2006.

[7] Shailendra Bahadur Thakali. Localising environment : Mustang's struggle to sustain village autonomy in environmental governance. 2012.

[8] Edoardo Paolo Ferrari. *High altitude houses Vernacular Architecture of Ladakh*. 1st edition.