

TRACING TRADITIONAL ELEMENTS OF JAPANESE ARCHITECTURE THROUGH
CONTEMPORARY MICRO HOUSES IN JAPAN



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TRACING TRADITIONAL ELEMENTS OF JAPANESE ARCHITECTURE THROUGH
CONTEMPORARY MICRO HOUSES IN JAPAN

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ABSTRACT

TRACING TRADITIONAL ELEMENTS OF JAPANESE ARCHITECTURE THROUGH CONTEMPORARY MICRO HOUSES IN JAPAN

The idea of minimized living is not a new trend, but it is becoming more significant in today's society. Changes in lifestyle and population rise have had a substantial effect on living spaces and environments. Gary Hustwit's documentary *Urbanized* (2011), shows that more than half of the world's people now live in cities and urban centers, and that this trend is likely to continue. The need for small housing rises. Rural houses are scarcer than ever, with limited space and difficult development sites being the normal. This thesis is motivated by the challenges posed by minimal and tiny living spaces and the resulting adaptable design solutions. It examines Japan as a case study, concentrating on traditional Japanese design elements and how they are interpreted for contemporary urban life, as well as the global impact of Japanese design. The early emphasis is on the concept of a compact metropolis, and Japan is used as an example of a densely populated metropolitan center. The geographical circumstances of Japan, being surrounded by sea and having a limited land area, as well as the religion and culture of the Japanese people with their traditional traits have influenced the Japanese worldview along with the way of life and contributed to the adoption of the minimalist lifestyle. The characteristics of the traditional Japanese home and its associated practices are central to this research. It addresses how the conventional application of human size and proportion has affected the spatial arrangement. At the same time, the important relationship between the elements and the house was found, and the materials and building methods used by the native Japanese were evaluated. The research then turns its emphasis to consider the impact these historic variants have on contemporary designs. Urban places with a high population density often have modern interpretations of these historic qualities. The emphasis of this thesis is on three case studies in Japan which are House in Kobe, R-Torso-C, Garden and House. After establishing the relevance of these designs, the study examines the impact of Japanese design on tiny houses. The last chapter of the study tries to find out the effects and reflections of traditional design solutions of Japanese houses on modern micro houses.

ÖZET

GELENEKSEL JAPON MİMARİ ÖĞELERİNİN ÇAĞDAŞ MİKRO EVLERDE İZİNİ SÜRMEK

Minimize edilmiş yaşam fikri yeni bir trend olamamakla birlikte, günümüz toplumunda önemi artmaktadır. Yaşam tarzındaki değişiklikler ve nüfus artışı, yaşam alanları ve çevremiz üzerinde kayda değer bir etkiye sahip olmuştur. Gary Hustwit'in *Urbanized* (2011) çalışmasında, dünya nüfusunun yarısından fazlasının artık şehirlerde yaşadığını ve bu eğilimin devam edeceğini belirtilmektedir bu nedenle küçük konut ihtiyacı artmaktadır. Kırsal yaşam her zamankinden daha az olmakla birlikte, sınırlı ve zorlayıcı alanlar için tasarım ihtiyacı normalleşmiştir. Bu tez çalışmasının motivasyonu, minimal ve kısıtlı yaşam alanlarının yarattığı zorluklar ile bunların sonucunda ortaya çıkan uyarlanabilir tasarım çözümleridir. Japonya örneği incelenmekte, geleneksel Japon tasarım öğelerine ve bunların çağdaş kentsel yaşam için nasıl yorumlandığına ve Japon tasarımının küresel etkisine odaklanılmaktadır. Kompakt bir metropol kavramı, ilk vurgu olarak ortaya koyulmuş ve Japonya, yoğun nüfuslu bir metropol merkezinin örneği olarak kullanılmıştır. Japonya'nın coğrafi koşulları, denizlerle çevrili olması ve sınırlı bir kara alanına sahip olması, geleneksel özellikleri ile Japon halkının dini ve kültürü, Japon dünya görüşünü yaşam biçimiyle birlikte etkilemiş ve Japon kültürünün minimalist yaşam tarzını benimsemesinde katkıda bulunmuştur. Geleneksel Japon evinin özellikleri ve bununla ilişkili uygulamalar bu araştırmanın merkezinde yer almaktadır. Çalışma, insan boyutu ve oranlarının geleneksel tasarım ve mekansal düzenlemeyi nasıl etkilediğini ele almaktadır. Aynı zamanda, yapı elemanları ve ev arasındaki ilişkiler araştırılmış, yerel Japonların kullandığı malzeme ve yapım yöntemleri değerlendirilmiştir. Araştırma daha sonra bu tarihi varyantların çağdaş tasarımlar üzerindeki etkisine odaklanmıştır. Nüfus yoğunluğu fazla olan kentsel alanlar genellikle bu tarihi niteliklerin modern yorumlarına sahip olmuşlardır. Japonya'da bulunan House in Kobe, R-Torso-C, Garden and House olmak üzere üç örnek bu tez kapsamında incelenmiştir. Bu tasarımların bu çalışma kapsamında ifade ettiklerinin irdelenmesinin akabinde, Japon tasarımının küçük evler üzerindeki etkisini incelemektedir. Çalışmanın son bölümünde ise Japon evlerinin geleneksel tasarım çözümlerinin modern mikro evler üzerindeki etkileri ve yansımaları çalışılmıştır.

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1. INTRODUCTION

The goal of this research is to conduct a conceptual analysis of the spatial organization of Japanese micro homes to determine the impacts and reflections of traditional design solutions of Japanese houses on contemporary micro house. This study has been structured around ideas like Modularity, Openness, and Surfaces in order to compare and analyze the spatial arrangement. Understanding the cultural and religious origins of the main features of Japanese architecture is the focus of the first part. In chapter 2, this study gives an overview of the basic features of traditional Japanese architecture in the context of certain ideas and tries to define micro houses. In addition, chapter 3 establishes a comparable framework for micro-modern Japanese homes, analyzing how conventional design solutions appear in micro-modern homes. In conclusion, an overview of the reflections of traditional Japanese architecture in micro-modern Japanese houses is provided.

This research aims to conduct a conceptual analysis of the spatial organization/layout of Japanese micro homes in order to determine the impacts and repercussions of conventional design solutions of Japanese houses on contemporary micro house. To clarify and define the subject, the emphasis is on the basic notions of traditional Japanese houses and their reflections in contemporary micro houses. The study's framework also include cultural, religious, and social components of the Japanese way of life. In this regard, this thesis study brings with the stated question; How can studying Traditional Japanese Architecture can help understand to Contemporary Micro House Design ? Japanese homes are one of the most prominent and well-known examples of vernacular architecture in the world, and they have influenced modern art, artists, designers, and many architects throughout the 20th century.

Famous architects who were inspired by traditional Japanese design like Bruno Taut and Frank Lloyd Wright. Wright stated that , "At last I had found a country on earth where simplicity, as natural, is supreme. The floors of these Japanese homes are all made to live on – to sleep on, to kneel and eat from, to kneel upon soft silken mats and mediate upon. On which to play the flute, or to make love." (Wright,F. 2005, p. 196). To compare and represent the traditional spatial characteristics and their contemporary manifestations, the following design elements and approaches have been selected: tatami,shoji,fusuma,natural light, ventilation, material and texture.

1.1. AIM OF THE THESIS

Many micro-housing applications are seen in various countries of the world. It is necessary to investigate to what extent it can be answered to the housing need in our country. This study aims to study examples of micro houses in order to learn about the diversity of their design via tracing traditional elements in architecture. In order to see that traditional values can still be preserved, this thesis is intended to contribute as a guide due to the small number of examples in our country. This study aims to make a conceptual analysis of the spatial organization/layout of Japanese micro house in order to find out the effects and reflections of traditional design solutions of Japanese houses on contemporary micro houses.

1.2. SCOPE OF THE THESIS

This study takes a closer look on the traditional Japanese houses to find out how studying Traditional Japanese Architecture can help understand to Contemporary Micro House Designs in Japan. Furthermore, the study has been arranged around certain concepts such as Modularity, Openness and Materials. The first part examines the cultural and religious origins of the general features of Traditional Japanese Architecture. In addition to the first chapter the study examines the forms and elements. This research outlines the fundamental elements of traditional Japanese architecture in light of predetermined notions in chapter 2. In addition, the third chapter creates a framework for contemporary micro houses in Japan, examining how traditional design solutions appear on contemporary micro houses. In conclusion, a basic overview of traditional Japanese architecture's reflections in micro-modern Japanese houses is provided.

1.3. METHODOLOGY OF THE THESIS

In this study there are three parts: literature review, the Elements and the Case Studies. The thesis tries to brace the research tool as academic resources which are books the main sources are: *A Japanese Touch For Your Home* by Koji Yagi and *Traditional Japanese Architecture an Exploration of Elements and Forms* by Mira Locher Foreword by Kengo Kuma, dissertations and articles.

In addition online web research such as Archdaily, Dezeen are used for choosing the case studies. The study tried focusing on the traditional spatial characteristics and their reflections by the following categories Modularity, Openness and Surfaces which are chosen as design elements, approaches to compare and represent in the Case studies. This study takes a closer look on 3 Case Studies which are House in Nada, R-Torso-C and Garden and House were selected and compared to following categories ; Design, Modularity, Openness, Surfaces by using plan section and images.



2. TRADITIONAL JAPANESE HOUSES AND THEIR MINIMAL ARCHITECTURAL DECENT

In this chapter the thesis tries to provide a perspective of Traditional Japanese houses to understand its minimal elements and approaches, relating the historical development and context of the Japanese Architecture while examining a number of the individual architectural basic elements such as roofs, walls, floors, ceilings, foundations. Furthermore, this study takes a closer look into the elements in chapter 3 which are tatami, shoji, fusuma, engawa and ranma.

In terms of building construction, Traditional Japanese Architectural design is built on an essential aspect that is uncommon in the majority of other countries. This indicates the existence of an abundance of strong, attractive wood. There are several volcanoes in Japan, and the ash they release generates fertile soil. In addition, Japan's humid environment nurtures gorgeous woods that give a steady supply of lumber. The Japanese have pondered and labored for many millennia on how to use lumber such that it is both strong and beautiful. It is a natural consequence of prolonged consideration of the same subject for the details to become more polished [1].

To improve these basic and simple structural systems that support buildings, a thorough examination has been conducted of the measurements and related details of other structural components, such as the tiles installed on roofs, the kind of fitting known as *shoji* that is attached using washi paper, and the flooring material known as *tatami* that is distributed between the columns. It is evident that a system in which the structure came first and everything else relied on it was produced and promoted by the country's profusion of strong and beautiful trees. In addition, nothing was required to be done to this wood structural system, such as covering it with other building materials or painting it heavily. This is because the wood's grain was already aesthetically pleasing.

Due to the fact that the building's structural materials and other components lacked embellishment, the natural character of the building's materials became significant. It is regrettable that a culture of embellishment now rules the globe. Wood, for instance, is utilized only as a decorative material, such as when attaching thin wood sheets to concrete

and steel constructions. As a symbol for nature, this skin might be selected. Thin stones may be used to demonstrate power and riches. Aluminum and glass may be used to demonstrate the presence of cutting-edge processes. The structure itself is entirely disregarded. People now compete on the basis of how expensively structures can be sold based on the modification of the skin. This age of skin is a product of global capitalism [1].

Now that the period of capitalism has reached a crucial turning point, it is time to look once again for the essence under the surface, the reality that must be concealed by the materials themselves. When seen from this new perspective, it is quite probable that Japan's construction heritage will be rediscovered as something entirely novel. This tradition also conceals a vast amount of environmental preservation expertise. The author thinks that this tradition has the capacity to address the environmental issues of the planet and the power to rescue the soul of the people of the planet from the chaos of today.

2.1. AN OVERVIEW OF JAPANESE ARCHITECTURE

The country's two major faiths, Buddhism and Shintoism, had a significant influence on Japanese construction heritage. The aesthetic principles were primarily inspired by Buddhism, which had been transferred from China to Korea in the middle of the sixth century. According to Buddhism, all things are the progression or destruction of emptiness. "Nothingness" should not be regarded as an empty place, but as a space of potential dedicated to the pursuit of inner serenity and spiritual enlightenment. This basic notion of nothingness spawned the idea of the zen aesthetic and of contemplative spaces in which the concept of essentiality predominates. Shintoism, also known as the Road of the Gods, is a native Japanese religion and is regarded as the national cult. Its members believed in a pantheon of thousands of divinities, each of whom is connected to a natural element [2].

This idea is the basis for the interest in natural materials and the desire for wood, the primary natural element in Japan's centuries-old woods, which is used in the construction of both religious structures and private residences. Despite the fact that Buddhism and Shintoism have separate traditions and rituals, the two faiths have been symbolically connected throughout their history, sharing rites, locations, and architectural styles; it is today impossible to distinguish between the two in contemporary Japan and in the architecture of the past [2].

Prior to settling and constructing houses, the ancient Japanese were nomadic, moving with the seasons, climatic changes, and available food supplies, and subsisting on hunting, fishing, and gathering. With the introduction of organized agriculture, particularly wet ricefarming, over 500 towns were founded to tend the fields and erect permanent residences [3]. These early eras are known as the J.mon period (ca. 10000–ca. 300 BCE) and the Yayoi period (ca. Several Japanese architects and historians have exploited the contrast between the rugged, creative spirit of the J.mon and the considerably more polished lifestyle of the Yayoi to explain the dual nature of the Japanese people and to classify various structures [4].

The oldest structures in Japan may be classified into three types: earthen-floored flat-land homes *heichi jkyo*, (pit dwellings) *tateana jkyo*, (vertical hole dwelling), and wooden-floored buildings with the floor placed directly on the ground *hiraya tatemono*, (one-story building) or elevated above the ground *takayuka*, (high floor), as evidenced in the raised-floor store house *takakura*, (high store house). Because these early dwellings were constructed completely of wood and thatch the structures does not longer exist. Meanwhile, several house sites have been identified and pits and postholes have been excavated. The building forms have been surmised based on the excavations as well as the representations of structures seen on old bronze mirrors and in the shapes of some haniwa [5].

The shape of the raised-floor storehouses may have been inspired by structures from other locations in Asia, particularly granaries from Southeast Asia or the Pacific Islands, and may have impacted the construction of the first shint shrines [6].

2.2. TRADITIONAL JAPANESE ARCHITECTURE AS A CONTEXT

Different aspects of Japanese architecture reflect tradition, including architectural shapes, the perception of space, the building materials, and the construction processes. In Japan, the materials, construction methods, spaces, and forms that are now considered traditional were not labeled as such until the Meiji period (1868–1912), when Japan opened its ports to trade with the outside world following more than two centuries of self-imposed isolation during the Edo period (1603–1868).

Historians have remarked that the rapid transformations of the Meiji period compelled the Japanese to see themselves through the perspective of the other and to give names to notions that had previously been implicitly recognized but unnamed. Apparently "tradition" was one of these nameless notions [7].

In the 14th century, the English term tradition originated from the Latin *traditio*. The commonly recognized definition is "the transmission of knowledge, beliefs, and practices from one generation to the next without the use of written instructions" [8]. Even if there was no term for it in pre-modern Japan (before 1868), this notion of passing down knowledge was popular and has been meticulously documented in connection to numerous aesthetic and technical interests, such as the design and construction of buildings and gardens.

This study takes a closer look to the Traditional Japanese Residential Architecture such as Minka and Machiya Merchant Houses while other ancient buildings like Buddhist Temples, Shinto Shrines, Shoin Complexes, Sukiya Complexes and Teahouses are out of the scope the study.

2.2.1. Minka

Minka or people's home (usually translated as folk house) is the sort of structure that finally evolved from the ancient houses. Since minka were built using natural materials, mostly wood, mud, and thatch, there are few examples older than 200–300 years. In spite of the fact that the number of minka in use declines each year, Japan is nonetheless home to several exemplary specimens. The extant minka reflect the last step in the evolution of the common home from the pithouse and flat-land dwelling, a period during which political stability and relative wealth led to an increase in communication throughout the nation and a decline in regional diversity [9].



Figure 2.1. Traditional house of Japan [10].

The standard minka has a *doma* with a tamped earth floor, but unlike pit homes, the floor is at ground level as opposed to being buried below. The *doma* is the site of the kitchen and where the majority of domestic duties are handled. Some *doma* are large enough to provide storage spaces and even stables for domesticated animals.

The minka's construction is made of dense wood, with columns built on stone foundations as opposed to being embedded in the ground as in ancient homes. Beams link the columns' apexes and, at occasion, their intermediate heights as well. The beams support a roof-supporting truss system. The minka's roof is the most conspicuous architectural element, and hence the most significant in terms of social standing. It is also the home's strongest regional expression [9]. (Figure 1.1)

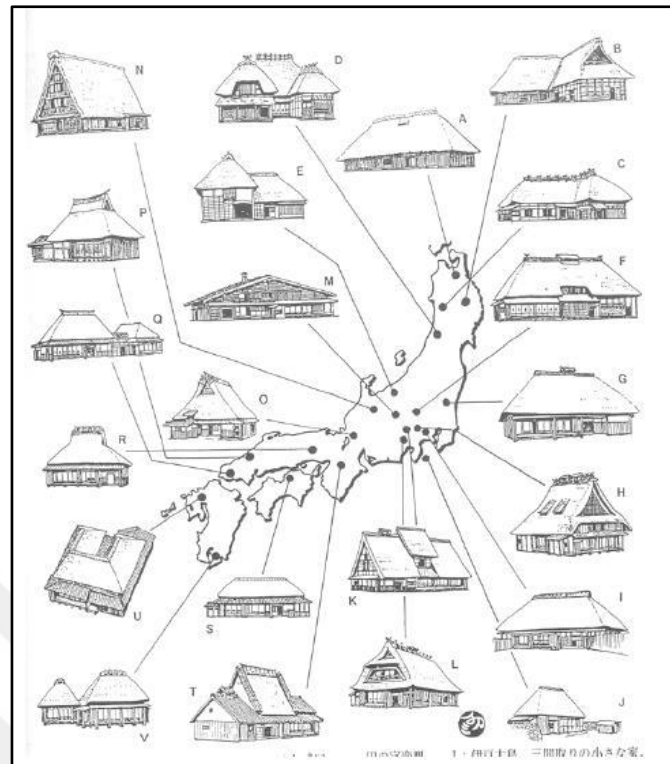


Figure 2.2. Regional differences of the Japanese houses [11].

Historically, the size and shape of a family's roof indicated their social position in the neighborhood. Some minka roofs are covered with wood planks kept in place by wooden battens and hefty stones. Others have ridges lined with ceramic tiles or even planted with flowers. The huge roofs of the minka enclose expansive rooms, sometimes with numerous levels of flooring and other times with the soaring roof exposed. Originally, the minka's interior consisted of a single huge chamber with a tamped dirt floor.

This evolved into a single room with a divided floor plane; half of the area had an earthen floor, while the other half was elevated and covered with wood planks or bamboo poles. Eventually, the floor arrangement got more complicated, as the elevated floor area became bigger than the clay floor and was partitioned into many sections with movable walls. (Figure1.2) The focal point of the interior area is the fireplace, in which a constant fire is maintained. The smoke and carbon from the fire prevent insects from entering the thatched roof and maintain the exposed wood structure. Typically, the hearth is located in the semi-private area of the minka, on a raised wooden platform close to and exposed to the doma. On one side of the hearth area are private rooms, while the entry to the doma and the working area are on the other.

There is space for cooking and working in the doma, individual rooms for living and sleeping, and occasionally even space for silkworms to be cultivated in the top level of the home during the winter months. Depending on the availability of resources in the area, the outer walls of minka may be clad with wood planks or rough mud plaster. The inside surfaces of these walls are also covered with a textured plaster of mud, straw, and sand, as does the outside. Permanent interior walls are also coated with mud plaster or wood paneling. As a result of the impact of upper-class residential design, movable internal partitions, which are used to divide living areas, evolved from basic wood panels to wood lattices covered with handmade paper [9].

2.2.2. Machiya Merchant Houses

In addition to the aristocratic residential compounds present in cities, another sort of urban residential structure, a form of urban minka, emerged. The traditional merchant's dwelling in a town or city was known as a machiya, meaning a townhouse, and had a modest store attached to the residence. Single-story machiya are represented in twelfth-century scroll paintings, while two-story machiya did not become prevalent until the Muromachi era (1334–1573) [12]. In Kyoto and other cities, property was subdivided into long, thin lots with the short end facing the street, and machiya often developed side-by-side, with a common well and a community garden.

The machiya, like the minka, is a species on the verge of extinction, despite the existence of several exemplary individuals, particularly in the well-preserved old districts of towns like Kyoto. The machiya occupy the area of the lots, with the front of the structure occupied by the store, which is immediately linked to the living spaces behind. As the merchant class grew more prosperous during the Edo period, their machiya grew to include multiple rooms, including baths and toilets, and one or more kura storehouses, which are separated from the living quarters by a back garden or open space used for shop related work and frequently contain the family's well. A lengthy hallway with an earthen floor links the front of the home to the backyard's open space and houses the kitchen, bathroom, and restroom [9].

In addition to having wood frames, mud and lime plaster walls, ceramic tile roofs, and tatami mat flooring, Machiya merchant homes also make use of these resources. However, the forms are modified to fit the size and shape of the urban site.

The home and store couldn't have been constructed separately in a wider yard due to the limited lots and close proximity of the dwellings. To bring in light and air and provide a connection to nature, little courtyard gardens, or *tsuboniwa* (literally, tsubo garden; a tsubo is a unit of measure equal to two tatami mats, about 3.24 square meters or 36 square feet), are instead built into the structures. The well-established paradigm of the house in the garden was changed to a new type the garden in the home by the addition of the *tsuboniwa* to the machiya.

2.3. EXTERIOR ELEMENTS OF THE TRADITIONAL JAPANESE HOUSES

This chapter tries to examine the basic exterior elements of Traditional Japanese Houses according to Sasaki Takashi definition and Judy Evans translation by using a spelling which is done by Aso Yuriko [13].

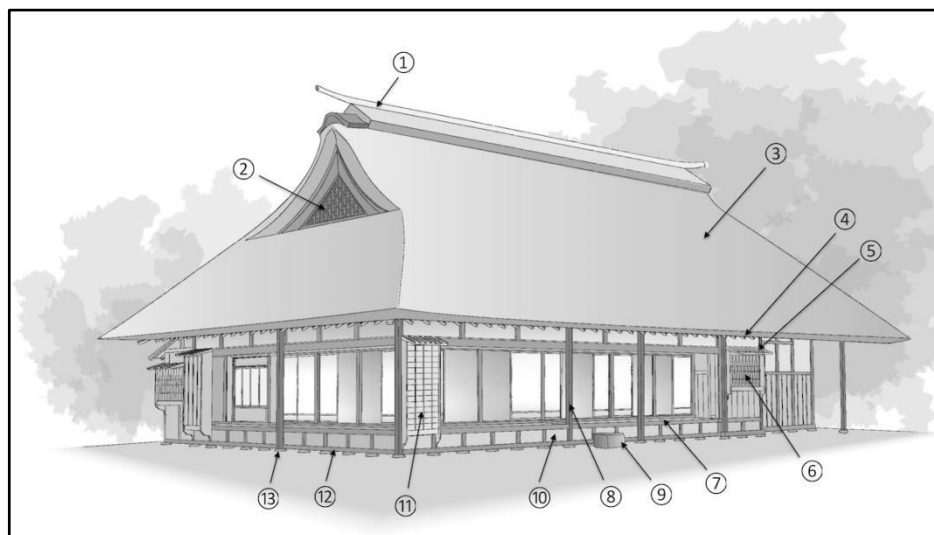


Figure 2.3. Exterior elements of the traditional Japanese houses [13].

1. Omune – Main Ridge: It is the main ridge of the roof that is the highest plane of the house. It is a significant element which the placement is celebrated with a ceremony.
2. Hafu – Gables: It is a triangular panel that is located at the gable wall with varying designs identified with individual names.
3. Kayabuki-yane - Thatched Roof: General roof is identified as Kayabuki-yane with high water-resistant materials, such as susuki grass, yoshi, common reed, kokera-buki timber shingles, hiwada-buki shingles and roof tiles since eighteenth century.
4. Taruki – Rafters: Roof rafters spanning from ridge to eaves for fixing battens. Purlins and battens are named as Shitaji.
5. Hisashi – Windows and Door Eaves: Traditional eaves over the windows and doors are used to gain protection from sun and rain. There are varying designs with different angled slope and support type.
6. Koshi Mado - Latticed Window: It is created by a frame and thin strips of woods that may have cross elements. They provide security as well as allowing ventilation and natural light. The typology with parallel elements only is called Renji, that is also used for doors.
7. Engawa - Veranda: It is a corridor or veranda built at the outside of a house to gain access to outside. Engawa is a frequently used element within a traditional Japanese house designed with or without rain shutters.
8. Enbashira - Veranda Posts :They are also known as Enbashira which are the posts at the edge of veranda for structural support.
9. Kutsu-nugi Ishi – Stepping Stone :It is a stone step located at the main entrance or at the front of the Engawa. Shoes are removed here.
10. En-no-Shita - Under-floor Space: This crawl spaces under the veranda with or without baseboards have enclosed or open typology. It is used to allow air flow and to reduce humidity.
11. Tobukuro - Box for Rain Shutters: It is a storage space mainly located at the end of engawa. The removable rain shutters and sliding doors are stored in this vertical cupboards.
12. Dodai – Foundation Sill or Footplate: It is a system of horizontal decay-resistant timber beams, that creates a footplate at the base of the house. But structurally

the main pillars (daikoku-bashira) generally located on top of the foundation stones.

13. Soseki – Foundation Stones: For structural support and stability, the foundation stones are located into a bed of gravel or stone to hold the main pillars.

2.4. INTERIOR ELEMENTS OF THE TRADITIONAL JAPANESE HOUSES

This chapter tries to examine the basic interior elements of Traditional Japanese Houses according to Sasaki Takashi definition and Judy Evans translation by using a spelling which is done by Aso Yuriko [13].

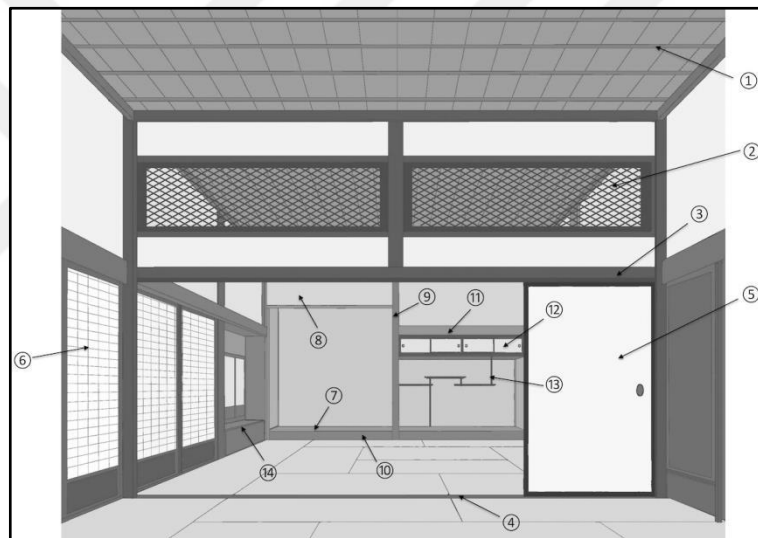


Figure 2.4. Interior elements of the traditional Japanese houses [13].

1. Saobuchi – Ceiling Battens: These narrow and long battens are used for visual reasons as well as structural need, holding the ceiling boards of tenjō ita. They are placed 30cm to 60cm centers in parallel with decorative alcove.
2. Ranma – Tansom Panel: It is a decorative panel with varying designs, located at high level of interior walls to allow air flow and light, some being openable.
3. Kamoi – Sliding Door Lintel: These are the lintels located for sliding doors with or without tracks. The locations without door opening have horizontal timbers called tsuke-kamoi, to keep this line.
4. Shiki-I – Door Sill, Threshold: They are the horizontal timber threshold of doors, gates and entrances.

5. Fusuma – Sliding Partition Door: These opaque sliding door panels are used to partition rooms and constructed with timber frame covered with heavy paper or fabric on both sides. It is also known as karakami-shōji or karakami.
6. Shoji – Translucent Sliding Screens: These translucent sliding panels are used to allow light to travel and constructed with timber frame covered with stretched shōji paper and glass.
7. Tokonoma – Decorative Alcove: These decorative elements are part of reception room designed to raise the floor level within a wall to display hangings and flowers. It also represents the higher rank in terms of seating plan.
8. Kokabe – Above-lintel Walls : They are high level horizontal panels separates the tokonoma alcove from rest of the room.
9. Tokobashira - Alcove Pillar : These ornamental posts are seen in different section forms and located on either side of tokonoma alcove.
10. Toko-gamachi – Facing-board: It is a decorative board designed to cover the different floor levels that is a feature of traditional Japanese House.
11. Nageshi – Tie Beams: It is a high level timber beam originally designed for structural reasons.
12. Tenbukuro – Overhead Cupboard: These high level cupboards with sliding doors are located above chigaidana or above an oshiire closet.
13. Chigaidana – Staggered Shelves: The staggered shelves on varying levels are designed within a recess by tokonoma.
14. Tsuke-shoin – Writing Bench : It is a seating bench generally located under the window, close to the tokonoma and in some designs it is combined with a library or a study area.

2.5. MICRO HOUSE

In recent years, the tiny house movement has gained prominence in the public mind. The trend has been influenced by an interest in "minimizing, decluttering, and downsizing" that has its roots in the romanticism of Thoreau and Emerson in the 19th century [14]. The evolution of the movement has also been affected by the minimalist credo of the 20th century that "less is more." The primary premise of the small house movement is that homeowners may decrease their environmental impact and boost their affordability by minimizing their footprint. In addition, proponents of the movement have expressed optimism on the potential of small homes to solve a variety of housing challenges. Tiny houses have been proposed as a solution for mobile housing for busy travelers [15] temporary housing and guest homes [16], housing for the homeless [17] and as a solution for housing in urban areas with large populations and limited space [18].

2.5.1. Defining Micro House

Micro-home is referred to as *kyosho jutaku* in Japanese. The Japanese are used to living in a compact space. The Japanese have, for decades, crammed their dense population into compact housing spaces. In the 1970s, the then-head of the European Commission, Sir Roy Denman referred to Japan as "a country of workaholics who live in what Westerners consider to be nothing more than rabbit hutches" [19]. Because they have been constructing small houses for so long, the Japanese are adept at space-saving measures and the creative construction of tiny houses that meet the demands of their occupants. The *Kyosho-Jutaku* (micro-homes) movement is a popular term in Japan for these types of tiny housing developments. Micro-homes are often no more than 50 square meters in size, however there are no official definitions of what constitutes a micro-home. However, the overall floor space may seem ample at first glance, but it may be dispersed across many levels on a compact land [20].

To be considered modern Japanese, a home must have a floor size of less than 130 square meters, a footprint of less than 100 square meters, and a frontage of no more than four meters. One to four bedrooms may be found in these residences, which can have up to six levels of construction.

Space efficiency and the construction of areas that look bigger than their footprint are prominent elements in their designs. The architects are able to handle bigger construction plans than one would expect to be viable on the selected sites because to their creative utilization of available space [20].

2.5.2. Micro House as a Concept

Micro houses, some of which are built on pieces of land the size of a single parking spot, have demanded a high level of creativity from Japanese architects [21]. According to experts, these tiny houses are no longer a rarity but rather the new normal. According to architect Junichi Sugiyama of Tokyo, micro-homes account for almost 70 percent of his architectural firm's revenue as of 2010 [22]. To design a house in such a confined area, architects employ a variety of aesthetic tactics, space-saving measures, and inventive storage solutions. Kitchens may also serve as eating areas, while bedrooms can be used for amusement [18]. The elimination of internal barriers and corridors visually expands areas for numerous usage, as do inventive elements like as furniture that can fold into walls [21]. Including as much natural light as possible also helps to make a tiny area appear more expansive. Examples include south-facing, huge windows to give the appearance of space [22] as well as windows of varying shapes and sizes strewn around a wall or tucked towards the base [21]. With fiber-reinforced plastic, precast and Ferro concrete, glass cubes, and thin steel membranes, the micro-homes of Japan may take on a range of innovative forms to complement their eccentric interiors. Transparent furniture and smaller-sized appliances preserve space, while concealed cupboards and the nooks and crannies created by narrow stairs provide storage alternatives [22].

Because Japan has a long history of living in small spaces, the Japanese have had sufficient opportunity to come up with inventive solutions to the architectural challenges posed by constructing in such a restricted area. As Türkiye comes to embrace the concept of small living, there may be lessons to be gained from the inventive use of space planning, materials, and construction experienced in Japan.

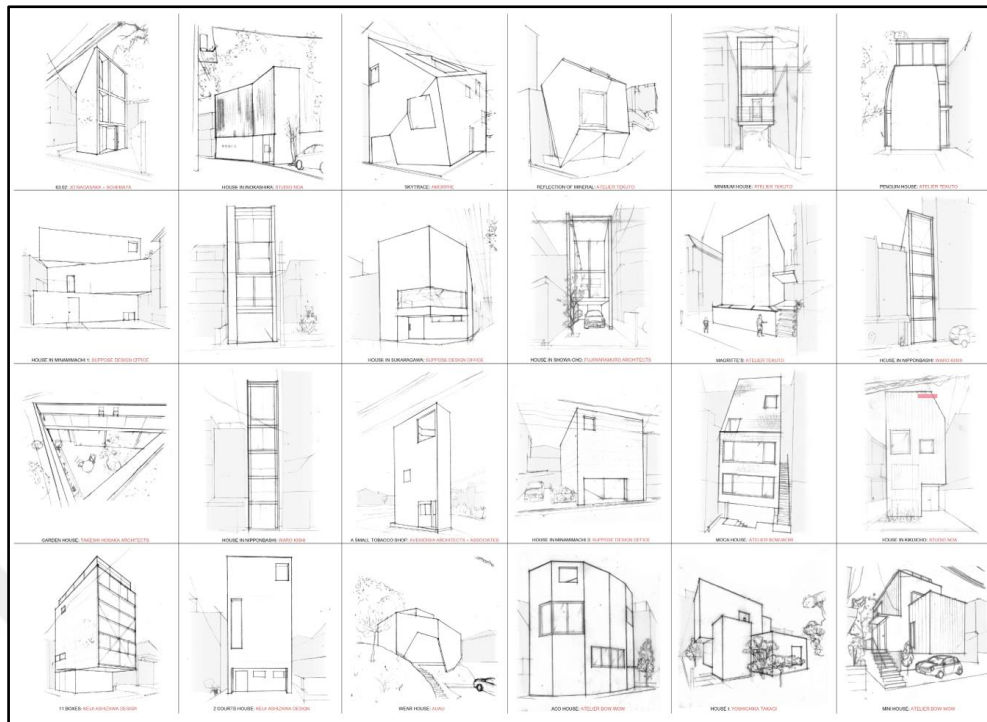


Figure 2.5. Exterior view of Japanese micro houses, prepared by Simon Richmond [20].

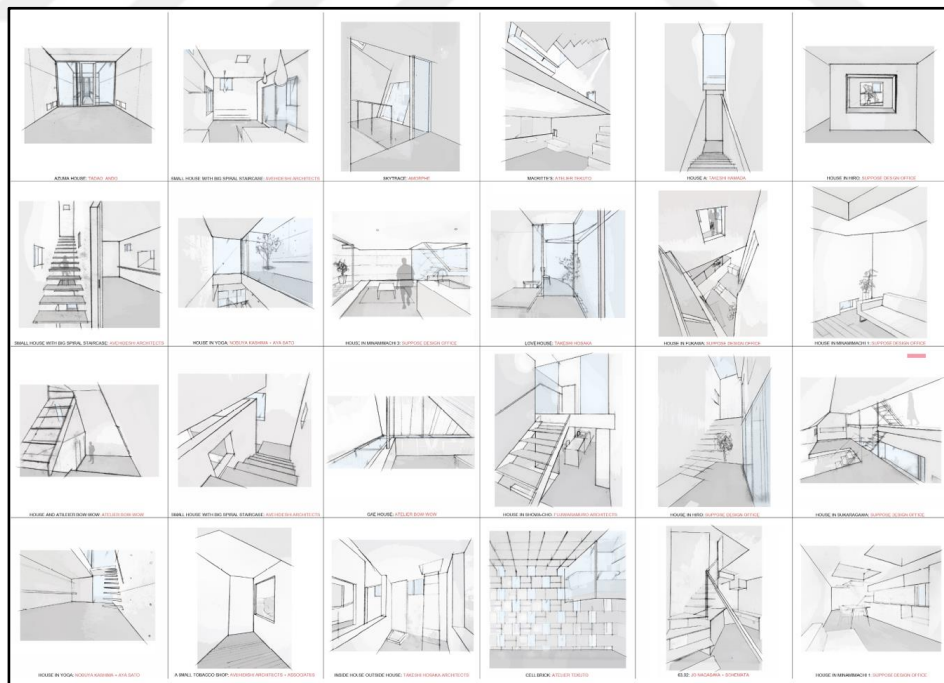


Figure 2.6. Interior view of Japanese micro houses, prepared by Simon Richmond [20].

This chapter has offered a history of Japanese architectural and urban development, outlining a number of cultural aspects that continue to have an impact on the West. Specifically, the study adheres to the Japonisme idea, in which inspiration is obtained from Japanese artistic principles and then interpreted in a foreign environment. The social history and urban environment of Japan, which led to the phenomena of *Kyosho-Jutaku*, give clear justification for Japan's selection as a model. Government policies and their effects have inspired architectural solutions that are fascinating and innovative. The introduction to *Kyosho-Jutaku*, or micro-living, presents the essential elements of the typology that will be examined in further depth in the subsequent chapter. The third chapter provides analyses and examines the elements of Traditional Japanese Design in Contemporary Micro Houses.

3. TRADITIONAL JAPANESE DESIGN ELEMENTS IN CONTEMPORARY MICRO HOUSES

In chapter 2 there were numerous elements which are divided into two: exterior and interior but in this chapter the study takes a closer look to following elements Modularity: Tatami and Shoji-Fusuma, Openness: Natural Light and Ventilation, finally Surfaces: Material and Texture which are examined through Traditional Japanese Design Elements for understanding Contemporary Micro Houses.

3.1. MODULARITY

When a need arises, each section may be used in a different way based on the time of day and the situation. Furthermore, the eastern culture of living has a distinct image of interior space that is distinct from the Western world's. It's also worth noting how easy it is to adapt this setting; the ceiling is supported by pillars, so you can make bigger or smaller rooms simply removing the dividing panels. As a result, it is uncommon to discover overly adorned spaces because of the mobility of Japanese culture and the notion of asymmetrical harmony. Walls that can be moved do not allow for a lot of decorating, thus the interiors are plain and minimalistic. Every room has a built-in wardrobe, which is also used in the West to store items that are only needed at specific times of the day. This ensures the multi-functionality of the space. A dining area may be transformed into a bedroom with this feature, and the cell it inhabits changes constantly during the day. The shoji/fusuma and the tatami together symbolize the beating heart of the house in a figurative sense.

3.1.1. Tatami

The tatami mat has been used since the 8th century (the Nara era in Japan), when single mats were used as mattresses or brought out for a high-ranking person to sit on. Over the ages, it has served as a stage for all aspects of life for generations of Japanese. From castles to homes, temples to martial arts training areas, the tatami has acted as a life-sustaining

element. Used as an integrated floor element, it provides a versatile platform for many everyday activities, including sleeping, eating, and working.

The addition of a futon mat transforms a space into a bedroom. Adding a smaller zabuton cushion and a folding table transforms the same area into a dining room [23].

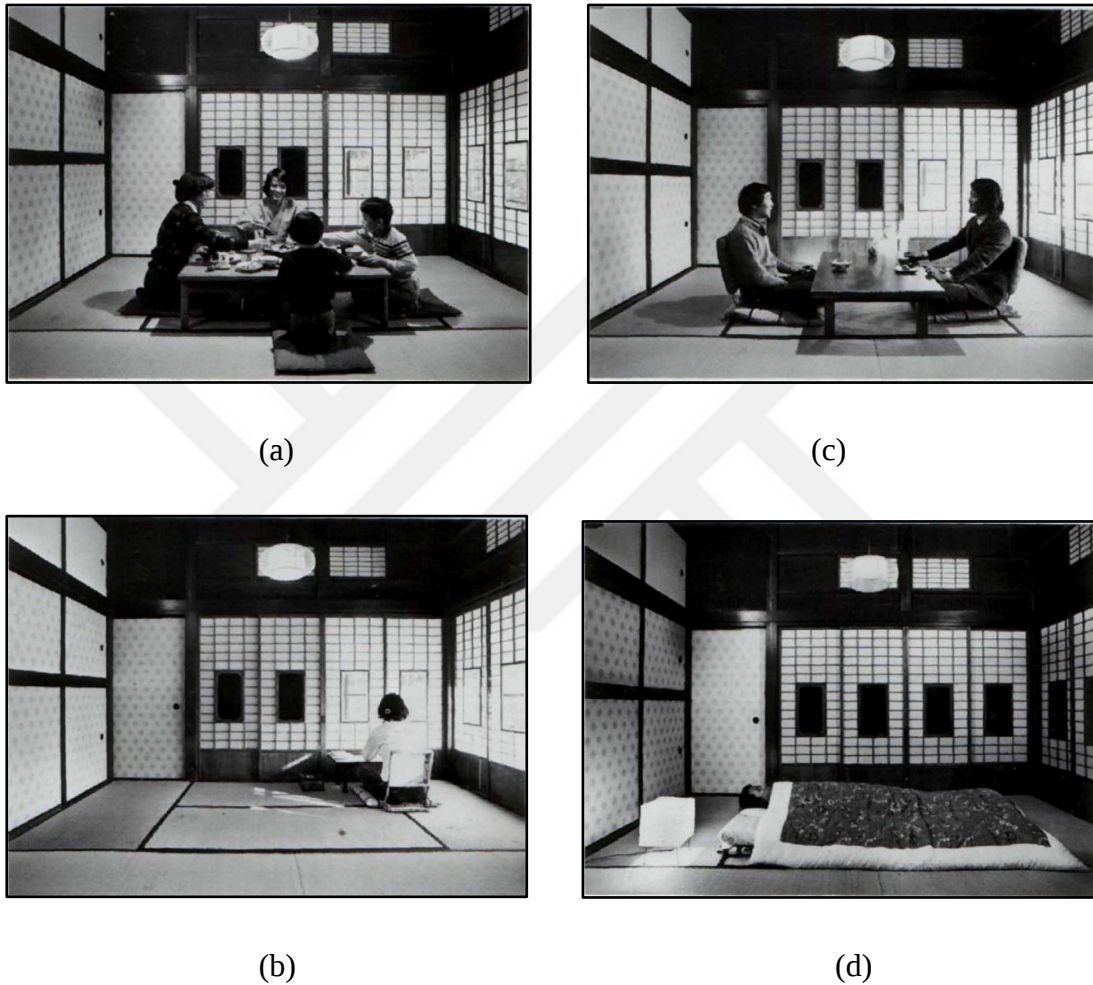


Figure 3.1. Multiple use for Tatami, the same space can be used for (a) eating, (b) working, (c) entertaining visitors and (d) sleeping [24].

Tatami's prominence in varied kinds of structures and locations catering to all socioeconomic strata made it a social and cultural unifier for centuries. As a typical horizontal unit of roughly 1,8 metres by 90 centimetres, tatami may be arranged in a variety of floor layouts. Its dimensions have also affected the building's vertical dimension, establishing a standard for wall components and sliding doors (fusuma and shoji). The height and form of the ceiling were altered to accommodate the vision of a person seated

on the floor as opposed to a person sat in a chair; ceilings are relatively low and often ornamented.

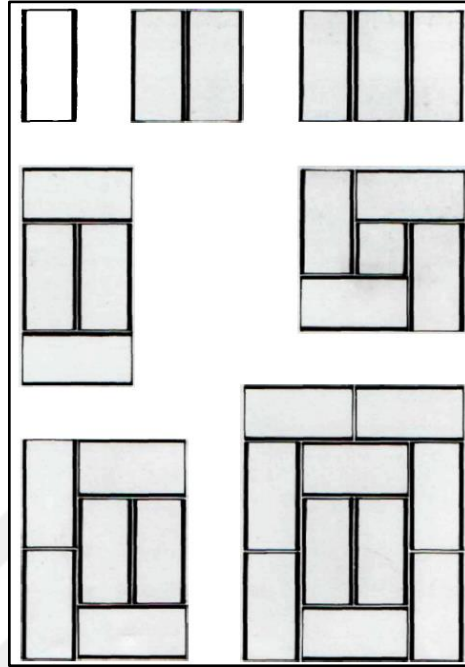


Figure 3.2. T-shaped patterns are common but 4- patterns are avoided because of the difficulty in achieving a good fit [24].

The tatami is a fundamental component of the physical ecology of post-supported traditional Japanese houses. The wooden frame allowed airflow through the hardwood floor structure and tatami flooring. Tatamis are constructed from natural materials, rice straw layers, and igusa rush, and are suitable to the environment of Japan: cool in summer and warm in winter. Moreover, during the hot and humid summers of Japan, the rush is thought to collect humidity and release it during the dry season. The floor system incorporates openings above wall components and sliding doors. Beautifully adorned transom panels (ranma) above the sliding doors provided for air circulation [23].

Katsura Rikyu, a separate Imperial Villa on what are now the outskirts of Kyoto, is the finest example of Japanese tatami culture. The floor plan of the shoin, the main study structure, has a typical Japanese design with hallways linking the rooms on the outside.



(a)



(b)

Figure 3.3. Katsura Imperial Villa (a) central perspective and (b) outside view [9].

Individual rooms are denoted by the *tatami* patterns and may be created by sliding *fusuma* doors that divide the continuous interior into discrete rooms. Although not as swiftly, the new way of living also affected residential housing patterns. There, the traditional Japanese way of life remained far longer than in public structures. During the Meiji era, individuals constructed homes that blended Western and Japanese ways of living, with areas for chairs and tables next to those equipped with tatami, and sometimes a single table that spanned both kinds of seating amenities. As Japan gradually adapted to the foreign way of life and buildings connected with it, foreigners began to adore the quickly vanishing traditional structures of Japan, admiring them in an orientalist manner. Europeans found Japanese architecture and used it into the modern movement as an argument. Katsura's proportions influenced Mondriaan and Bauhaus photographers, while Horiguchi Sutemi's Okada home references both the Pavilion by Mies van der Rohe and traditional Japanese architecture.

One may ask why the Japanese continue to live on tatamis. The high population density of Japanese cities may necessitate a desire for multipurpose areas, for example. In a tatami arrangement, a chair and a table are not required, although sabutons may be rolled up and stored. Integrated storage eliminates the need to purchase a cabinet.

Advertisements in Tokyo and around Japan also appear to imply that tatamis have persisted in another location (and are perhaps even coming back). Publicity promoting leisure areas, like as traditional hot spring spas, depicts tatami rooms for sleeping and dining, making ancient lives the antithesis of Tokyo's hectic contemporary culture.

The preservation or reappearance of such traditional components is also shown in the traditional Japanese dress (*yugata*) worn by ladies and men in traditional resort towns, as well as on a summer day in one of the country's major metropolitan areas [23].

Tatamis are no longer an integral component of everyday life in Japan; they have withdrawn into niches, including Western-style *tatami* beds and resorts. However, a thorough examination of their unique multifunctional potential as a platform for life may for this unique heritage of multipurpose tatami living to endure.

3.1.2. Shoji-Fusuma

These are among the most significant components from both an aesthetic and spiritual perspective, they are characteristic of traditional Japanese dwellings, and they are responsible for the play of light and shadow that is so valued and sought after in Japanese architecture. These concealing components blend usefulness and beauty to illuminate and ventilate the room. They consist of: Noren are traditional separating curtains used to separate/shield the inside from the external; they are often seen on windows, walls, and at the entry to a residence. Typically, they contain vertical slits for access and to enable light and darkness to pass through. Made of cloth or hemp, they may be seen outside of stores and restaurants to shield customers from the sun and wind, and are occasionally used for advertising. They were prevalent in old dwellings and continue to be prevalent in contemporary ones. Sudare are bamboo-made screens. They are traditionally crafted by artisans who, as a result of their familiarity with bamboo working methods, are able to produce compositions that are absolutely remarkable. They are particularly adaptable in that they provide protection from the sun while allowing occupants to see outside while fully concealing the inside from the outside. These components are also height-adjustable, which is a significant distinction from noren [2].

From an architectural standpoint, they are among the most essential features, both from an aesthetic and spiritual standpoint. They are found in traditional Japanese dwellings and are also responsible for the play of light and shadow in Japanese architecture. The light and air provided by these obfuscating materials is both practical and pleasing to the eye. Included are: Noren are traditional curtains that divide the inside of a home from the outside, and may be found on windows, walls, or even at the front door of a house to accomplish this.

In order to get access and let light and dark in, they often feature vertical cuts. They may also be seen outside stores and restaurants to shield them from the sun and the wind; they can even be used for advertising at times.

While they're more prevalent nowadays, they're nonetheless common in older homes. Bamboo is used to make sudare screens. They are handcrafted by skilled artisans who have a deep understanding of bamboo working processes, allowing them to produce stunning designs. With its ability to block out the sun while allowing those within to see out, they are very adaptable. Another feature that sets these components apart from noren is that they may be raised or lowered to suit the user's preference (Figure 3.2).



Figure 3.4. Katsura Imperial Villa inside view into the garden [9].

Sliding doors termed shoji are composed of wood and transparent paper. They originated in China, where they were mostly utilized as interior dividers because to their limited load-bearing ability. To sustain the framework of the house, shoji have no structural purpose because of the pillars. They filter the light coming in from the outside and adjust the brightness of the inside. They have the ability to drastically alter the mood of a house because of their adaptability. It's common for the paper to be put higher on exterior walls so that a garden may be seen from a seated position, while yet keeping the inside of the house safe from prying eyes. With the use of paper, you may divide sections and control the lighting and air in the interior. A wooden frame glides along two runners, with one or

more separating strips of wood in between the rice paper sheets, which are then glued together.

Large wefts of paper employed in traditional dwellings let light into the interior, resulting in an everchanging mood and a dynamic feeling of space. The material also has two additional qualities that react to the surrounding environment: it allows air through, but heat loss is also maintained to a minimum. The sole drawback to this kind of panel is that it blocks all views of the outside during the winter, when wooden panels are employed to shelter the shoji from the elements. However, the adoption of glass gradually alleviated this issue [2].

According to Brown:

A little wooden lattice, coated with panes of oiled paper, that functions as a sliding door and window and is reasonably windproof and impermeable. The shōji is not see-through... It aids in avoiding unwelcome stares, however when the sun strikes such a wall, the light intensities on its vertical plane are significantly amplified... When the sky is foggy, shōji creates lovely but dismal interiors... During certain times of the day, if the room gets too gloomy, the only remedy is to slide the shoji and leave the wall open to let in more light; however, insects or wind may occur during this procedure [25].

In traditional Japanese architecture, the shoji screen is a potent architectural feature that may regulate the quantity of light entering a room. In addition to the quantity of light entering, the light that did enter was diffused along the oiled paper, lighting the room in a manner distinct from conventional illumination tactics. No words can adequately convey that feeling when one sits in the dark light, soaking in the gentle glow reflected from the shoji, absorbed in meditation or staring out over the garden [26].

The modern use of the shoji screen has transformed the materials of the screen, but it is still able to pay tribute to its beginnings and its rich effects on interior spaces. Today, shoji screens are produced with frosted glass and a steel frame. In homage to its heritage, the frosted surface of glass diffuses light, producing a hazy impression. The photographs on the preceding and subsequent pages depict the interplay of light entering a room via a shoji screen and its interaction with the various elements within, including wood and concrete [27].

3.2. OPENNESS

The research of Japanese predecessors yielded a greater understanding of approaches and tactics encountered often in their designs. The following illustrations are simplified, abstracted principles taken and decontextualized from antecedents to build a toolkit of solutions applicable to the design of tiny homes. These architectural solutions reimagine conventional planning aspects so as to "instill a feeling of both order and expansiveness" [28] by controlling space, light, views, planning, and integrating furniture to create architecturally cohesive educational environments.

Internal Sight-lines and Views: Buildings can be made to appear larger by extending the view points and sight lines within the structure. Occupants of other rooms and spaces within the residence have access to an internal view that is greater than the one they are currently occupying. The legibility of signage and the ease with which people may communicate within a space are both improved when sight lines connect the two. On a smaller scale, the same principles can be utilized. For example, walls and stairwells can be built to allow a clear view of the space beyond the current level of the interior. It is also possible to create a greater sense of openness within a structure by utilizing small gestures like partial height walls, interior windows between rooms, or open riser staircases (Figure 3.3) [20].

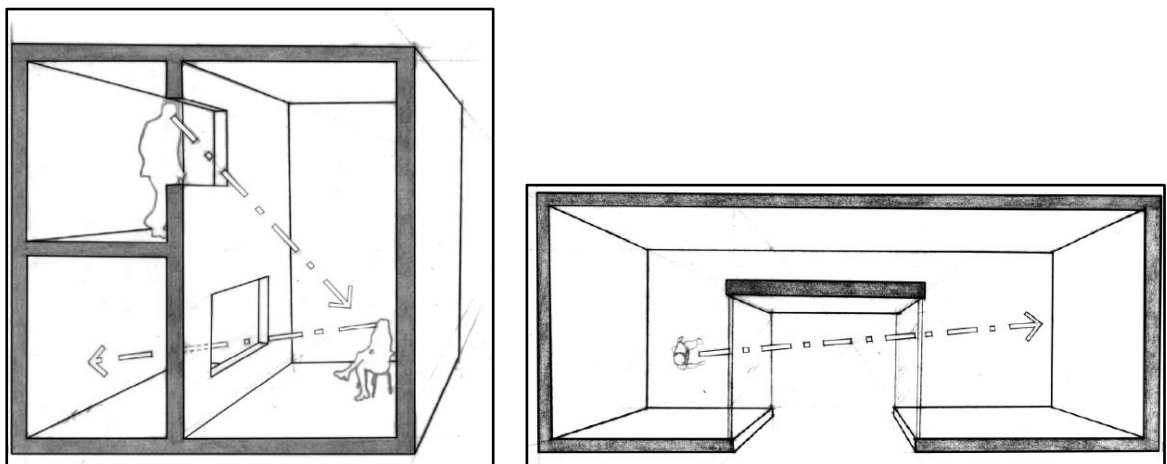


Figure 3.5. Internal sight line diagram (prepared by Simon Richmond) [20].

External Sight-lines and Views: Similar to the preceding pictures, this series addresses the concept of extending sight-lines, but in this case to take use of outdoor vistas. Shakkei is the ancient Japanese philosophy of taking inspiration from the natural environment, and it is evident in all of the investigated case studies. Due to a lack of "room for spatial elaboration, visual complexity and interest must often be borrowed from outside" [20]. By linking the inhabitant of a structure to its larger setting, the visual envelope is extended beyond the interior's physical boundaries, so extending the experience sense of space. With the barrier between the external world and the building's occupants blurred, the link between inside and outside is strengthened to the point that they seem to be the same area, hence expanding the perception of space. Due to the urban setting's severe site restrictions and the need to retain seclusion, designers of Japanese antecedents often do not employ traditional fenestration. In reaction to their environments, they generate their own outer views by opening to courtyards, indoor gardens, and terraces.

According to Susanne Tamborini:

The size of the garden is of no importance. It could be tiny, e.g., only an adjacent corner courtyard. What is important is that it be perfectly arranged from the perspective from which it will be seen from within the house [30].

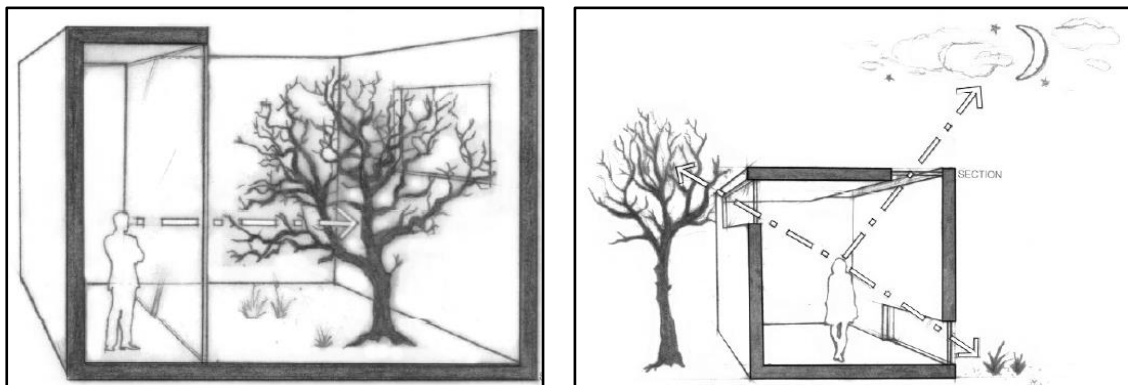


Figure 3.6. External sight line diagrams [20].

The majority of instances, regardless of the scale of the structures, had some type of outdoor space, demonstrating the importance and usefulness of such areas. Alternately, the structures face upwards. The designers use the limitless, often unbroken view of the sky as an ever-changing window to the exterior environment. To a lesser level, but nonetheless successfully, the architects' aim to link to the exterior world in a more abstract manner by

capturing temporal and transitory lighting or heavenly aspects, so producing an unconsciousness of the external circumstances [29].

Increasing height of spaces/rooms as the footprint shrinks: Although extending sight lines is one approach that can be taken to alleviate space constraints, this diagram demonstrates that even with the anticipated shortening of space along the horizontal axis that is caused by the obvious site restrictions, at least some of the spatial size that is felt by the occupant can be compensated for by increasing the volume along the vertical axis (Figure 3.4) [20].

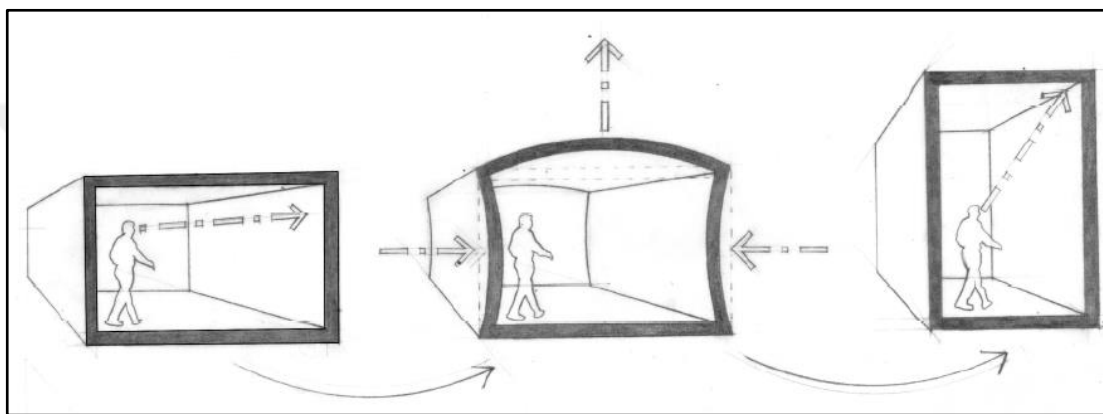


Figure 3.7. Diagram of increasing height of spaces (prepared by Simon Richmond) [20].

Rooms and spaces arranged in a vertical stacking configuration as opposed to horizontal layout: Given the unconventionally tiny plots of land on which the examined residences are built, the designers had no choice but to stack the different program functions vertically in order to fit them. Consequently, there are generally fewer partitions, since functions are commonly split by floor planes. By decreasing (or, in certain cases, removing) the horizontal configuration of areas, space-consuming horizontal circulation is diminished and replaced with vertical circulation [20].

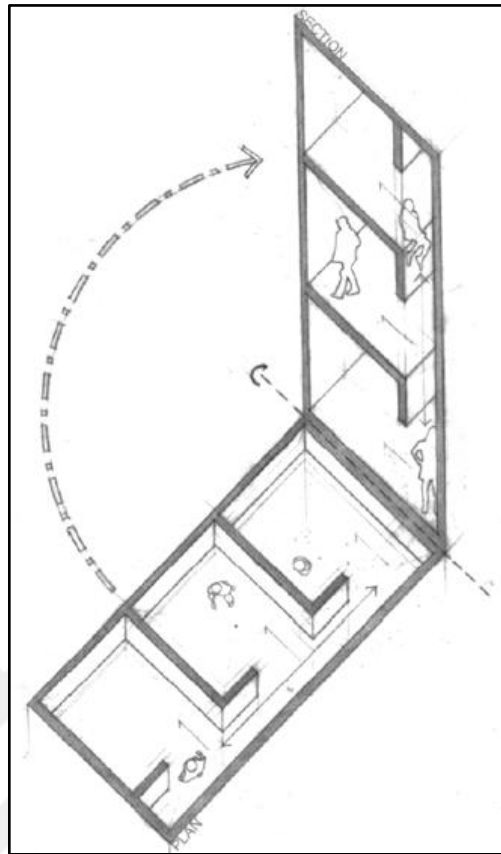


Figure 3.8. Vertical stacking configuration diagram, prepared by Simon Richmond [20].

Vertical Circulation: Following on from the previous design strategy, this graphic examines how adding vertical circulation can provide a variety of secondary uses to a dwelling's circulation path. "Vertical circulation links spaces both physically and conceptually, creating a cohesive structure throughout. If one rule of small houses is that long corridors are to be avoided, then stairs must be considered as more than a diagonal corridor " [30]). These functions can range from providing additional storage space to providing additional natural light. When the stair is viewed as more than just a functional element for carrying people between floors, the stairway becomes an architectural element with the capacity to diffuse light by concurrently acting as a void space. This ability is what gives the stair its architectural significance. The stairwell enhances readability in two ways: first, it serves as a powerful compositional feature, and second, it creates a distinct zone for vertical circulation [20].

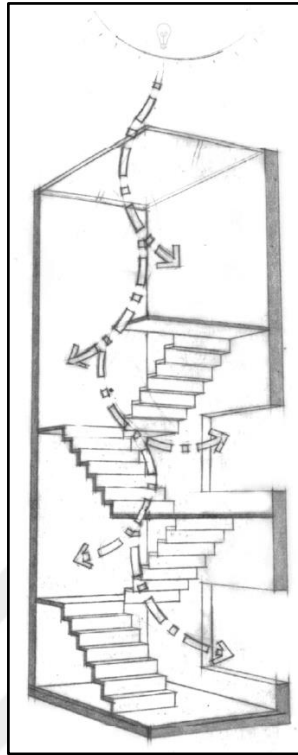


Figure 3.9. Diagram of vertical circulation, prepared by Simon Richmond [20].

This regulation of movement can assist in orienting and directing the occupant to particular view shafts in the environment. Making use of what is typically unusable space, the stairs may alternatively be structured to integrate storage or utility rooms underneath it, such as a laundry room or toilet. This would result in the space being put to better use. However, there is a trade-off involved, as this design approach prevents the stairwell from functioning as a light well if it is implemented on floors that are above ground level (Figure 3.5).

Split Level: When analyzing Japanese predecessors, a dominant design notion becomes apparent. Split levels, in which floors are offset by half a level or more, were common in many houses. The stacking effect and vertical ascent sought on tiny sites can be achieved while still allowing for shorter stair runs between different levels and program functionalities. Divided-level architecture allows for a sense of continuity in the design of several spaces, while still maintaining the distinctness of each individual location (Figure 3.6) [20].

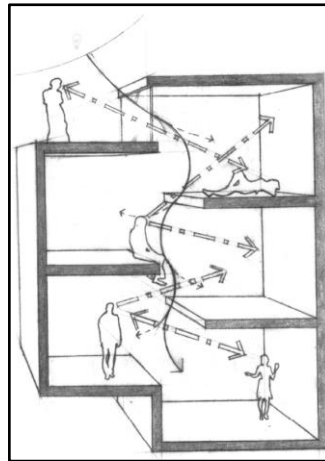


Figure 3.10. Diagram of split level, prepared by Simon Richmond [20].

Rooms serve as circulation space: It's preferable to use as little dedicated circulation space between rooms as possible while working on such compact premises [20]. For example, one room could serve as a circulation space in addition to its primary use, as suggested by Japanese designers. This can be seen in extreme cases, such as when a child's bedroom is only accessible through the parents' room. However, it also shows how a room may serve as a circulation area while still honoring traditional Japanese family values.

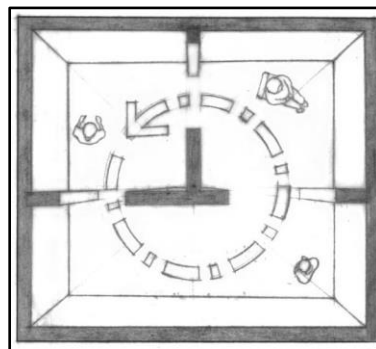


Figure 3.11. Rooms serve as circulation space, prepared by Simon Richmond [20].

As a result of cultural differences between Japan and the rest of the world. Open plan living spaces, on the other hand, can achieve the same goal in a form that is more approachable and acceptable to the general public (Figure 3.7) [20].

Voids: When there is a shortage of useful floor space, it may seem counterintuitive to remove it. However, the precedents of Japanese architects demonstrate the strong potential of vacant space in micro-architectures. It's a sacrifice of floor space for the sake of the whole. (Figure 3.8)

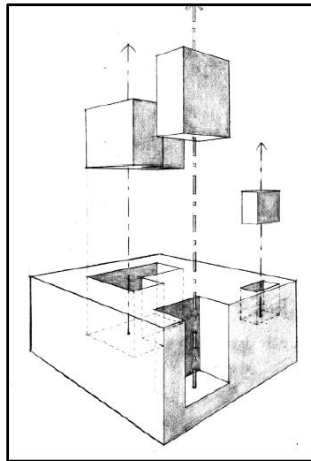


Figure 3.12. Diagram voids (prepared by Simon Richmond) [20].

The quality of the space improves despite a reduction in floor area. Allowing light to diffuse over the area and enter deeper into the volume is the goal of the architects. In the buildings studied, voids are used to create courtyards and light wells on the exterior or to create more generous double-height areas on the interior (Figure3.9).

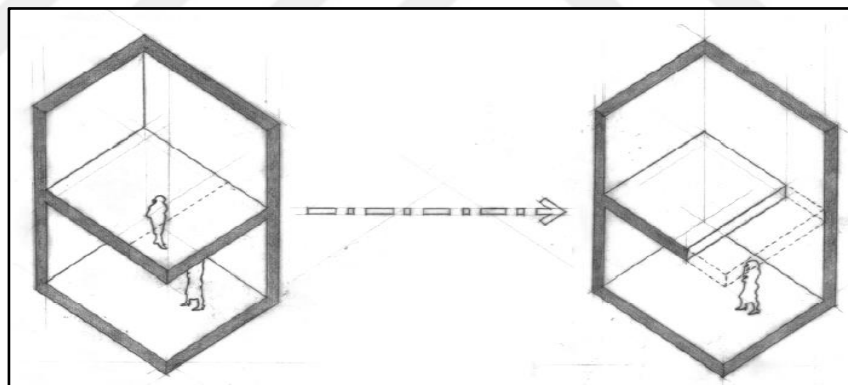


Figure 3.13. Diagram voids, prepared by Simon Richmond [20].

3.2.1. Natural Light

People's perceptions of available space are greatly influenced by the lighting in spaces designed with a focus on minimalism and simplicity. It is possible to clearly identify the boundaries of a scene with the use of lighting and shadows. It is possible for lighting to help interior design characteristics such as form and color express themselves with greater clarity. Because of the wide range of physiological responses that lighting may elicit in space, it is an important consideration in both the design of space and the stories that are

told there. As a result of these traits, lighting plays an important role in basic attitude. Lighting is a key component in the design of a minimalist space since it serves as a foundation for the rest of the design. Many designers try to accomplish this effect by adding a lot of components to the organization of space in these environments [31].

In a traditional Japanese home with low, overhanging eaves, the lowest portions of a room get the most light, while the upper portions grow darker. This is due to the fact that sunlight, which is obstructed by the eaves, enters the room after being reflected off the ground or veranda and traveling upward.

Light becomes less brilliant as distance, or in this instance altitude, increases. The Western window, on the other hand, permits direct sunlight; a curtain is employed to block it out when required, and the light travels downhill. Originally, in Japan, lighting fixtures for the residence were positioned on the floor due to the way light entered it, as explained above. The same holds true for garden illumination: instead of hanging lights from trees, the Japanese used lanterns made of stone that were put on the ground. Moreover, this kind of illumination is well suited for the floor-sitting habit stated above. As tables and other surfaces requiring light were low, floor-mounted lamps were perfect. The development of glass in Japan occurred extremely late; hence, the art of using glass to give direct, brilliant lighting and to reflect light in a dazzling, glittering manner did not thrive. Indirect lighting is considerably favored over harsh, direct lighting. If contemporary lighting may be compared to the sun's brilliance, then perhaps traditional Japanese illumination might be compared to the moon's luminosity. Part of the serene beauty of a traditional Japanese house is captured by indirect lighting, which also enhances the soft textures and natural hues of a tatami- and shoji-adorned room.

Today, however, the delight connected with the interplay of light and shadows seems to have been lost in Japan, as has the notion of creating ambiance by the use of natural or indirect lighting, such as in a tea room. However, soft lighting may offer a new depth to a space [24].

The ability of light to alter our sense of scale is unmatched. Consequently, the placement and planning of day illumination in compact dwellings becomes more and more critical. Even more so in densely populated urban areas where maintaining one's privacy might be difficult. Some of the common strategies employed in Japanese-micro architecture "for

considering light as a medium in the home"[28] are disclosed here, which calls for a careful mediation between light and privacy. Through gaps or cut-outs in the interior partitions of the building, daylight from nearby spaces can be used to illuminate under-lit areas. A lightwell is a common method of distributing diffuse light across a home. When a room's location or privacy concerns prevent it from having a window, this method is especially useful.

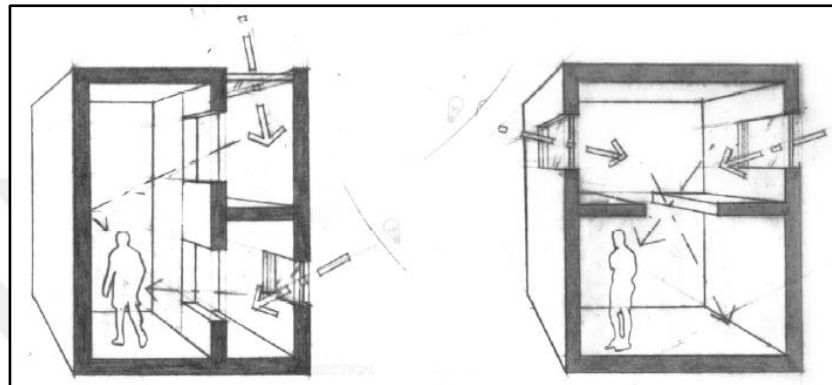


Figure 3.14. Borrowed light diagram, prepared by Simon Richmond [20].

Basements can be lighted by voids, 'borrowing' light from the above-ground areas. For circumstances where privacy is a problem, architects can employ top lighting to bring light inside the building while obstructing views. It's possible that the architectural shape can be dissolved by light that filters down from fenestrations either in the ceiling or above the eye line. Diffuse light also softens the interior space's edges and lines, making it appear larger than it actually is. Translucent or perforated materials and screens function in a similar way, allowing light to enter but maintaining privacy and a sense of what's happening outside. As a result, light is believed to play an important role in minimalist architecture, and in some designs, it even has the status of a building material [20].

Natural light is only one component of lighting as a construction material; artificial lighting also plays an important role in supporting the architectonic vision. Due to the fact that natural light isn't available all of the time.

Natural or artificial light illuminates user needs more than its effects as solid elements and aids in the removal of unnecessary aspects in places by bringing simplicity, purity, freshness, and silence to the space in question.

3.2.2. Ventilation

The buildings of traditional Japanese architects were also constructed in such a way as to take advantage of the free movement of energy in the surrounding environment. To put it another way, buildings were constructed to allow for natural air flow, which in turn helped regulate the climate within. The typical Kyoto townhouse, or *machiya*, during the Meiji Era, is one particularly good illustration of this design's mastery of natural airflow across a building. The first floor of these houses is open to the outside, which is why it was built that way. As a result, Kyoto's hot, humid summers were kept at bay by the building's ability to cool itself down. Brown claims that these townhouses are "models of natural climate control for high density metropolitan regions," [32] in reference to their design.

Japanese carpenters devised the *toriniwa*, a hallway running from the front to the back of townhouses, to improve airflow through the typically lengthy structures. With its groundlevel location and running length of the house, the triniwa is a feature that is neither an interior nor an external part of a home. The triniwa is defined by Kuma as follows: "Earthen flooring hallway that leads from front to back entrance of home in urban residential design known as Machiya is called "tori" or "niwa". With skylights and lofty ceilings, it is ideal for entertaining. A cross-ventilation system created by the tori-niwa helps keep the house cool in the summer, as it is roofed over." [1]. This long hallway needed cooler air to circulate, thus it was normal for the street outside to be sprayed with water, decreasing the surrounding air temperature. Known as *uchimizu*, it is still practiced by some Japanese homes. Evaporative cooling, which is a particularly energyefficient kind of air conditioning, is an example of a traditional sustainable approach.

Besides the triniwa, the townhouses kept an inner courtyard to allow air to escape and thus complete the energy flow cycle. There was an interior garden and courtyard known as the *tsuboniwa* that completed the flow of energy through the house, as well as bringing nature into a typical city residence. Tsuboniwa "...perform a key environmental control role, delivering a continual flow of naturally cooled air that is drawn through the remainder of the home with the slightest wind," according to Brown [32].

When sliding doors and shutters are used properly, a highly controllable bi-level cross ventilation system is created, as Brown explains with the dexterous employment of sliding

doors and shutters even while working with such unpredictability as wind, Japanese townhouse architects found a technique to regulate the flow of air in their structures.

As previously indicated, the tsuboniwa is a means of introducing nature into the congested city life of its inhabitants. To Kuma, the tsuboniwa is "A world in miniature," [1] because of its central role in the machiya's design. The tsuboniwa is "...an extension of the internal areas that open upon it," [33] according to Teiji Ito, author of *The Elegant Japanese House*. According to Alexander, a tsuboniwa is what he refers to as a outside room, and he says that every building "needs an outdoor room linked to it" because of this. Our need for nature and fresh air persists, even as we move more and more of our lives indoors. Bringing nature to people in any form is a good characteristic, as Alexander correctly assumes. An outdoor room or tsuboniwa, even though they are artificial surroundings, accomplish the purpose of introducing fresh air, plants, sunlight, and the impression of being outside, even though they are artificial environments [34]. In terms of Japanese garden design, this tsuboniwa is a smaller and slightly more enclosed form. The importance of natural light is also taken into account in its layout, as its composition takes into account both seasons and light availability in its arrangement. To avoid obstructing light and air, planting in garden spaces like these is often confined to a few deciduous trees and smaller flowering plants and shrubs, [33] it states. To put it another way, the townhouse shows how Japanese architects came to appreciate nature's calming qualities and hence developed an urban home that can bring nature to its residents. To put it in Ito's words: The cool shade of summer greenery, the vibrant hues of flowers and fall leaves offer a sense of nature's seasonal pageant to the surrounding rooms [34].

3.3. SURFACES

3.3.1. Materials

The impression may not be so displeasing while everything is fresh, but as the years pass and the beauty of the grain emerges on the boards and pillars, the gleaming expanse of white tile becomes as odd as the legendary bamboo grafted onto wood... And certainly there is no better location to enjoy this pleasure than in a room surrounded by peaceful walls and beautifully grained wood, with a view of blue sky and green foliage [34].

The significance of materiality within the design is one of the most prevalent characteristics of Japanese design. Whether it is the appreciation of the patina, the selection of wood, or any of the many other key material elements that are evident in Japanese design, materiality has always been the apex of Japanese design. Tanizaki compares the significance of Japanese materiality to the way in which light might finally interact with it.

The most popular material used in modernist designs was concrete, yet concrete alone does not define the architectural style that has established itself over many decades [27].

This style is instead enhanced by the usage of additional materials. In both Western and Japanese modernism, there is a goal to completely adorn the features of the materials by displaying a limited amount of decoration on the designs. By doing so, visual distractions are minimized and the materials become more prominent. While Japanese modernism employs the same elements as its Western equivalent, it is the manner in which these materials are used that distinguishes Japanese from Western modernism. In Western modernism, the use of steel, concrete, and glass is unified to create numerous aesthetically pleasing designs that often accentuate materials for what they are: concrete and steel for their strength, and glass that spans over large spaces in a manner reminiscent of the International style. The materials employed in modernist architecture were allowed to reveal themselves in their entirety.

The raw visual aesthetics of Japanese modernist materials may be traced back to wabi-sabi, or the quest of beauty through imperfection. Wabi-sabi is understated and unassuming, a kind of beauty that patiently waits to be revealed. It is a partial view: a branch symbolizing the complete tree, shoji screens filtering the light, and the moon veiled by a cloud ribbon to the extent of 90 percent. The cool speckled surface of a tarnished silver bowl, the yielding gray of worn wood, and the graceful wilting of an abereft autumn branch [35].

3.3.2. Texture

The significance of color and texture on the sense of space is significant. Different colors and textures may alter the psychological experience of a location without altering its physical features. Color and texture are intertwined; the color is dictated by the surface's texture. Lighting also has a significant impact in the impression of color and texture. Bright

and light colors on forms provide effects such as brightness, depth, proximity, and distance [36].

In the next section, the opening and lighting elements have been specifically investigated. In Traditional architecture, the absence of technology prerequisites and the shortcomings of the time period contribute to the simplicity of traditional housing building. Utilization of natural materials with their own color and texture, originating straight from nature, such as stone, wood, mud, etc... Bring a minimalist approach to classic architecture. In minimalist interiors, bright and neutral hues that resemble the colors of nature are favored (soil color, etc..).

The colors white and gray contribute to the tranquility and purity of space. White color influence on man's psychological impression of cleanliness, purity, and innocence, whereas gray evokes feelings of quiet, stability, dependability, and simplicity [37].

One of the factors influencing the selection of light colors in minimalist spaces is the preference for light colors, particularly white, which reflects light better from surfaces. Minimalist interiors forbid the use of several colors and textures, which fatigue the eyes. More color and texture variety in space leads to spatial disorder and unsettling effects on humans.

4. MICRO HOUSE CASE STUDIES

In this chapter the case studies will be examined according to these main subjects which was mentioned in chapter 3. Modularity includes *Tatami* and *Shoji-Fusuma*, Openness includes Natural Light and Ventilation lastly Surfaces includes Materials and Texture. Furthermore, the case studies are chosen by these criteria: must be located in Japan, must be named as Micro House, have a relation with Traditional Japanese House Elements, must be completed after the year of 2010. That is to say, according to these criteria the Case Studies are firstly 'House in Nada' by Fujiwaramuro architects secondly 'R-Torso-C' by Atelier Tekuto and lastly 'Garden and House' by SANAA architects. Each Case Study is examined by this following categories about the Architects and Projects secondly about the Design and the 3 categories which was mentioned in chapter 3 'Modularity', 'Openness' and 'Surfaces'.

Table 4.1. Comparison of 3 Case Studies.

	House in Nada	R-Torso-C	Garden and House
			
Architect	Shintaro Fujiwara x Yoshio Muro	Yasuhiro Yamashita x Atelier Tekuto	Ryue Nishizawa x Taeko Nakatsubo
Location	Nada, Japan	Tokyo, Japan	Tokyo, Japan
Completion Date	2012	2015	2011
Site Area	63,33 m ²	66.67 m ²	37,84 m ²
Building Area	22,13 m ²	31.21 m ²	24,66 m ²
Total Floor Area	36.95 m ²	103.74 m ²	66,03 m ²

This Case studies are selected in few features that distinguish all of these projects from each other these are form, design, material, openness, connection with outside, nature. In addition, the projects have different architectural texture which is represents the different surfaces of micro houses.

4.1. HOUSE IN NADA

Architect : Shintaro Fujiwara x Yoshio Muro

Location : Nada, Japan

Completion Date : 2012

Site Area : 63,33 m²

Building Area : 22,13 m²

Total Floor Area : 36.95 m² [38]



Figure 4.1. Outside view of House in Nada [38].

Fujiwaramuro Architects is an architecture firm based in Osaka, Japan. The members of this firm are Shintaro Fujiwara and Yoshio Muro who were classmates at the Kinki University. In 2002 they established the firm named FujiwaraMuro Architects and they have been teaching at the Kinki University in Osaka since 2020. The firm which has many Project outcomes in different regions of the country , specialiezes in housing. Furthermore, the Project named House in Toyonaka which is designed by this firm wins the A`Design Award 2019-2020 silver. According to the architects they believe that there is a resonance between the traits of each person who lives in metropolitan areas while in other locations, the qualities of the site are unique to each person. According to the Architect: 'When I look back on the micro houses I have designed in the past, I sometimes feel that the merits of small spaces may win out over those of larger spaces..' [38].

House in Nada is in a residential neighborhood in the center of the Japanese city of Kobe. In a region with high real estate costs, the customer was able to acquire the land at a reasonable price due to the small size of the parcel (36.95 m²). The project area, which consists of a plot flanked by two homes, is so modest that one may easily overlook it. [40], [41]. When the designer examined the site's conditions, they were uncertain if they could match their client's requirements. The architecture firm believes that his adaptability with respect to the size of the property and his optimistic outlook on the project were crucial to the realization of a home on this modest piece of land.

The client's requests were usual for a nuclear family of four: a parking place, a light living room, two rooms for the children, a bedroom, etc., but they were all squeezed into such a little area.

Three-story structure was the result of the architect's efforts. It also features a low-ceilinged subterranean storage area where practically everything that needs to be stored is kept [39].



Figure 4.2. View from the street [38].

The house is located back from the street, with a huge aperture on the ground level serving as a parking and the entrance recessed into the back side. (Figure 4.3) The whole street front is encased with boards of knotted wood, with the exception of three windows of differing sizes and heights that showcase skyline and neighboring hills. (Figure 4.3)

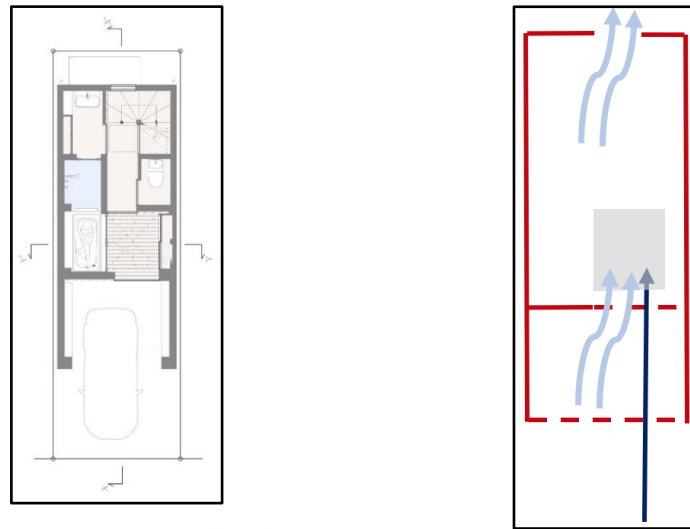


Figure 4.3. First floor plan 1/200, image prepared by the author.

In front of the first floor is a space that can partially accommodate an automobile. Even though it is a tight fit, a standard-sized passenger car may be parked in the parking space. The first level also houses the entry hall, the bathroom (a separate room for taking a bath), and the toilet. The restroom is visible on the left while entering the home. While having a bath, one can see the mountain bikes stationed at the entryway (mountain cycling is the client's interest). The entry hall's floor is equipped with wooden slats and is designed to drain water, allowing youngsters to fling open the restroom windows and utilize the space for playing (Figure 4.4).

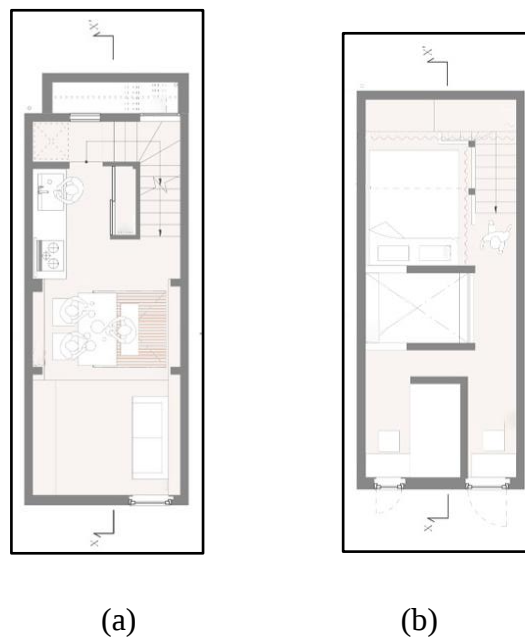


Figure 4.4. (a) Second and (b) third floor plan 1/200, image prepared by the author.

Kitchen, dining area, and living room are located on the second floor. The dining room floor is likewise made of wooden slats to give the impression of being connected to the first level. When seen from the other side of the flooring, the entry hall and bathroom are visible on the first level. When one looks up, they discover a skylight embedded in the roof and a vaulted ceiling (Figure 4.5).

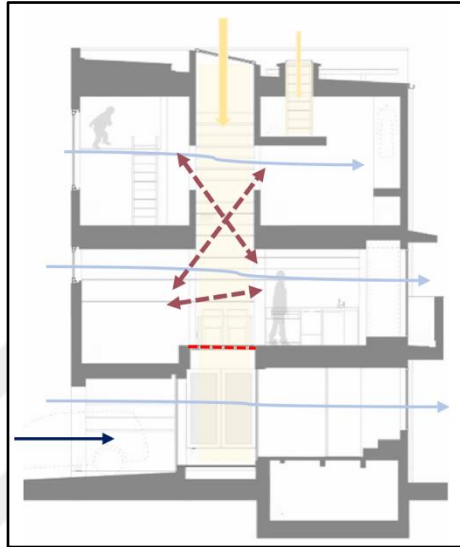


Figure 4.5. Section of House in Nada, image prepared by the author.

The two rooms for the kids and the bedroom are on the third floor. Only 3 m² of floor space is used in the children's bedrooms. Additional to that, there is a bunk bed that divides the two rooms, allowing access to the top and lower bunks in each room. A tall structure was permitted to be built on this location because of the construction standards. Thus, the designer were able to prevent the home from seeming claustrophobic by installing high ceilings that drive the eye upward. Utilizing the heights of the bedroom's ceilings, we constructed a loft to offer more space for storage. Shelves were also installed equally throughout the atrium's wall from the first to third floors, reaching from the ground level to the skylight. (Figure 4.5)

4.1.1. Modularity

In this Project the entrance hall is designed by the traditional Japanese elements with *fusuma* and *genkan*. This space is known as *genkan* in Japanese traditional house.

Before entering the main part of the residence, guests must remove their shoes in this space, which serves as the official reception. Lower than other floors in a home, this is because it is designed to keep dirt and debris outside, while preserving a sense of cleanliness inside of it. In the previous half-century, this neighborhood has fared the best in terms of coping with the ferocity of urbanization. Even in today's most up-to-date residences, this space retains its symbolic significance (Figure 4.6).

Houses constructed in the traditional style feature what is known as a genkan, which is more of a formal entrance. In order to enter the building, you must first stand outside and give a traditional welcome before sliding open the exterior door and stepping onto the ground-level concrete floor (*tataki*). You will be greeted by a member of the household in the tiny open room facing the *tataki*. Remove your shoes, then walk up onto the wooden step if the individual welcomes you inside (*shikidai*). You may now enter the home and go to the guest room. The genkan is situated on the border between the house and the rest of the world in terms of mentality. Japanese people don't wear their shoes inside the house, thus they require a place to put them on before entering the house. The genkan is a gateway between the interior of the house and the exterior world. It gives guests an impression of the house (Figure 4.6).



Figure 4.6. Entrance of the house an example of Engawa [38].

Traditional Japanese houses often have sliding components, which contribute to the play of light and shadow that is so prized in Japanese design.

Sliding elements are also essential from a spiritual perspective. The light and air provided by these obfuscating materials is both practical and pleasing to the eye. They are as follows: Noren are traditional curtains that divide the inside of a home from the outside, and may be found on windows, walls, and even at the front door of many houses. Furthermore, Shoji are sliding room dividers composed of a wooden frame stuffed with transparent paper. Because of their limited load-bearing capability, they were originally utilized only as interior dividers in the Chinese civilization. The house's pillars provide structural support, therefore shoji have little effect on the building's design. Their job is to control the interior's lighting by filtering light coming in from the outside. They have the ability to drastically alter the mood of a house because of their adaptability.

4.1.2. Openness

A wide central atrium divides the area into halves, while wooden grating dematerializes the lateral planes. The bottom of the home is bathed in sunlight as a result of these two architectural initiatives. This storage area is used in combination with the asymmetrical sprinkling of apertures that pierce the envelope in the middle void. Ladders go up to a lofty rooftop from the interior rooms.

According to the designer of this project, the bookcases are arranged in a symmetrical pattern throughout the home. Using the principle that everything appearing in succession automatically attracts the attention to the end of the line, designers made this decision purely on the basis of how visually appealing it is. By changing the attention to an object in the distance, designers hoped to elicit a larger sensation of distance. Because of the limited storage space in a little home, designers anticipated that the shelves might be utilized to store items. This would have helped to make up for some of the inconvenience. The shelves are now being utilized to hold books and photo frames (Figure 4.7) [38].



Figure 4.7. Interior view of the house [38].

Near the kitchen, the dishes are neatly arranged in rows on the shelves, creating a welcoming atmosphere in the home. In this scenario, the architects may say that the client's aesthetic sensibilities assisted the design. The rooftop area of the home is another unique element. Climbing up to the roof is possible through a hatch in the loft above the bedroom. The customer must have had this in his or her head all along. A hatch of this kind wasn't required for any practical purpose at all. It was purely out of desperation on the part of the customer to get access to the roof. Mt. Rokko can be seen in all its glory from the rooftop, and in the summer, guests may take in the adjacent fireworks show from the same vantage point.



Figure 4.8. Interior view of the house [38].

Wide windows at the kitchen's back illuminate the space and provide access to a small balcony. A set of rectangular roof windows also allow light to penetrate the home's interior. The dining area's floor is constructed of slatted wood, allowing natural light to reach the lower level. For the same purpose, a glass-topped dining table was required to be placed above the bottom surface. Shelving that spans the walls of the living and dining spaces ascends through the gap to the level housing the bedrooms on the top level (Figure 4.8).

4.1.3. Surfaces

The facade of the home is adorned with red cedar wood. Only incombustible materials may be used in building in this area due to local fire protection restrictions. As a result, specific treatment of the wood was required in order for it to be approved as a noncombustible material. Of course, this implies that the material is a lot more expensive. Because the amount of material required in a tiny home is minimal, it's possible to employ high-quality raw materials even if they're a little pricier.



Figure 4.9. Interior view of the house [38].

The clients request was that to cover the whole front of the home with wood. Window sashes were also made of red cedar to match the outside wall. The end effect is a modest home that seems like a huge tree in the neighborhood (Figure 4.9).

4.2. R-TORSO-C

Architect : Yasuhiro Yamashita x

Atelier TEKUTO

Location : Tokyo, Japan

Completion Date : 2015

Site Area : 66.67 m²

Building Area : 31.21 m²

Total Floor Area : 103.74 m² [42]



Figure 4.10. Outside view of R-Torso-C [42].

The majority of Yasuhiro Yamashita are more than 200 project outcomes in Tokyo family houses. The best known project is R.Torso.C, a micro house that maximizes a small footprint using intelligent, ecological building materials. As population density continues to increase, Yamashita anticipates a rise in demand for these types of one-of-a-kind, individualized residences. Sustainability is a critical issue that is growing in importance. To overcome this, Yamashita and the construction workers modified the composition of traditional concrete. According to the Clients of this project: “We want to see exposed concrete finish inside and out. A distinctive piece of architecture that is at the same time environmentally conscious.” [42]. The clients' initial request was for these specific details. After using those words as a jumping off point, the atelier proceeded to carry out a variety of studies and researches of space and material investigation, and after two and a half years, the house was finally completed (Figure 4.10).

The R Torso C project, completed in 2015, recently won :the 2017 American Concrete Institute Awards' Overall Excellence Award and first place in the low-rise buildings category, 2018 fib (Fédération internationale du béton / International Federation for Structural Concrete) Award for Outstanding Concrete Structures : Buildings Category Winner, 2016 WAN Concrete Award Shortlisted [43].

R Torso C is a private Residence and is located in the high density residential districts center of Tokyo.



(a)



(b)

Figure 4.11. (a) Overview from the sky and (b) a view from the street [42].

According to the Architect Yasuhiro Yamashita: “In Tokyo we don’t have many ways to connect with nature; there are buildings in every direction you look. But we can always look up.” [43].

In Tokyo neighborhoods with a lot of people living close together, building "towards the sky" is a way to show respect for nature and the environment. It is the only way to really get a sense of how big nature is. The building's corner was cut off at an angle so that it had a strong connection with the sky (Figure 4.11) Also it can be seen by the view from the street (Figure 1.11). By trimming the internal volume, this action gives the continuous four-story space inside a sense of being more open. Furthermore together with an environmental engineer, a "thermal circulation system" was added to make sure inner temperature was comfortable.

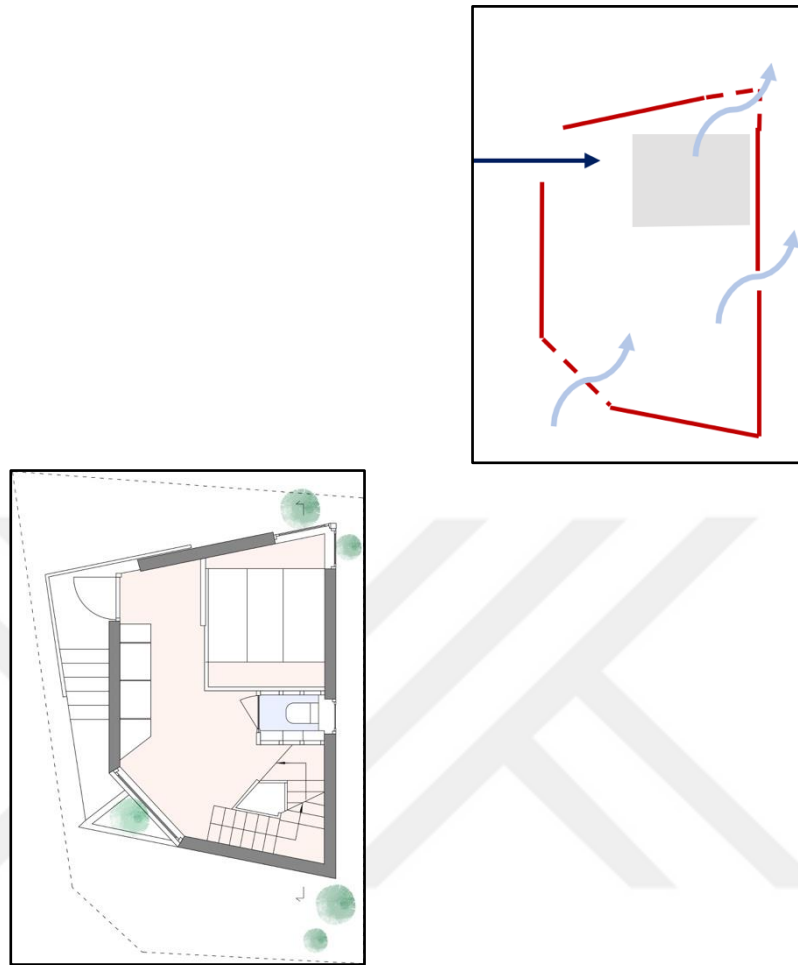


Figure 4.12. First floor plan 1/200, image prepared by the author.

The property consists of four-story building is that can not be seen from the street. A floating stairway connects all floors of the residence, while the geometric frames provide a constant stream of natural light to the interior.



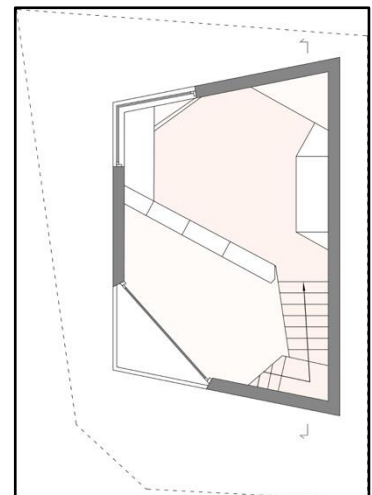
Figure 4. 13. Interior view of the building [42].

Internally, the basement has a sound-proofed audiovisual space, while the first level houses a large gallery and traditional Japanese room (complete with tatami mat floor). Functionality was emphasised on the second story, with a combined living/dining/kitchen area and bathroom. Although the living space is limited, the huge oblique window and five-meter-high ceiling bring emphasis to the space's height.

The R Torso C micro-house concept was designed with sectional and volumetric design in mind, according to the company.

When it comes to creating a welcoming interior for a tiny home, Atelier TEKUTO designer Yasuhiro Yamashita says,

Since small houses on small sites have limited floor area, cross-sectional, vertical elements such as ceiling heights, the connection between floors, the placement of voids are essential to create comfortable interior space (Figure 4.14) [43].



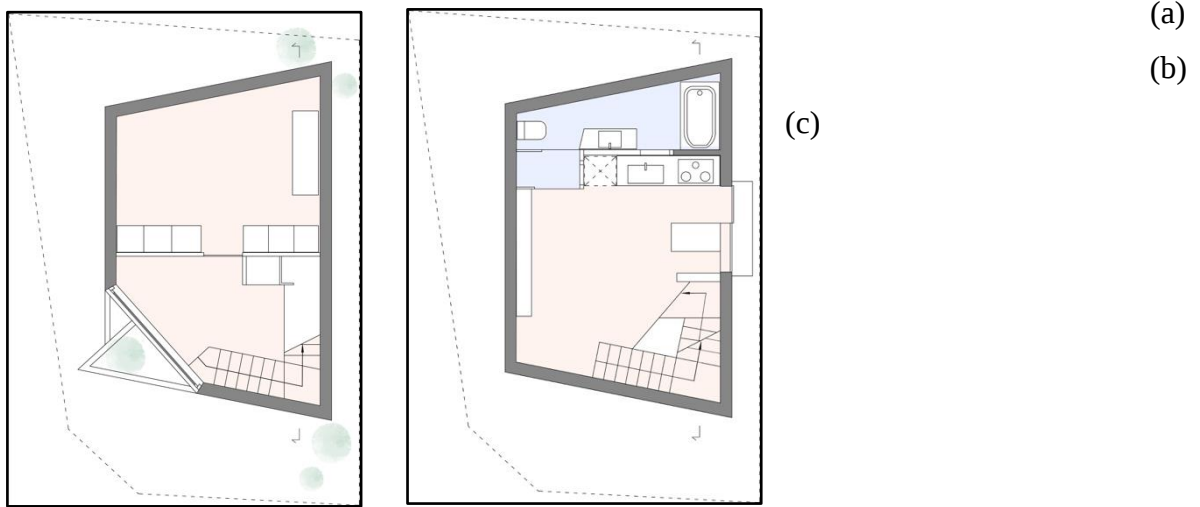
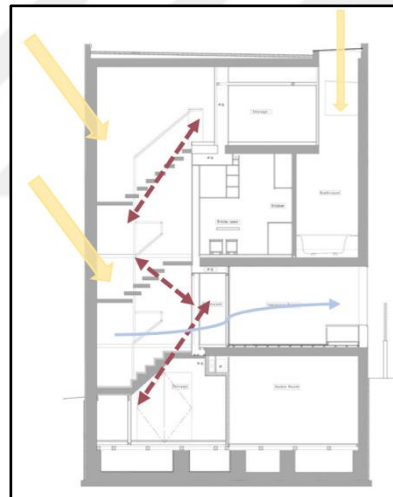


Figure 4.14. (a) Basement, (b) second and (c) third Floor 1/200, image prepared by the author.

Figure 4.15. Section of R-
by the author.



Torso-C, image prepared

4.2.1. Modularity

In the corner of the 1st
that can flexible by using
sliding outer or inner door

Floor is a Japanese room
Shoji papers. Shoji is a
made of a latticed screen
covered with white paper that may be used in a variety of ways in the interior and allows
for expansion. As a result of being in the shape of sliding panels, flexible boundaries in the
space are formed. The daylight is refracted and merged into the inside since it is
constructed of translucent paper. The use of natural light in the space reaches its peak with
Shoji. This building's Shoji was constructed by modifying it to the present day.



(a)

(b)

Figure 4.16. (a) Traditional Japanese room by using Shoji (b) closed [42].

Also in this house Tokonoma which is a sacred corner that can be defined as a burial site, exists. The basis of the word tokonoma mean is "toko," which means "floor," and "ma," which means "space" [44].

There is usually a form of furniture arrangement that works as a kind of table in the room where the tokonoma is located, along with a heat source called kotatsu. Kotatsu is a Japanese word that signifies a unique heater which is a mix of the words "ko," which means "torch," and "tatsu," which means "fire." It is a low table with a cover, the bottom section of which was once coal-fired but now has an electrical heating system, and practically all Japanese Kotatsu are an essential feature of Japanese interiors. This table serves as a dining space, a place for traditional tea ceremonies, a place to receive guests, and a gathering place for the family. The Kotatsu is unique in this regard. It can also be said that it serves as an area organizer and divider in Japanese interiors (Figure 4.17) [45].





Figure 4.17. Interior view of Japanese room [42].

In the corner of the 1st floor , a room reminiscent of a traditional Japanese house was designed. Tatami is used to cover the floor. With its durable and flexible structure, it may be used indefinitely. Tatami, which offers the opportunity to sit and sleep at the same time, has a soft structure. By removing other objects from the space, it serves the function of multiple pieces of furniture.

4.2.2. Openness

On R.Torso.C, the crew chiseled out a triangular opening in the roof to provide a panoramic perspective of the city. It alters the house's interior volume, but it also adds depth and space to the four-story structure. Both physical and psychological richness are achieved via the employment of two design methods in the creation of this project. "NU-KE (noo-kay)": NU-KE "expands" space and gives it depth via the use of many layers of walls and spatial volumes that create visual and psychological links between the inside and external.

According to Yasuhiro Yamashita; It was necessary for me to remove a few of the corners of the rectangular structure in order to develop "NU-KE" toward the sky, Tokyo's only surviving big piece of wilderness [43].



Figure 4.18. Interior view of the building [42].

Simultaneous consideration of a diagram or plan In order to create a multi-layered environment with an improved sense of spaciousness, the architect sketches plans and sections concurrently and produce multiple study models. Living area and bedroom are separated by a set of concrete stairs; a toilet and high window link to both. The bathroom has a skylight that connects it to an external. Because of these relationships, the spatial richness of the environment cannot be assessed only by area. A second tip is to use a restricted color palette. "A place with too many colors might seem smaller. If you choose one or two complementing hues, you may generate an impression of spaciousness." In the end, Yamashita and his crew attached the steps to the walls using a single support pole. This also optimizes space and promotes openness [45].

4.2.3. Surfaces

To optimize the sense of space, the firm, which is famed for its micro-houses, employs strategically placed windows and skylights. The employment of comparable colors and textures, according to Yamashita, also makes the area seem bigger than it is.

Atelier TEKUTO created a recipe for recyclable concrete as an alternative to sand-based concrete to suit their customers' need for environmentally friendly construction materials. Shirasu, an exceedingly fine volcanic ash from Japan's south, is the main element in the

concrete. Shirasu is more durable and dense than ordinary concrete, and its smooth texture makes it the perfect finish for exposed concrete.



Figure 4.19. Interior view of the building [42].

Although the new concrete is still in the early stages of development, it has the potential to be used in ecologically friendly design. "This method was employed in ancient Rome, and the Pantheon was serviced by it for 2,000 years." And prior to this operation, The designer were just dumping the volcanic ash that was in Japan." In addition to materials, the architect thinks that in future megacities, creating creative construction strategies would be more vital than before. According to Yamashita the Colour and texture in this Project used exposed concrete, charcoal stained and persimmon tanned wooden boards, hammered steel, black stainless steel, oxidized black silver plate etc. The colors of these rich materials are unified by a grey to black colour and all have a matt texture. This attention to colour and texture creates unity, and makes spaces interesting and enriched [43].

4.3. GARDEN AND HOUSE

Architect : Ryue Nishizawa x



Taeko Nakatsubo

Location : Tokyo, Japan

Completion Date : 2011

Site Area : 37,84 m²

Building Area : 24,66 m²

Total Floor Area : 66,03 m² [46]

Figure 4.20. Outside view of Garden and House [46].

Tokyo-based architect Ryue Nishizawa is known for his innovative designs. His own business, Office of Ryue Nishizawa, was created in 1997, and Ryue is graduated from Yokohama National University. Kazuyo Sejima and Nishizawa created SANAA (Sejima and Nishizawa and Associates) in 1995. Ryue was awarded the Pritzker Prize in 2010 with Sejima, making him the youngest winner ever at age of 44 [46].

It was evident from the beginning of their work in Japan that they had a unique style that was both readily identifiable and misunderstood. In order to activate and inspire users to engage with their environment, they remove any extraneous details from their trademark understated white spaces. Transparency and abstraction by SANAA are not used just for minimalist purposes but also as a blank canvas for social activism and the personalizing of space. Ultimately, their designs' expressive nature may be summed up in one word: lack of expression via materiality [46].

The building is located in a crowded business zone and serves as the home and office for two authors. The site was just four meters wide, thus Nishizawa built a structure with glass walls to minimize additional constriction of the internal areas. This glass and concrete home creates an austere domesticity that is only moderated by the elements of the outside world.



Figure 4.21. View from the street [46].

Tokyo is a city of contrasts. Zen temples, Mammon temples, decaying wood houses, and immaculately manicured formal gardens are all on display in this sprawling city. So Ryue Nishizawa's four-story home looks to fulfill the requirements.

According to the Architect: "My final decision of structure consisted of a vertical layer of horizontal slabs to create a building without walls" [46]. The concrete slabs seem to be floating, but closer study reveals that the building is supported by three different-shaped concrete columns and a slender corner metal column.

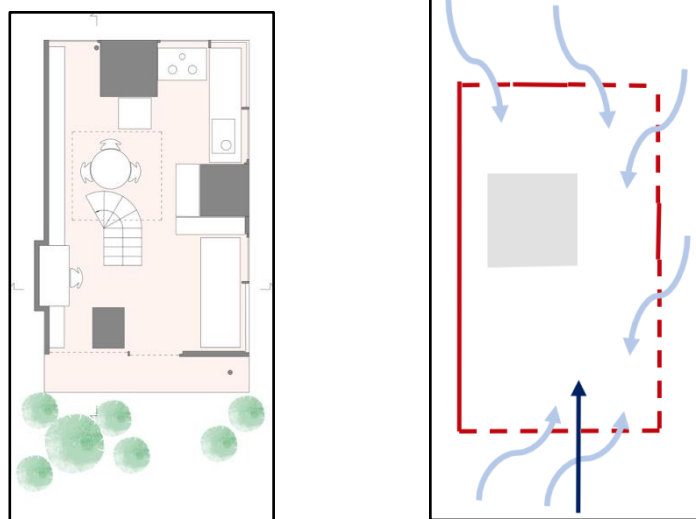


Figure 4.22. Ground floor plan 1/200, image prepared by the author.

Ground-floor sitting, storage, cooking and dining areas form a caravan-like configuration. There is a metal stairway that links each level. On the first level, you'll find a little bedroom with an L-shaped open balcony and an outdoor meeting space (which is accessible from both above and below).

An covered staircase leads to an outside area that connects to the back of the building, where there is an independent restroom. With a private patio at the front of the home and an outdoor staircase leading to the roof terrace, there is enough space for two bedrooms on the third floor. From the street, this Modernist architectural element may be seen in the circular cut-out in the roof slab. Prosaic issues arising from the lack of rails on the stairs and roof terrace cannot be ignored.

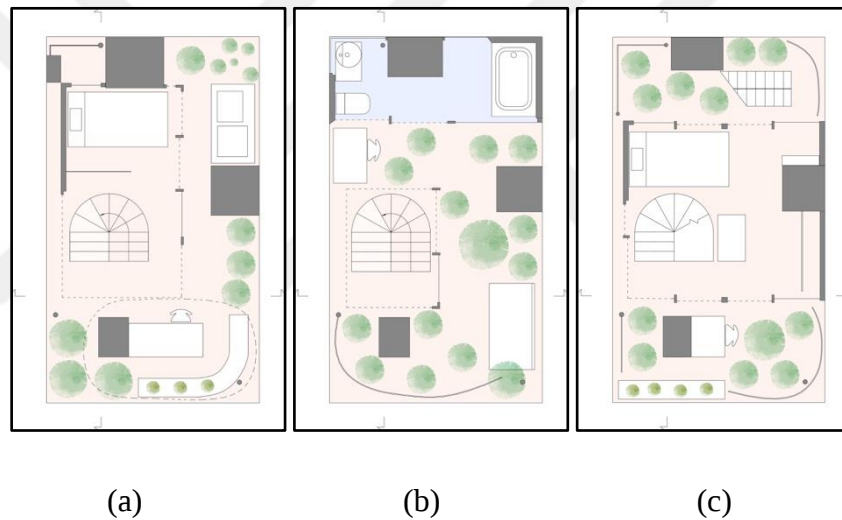


Figure 4.23. (a) First,(b) second and (c) third floor plan 1/200, image prepared by the author.

As shown by the architect's plans, the part is a series of horizontal shelves filled with trees, plants, and occasional chairs and tables. In many respects, the end product resembles a populated chart. Curtains made of fine gauze offer an extra touch of homeliness while also providing a measure of seclusion. In fact, some of the outside areas floor finishes are truly earth, and the route to the toilet requires you to venture outside, maybe barefoot, before sliding the opaque door to return inside.

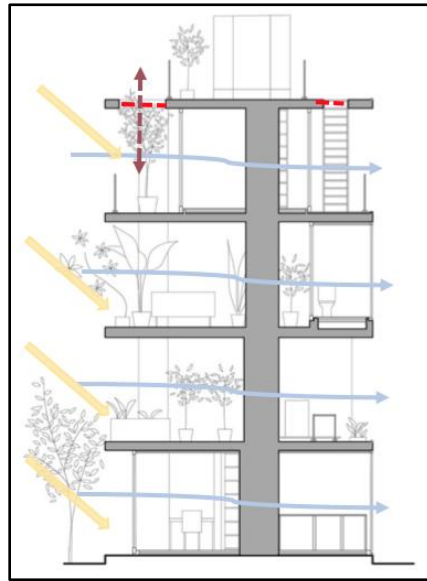


Figure 4.24. Section of Garden and House, image prepared by the author.

The flora, in many ways, contributes to the construction's vulnerability. It's common to see balconies crowded with plants and flowers around the city, but here we have a literary essay that brings these two worlds together in a notion that is both surreal and homely. This controversial project also examines the idea of a household environment and the way in which people live.

4.3.1. Modularity

In the thick concrete floor plates, stairwells wind their way up the structure in a spiraling fashion. An aperture in the roof allows plants to grow higher and reach the top terrace. The exterior of the building is obscured by a screen of plants on each of the structure's four storeys, obscuring it from passersby. The interior is shielded from the outdoors by the glazed walls that surround it.



Figure 4.25. Interior view of the Building [46].

Because each room is smaller than the slab, the connection in between garden and the room may be determined at any floor level. The whole structure is a wallless, transparent construction built to maximize sunlight despite the gloomy site circumstances [47].

4.3.2. Openness

Because of the limited amount of available space, a traditional portico construction was ruled out in favor of superimposed reinforced concrete slabs resting on two back cores and a few barely detectable steel supports. With its winding stairway that weaves among the platforms, the home rises vertically, like an unusual architectural promenade. The rooms are enclosed by glass that is set back from the exterior surface, giving the impression that the structure is devoid of walls. As a result of the abundance of natural light and ventilation, plants are able to flourish in every room of the house, enhancing the home's sense of spaciousness and immateriality.



Figure 4.26. Interior view of the building [46].

"The entirety is a wall-less transparent building designed to provide an environment with maximum sunlight despite the dark site conditions" added the architect. "Every room, whether it is the living room, private room or the bathroom, has a garden of its own so that the residents may go outside to feel the breeze, read a book or cool off in the evening and enjoy an open environment in their daily life."

In terms of privacy, there are concerns about beds that open up to the stairwell, as well as worries about seasonal occupancy, because it gets down to 2°C in January in Tokyo[48].

4.3.3. Surfaces

The rooms are generally partitioned by glass or draperies, allowing for maximum light and flexibility in the openness of each level. While the house's vegetation serves as a screen or wall, it also gives a sense of solitude to its tenants. There is just one room on each level, and it is connected to a garden, so that people may spend as much time as possible outside. With its minimalist design and furniture incorporation into its architecture, this home blurs the line between nature and human. There is a lot of flexibility in how the room and the garden are connected on all floors [46].

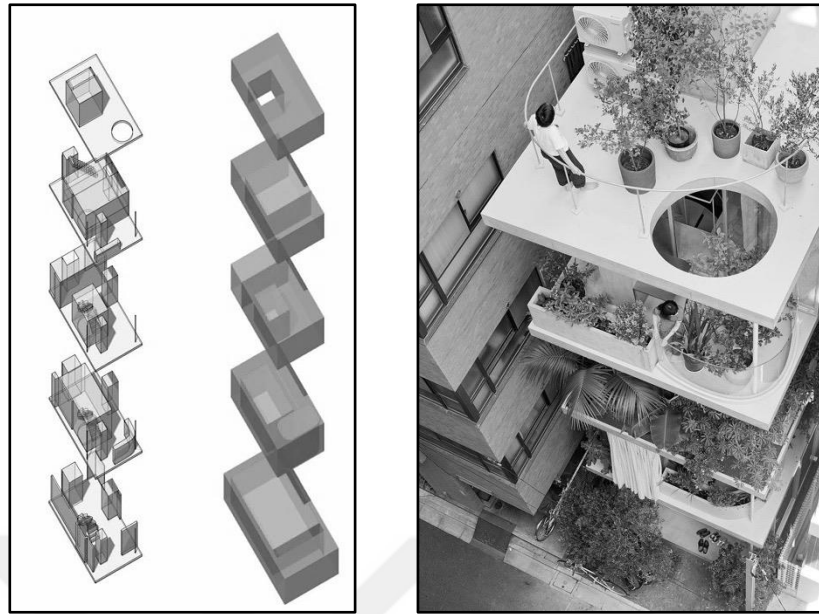


Figure 4.27. Exterior view of the building [47].

Initially, one may think about removing the home itself and the surrounding towers in order to extract the Project's main principles. The first several iterations of this method exhibit an unusual arrangement of nature inside its artificial spatiality. In spite of the absence of the original building structure, the essential proportions supporting daily living may still be deduced.

5. CONCLUSION

In conclusion, contemporary micro homes maintain the characteristics of traditional Japanese residential architecture. In densely populated urban regions, traditional design principles accommodate 21st century requirements. Designing a micro-modern house on a small lot involves transparency, multifunctionality, and simplicity, all of which are derived from the features of a traditional Japanese house, but with a contemporary interpretation and revisions.

The traditional Japanese house is a place that offers all necessities for everyday living. This is also applicable for contemporary micro houses that perform their purpose at the ideal level. In Traditional Japanese house, the floor is the most useful area of the home, since it is used for fundamental everyday activities such as sitting for various occasions, eating on a low-rise tray, and sleeping on a mattress set on the floor.

The residential design of Japan and Micro Houses share a similar approach to the incorporation of built-in utility spaces such as cabinets, bedding closets, and storage. Using wall-mounted utility spaces to its advantage, the home included very minimal furniture.

The fundamental conceptual connection between the rooms of traditional Japanese homes and Micro houses is the simplicity of the residents' lifestyles. The occupants of both Traditional Japanese homes and micro houses had a life of complete satisfaction with a little amount of resources. In other words, the minimalist perspective of Micro Houses originates from the constraints of a nomadic lifestyle and is very functional. The simplicity of Japanese homes is mostly a reflection of the users' life philosophy, which is comprised of religious beliefs (Zen and Shinto) and traditions.

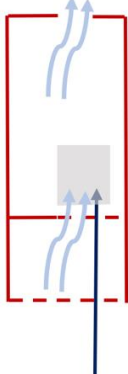
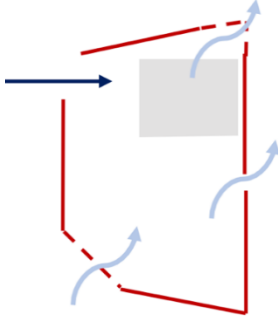
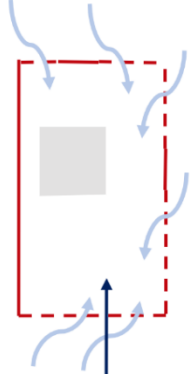
As the world's population grows, the number of people living in metropolitan areas will expand considerably. With the world's major metropolitan centers already experiencing exponential rise, designers and architects face the thrilling challenge of doing more with less space. To sustain human health and environmental quality, as well as social and economic stability, inventive solutions are required. This study examined the concept of a tiny city as a model for sustainable living in a world with a growing population. Japan is

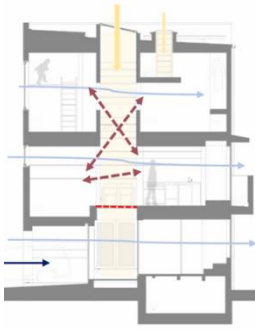
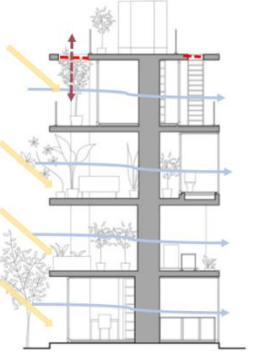
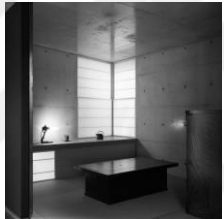
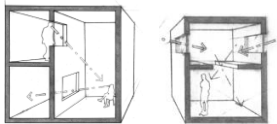
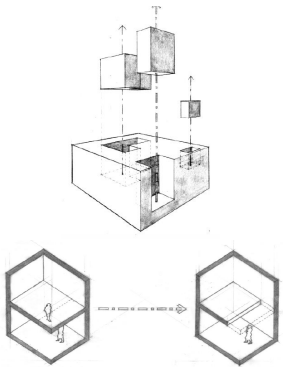
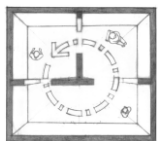
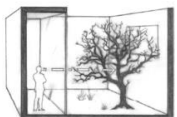
one of the biggest metropolitan regions in the world and a perfect illustration of a dense urban metropolis.

After examining the historical and economic causes of Japan's development, it is evident that many cities throughout the globe are in comparable stages of development. The emphasis was on innovative adaptations of traditional components, with special attention to three micro houses in contemporary Japan. These intriguing case studies demonstrate that traditional Japanese design ideas may be effectively adapted to the contemporary minimal home and that the past and the present can live in a supportive way. The primary subject of this thesis was an examination of traditional Japanese design principles and an assessment of their applicability in a contemporary environment. Through reinterpretation and adaption, old solutions may have considerable relevance in a modern context, as shown by a comprehensive review of all relevant factors. The study provided in this thesis indicates that native Japanese principles may be effectively applied to current urban housing and may offer lessons for the global future of urban life.

In conclusion, in light of the facts that have been discussed up until this point, it is conceivable to make the assertion that traditional residential designs in Japan and contemporary micro houses have strong connections in terms of several fundamental notions. Although the inspirations that lie behind these ideas are noticeably distinct from one another, there is still a factor in common between these varied approaches, and that is the fact that they have both been primarily affected by the prevalent religious thinking and practices of their periods.

Table 5.1.Comparison of 3 Case Studies in Categories.

	House in Kobe	R-Torso-C	Garden and House
Plan			

Section			
Modularity		 	
Openness	  	 	  

Surfaces			
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In addition to this study as a further research would be a comparison of Case Studies of micro houses in different location of Japan. Also a further research may be a comparison of case Studies such as Tiny, Capsul and Small houses to find out and understand how Traditional Japanese Architecture effects. In addition to a future research, micro house case studies comparing to the traditional architecture in different countries. This study takes a clooser look to Japan but there are so many countries that has the similar character so the next research study could be same methodology but in the way of different countries.

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