

A study on the comparison between the standard farmhouse plan in 2019 in Korea and the farmhouse plan in Danang, Vietnam in 2017

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Abstract: The aim of this study is to present the spatial difference between the Korean farmhouse and the Vietnamese. As a research method, one Korean farmhouse planning was chosen from the standard planning of the Korean farmhouse standard indices the other was chosen from the Vietnamese farmhouse was built in Da Nang, Vietnam. This research shows the hidden differences between the Korean culture and Vietnamese in farmhouses and what the reasons are residing behind them. As research tools, Gamma diagram analysis and movement analysis are hired to display these reasons. To make successful farmhouses in both countries with keeping pace in 21st century with declaring digital farming, it is necessary to predict which spaces will be expanded first to maximize the productivity in farmhouses. This paper has the solutions for both questions above.

Keywords: Farmhouse, Rural Housing, Plan, Elevation, Korea, Vietnam, Flow Movement Line, Gamma Analysis, Space Grammar.

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1. Introduction

1.1 Background and purpose of the study

Vietnam's rural population was about 60.84 million in 2018, accounting for 64.3% of Vietnam's total population, a decrease of about 400,000 compared to 2010. Among Vietnam's rural areas, 14.28 million (23.5%) live in the northern, central and central coastal regions of Vietnam, 13.25 million (21.9%) live in the Mekong Delta region, and 13.25 million (21.9 %) live in the Red River Delta region, which is home to 12.85 million people (21.1%).

On the other hand, rural areas in Korea, where the agricultural population has continuously decreased, are mainly capable of only one crop per year, but in Vietnam per 3 crops. I compare spatial arrangements are made by the standard layout and floor plan of farmhouses per two countries. The purpose of this study is to compare the characteristics of farms and the differences in internal circulation and to summarize the impact that these differences can have on farm household income. In addition, due to the ongoing global warming, the climate in Korea is gradually becoming tropical, the environment for cultivating tropical crops expands.

1.2 Research scope and method

In order to reflect the changing rural situation in both countries in 2010, in the case of Korea, a universal plan was selected from among the standard farmhouse plan types from the standard design plan for wooden houses made by the Korea Forest Service published in 2019, and the characteristics of the space layout and the size and size of each space are selected for the analysis of the connections between spaces and internal traffic lines.

Second, among the farmhouse plan types completed in 2017 that used a lot of wooden building materials in Vietnam, a universal plan was selected to analyze the characteristics of the layout of the space, the size of each space, and the connectivity between spaces and internal flow movement lines.

2. Research on the prior studies

Despite newly built farmhouses and standard houses in the Gyeongnam province, these houses are composed of dining room - kitchen, living room, and bed rooms, and each spatial composition are different from each other. It is organized into 6 standard forms by the relationship of, and shows the rules of 6 types of space grammars, and also shows the location of the attic as a storage space in the cross section. This study is a case of analyzing the plane and section of Korean farmhouses based on the basic functions of them. It was not possible to find out, and the causes of when the farmhouses would be later expanded, reduced, or rearranged in plane and section, and to predict their future forms.

In addition, it found the changes in the use patterns of the main house and Sarangchae, a detached house for a male owner of the building and garden in the 1960s, which correspond to the rooms and living rooms of modern houses and also it shows changes in the use patterns of the kitchen (Park 1992)¹. But there is no shape-grammatical analysis of the layout relationship of the kitchen as a space for preparing meals for the hostess and other spaces. Nevertheless, this research pointed out along with the pictures that the number of rooms increases or the size of the space increases as the family expands, but this is also missing the part analyzed in terms of the overall morphological grammar of farmhouses according to the

comparison of the relative area with other spaces and the change in form.

According to a study published in February 2004 (Kim, Kim, and Lee 2004)ⁱⁱ, the number of rooms increase in proportion to the size of existing farmhouses was generally expanded, but the increased number of rooms in farmhouses caused unwanted usages of more rooms as storages according to the period when the population of young people moving to Seoul increased. Finally, these rooms lost the basic character of the bed room itself, the balcony is also used as a storage space for seeds and grains, and the overall storage space is in shortage by these irregular stuffing. It described simply the pattern in which space is used for other purposes, but it couldn't suggest a new space grammar rule that suggested an alternative solution for additional storage space through analysis of plane, section, and elevation.

In the study published in December 2009, a south-facing housing plan analysis (Hwang and Lee 2009)ⁱⁱⁱ method was used, and a gamma - analysis method was used to analyze the connection and correlation between each space within the house, but due to the limitations of the gamma analysis method, although the connection between each space is analyzed as the main circulation and virtual circulation, but the frequency of occupancy for usage of each space and the density of users at the time of use are not displayed from the users' point of view. So, it is not possible to predict the necessary additional area for increasing the room or dummy area of for space saving in the room of the farmhouse by calculating the effective space analysis according to the density of users staying in the space and the size of furniture and items to be loaded in each space. Thus, it was not possible to present a newly revised specific plan of space grammar for renovation or remodeling according to the proposal of a fixed plane, cross section, and elevation.

3. Korean standard farmhouse

Korean rural housing has the characteristics of a mixed-use housing that serves as both a residence and agricultural work, unlike urban housing that is only for family housing. The residential space and affiliates are separated and the function of the yard becomes stronger as an external space rather than a work space. In conventional rural housing, the toilet was placed outdoors as a separate building, but similar to early urban housing, it has changed to a form that is placed in an affiliated building or a residential building or absorbed internally. In the case of being absorbed into a residential building, various aspects such as access to the outside, conventional and flush toilets, and presence or absence of bathrooms are shown.

4. Vietnamese farmhouse

4.1 Type

There are 2 types of farmhouses in modern Vietnam that meet the demand of production by the cooperative economy (farmhouse: agricultural product drying room, production / processing and product storage arrangements), and 14 types that satisfy the centralized economy production (collaborative farmhouse: dormitory type) (HKTSVN 2003)^{iv}. There are two types in farmhouse. First, traditional house types of farmhouses are not built in old villages, but they are very suitable for agricultural economic production because they perfectly meet the conditions of well-

functioning folk houses such as gardens and fish farms. Secondly, dedicated farmhouses only for agriculture are. These are categorized as a type of farmhouse for those who engage in purely agricultural activities, and the entire economic activity of the household is devoted to agriculture itself.

As a kind of collaborative farmhouse, in first, lot house, a type of farmhouse in which parcels are divided according to the style of street trees in urban areas, and the average area of each parcel is about 100m² (5m wide, 20 m long). This lot house is built as a house by dividing the land into a newly built rural residential area, city center, village inter-village road, and communal road. Lot houses unique to Vietnam have to allocate all space to the regulated average area, so the area of the yard and garden is insufficient or the functional space for agricultural production is not large enough, while pursuing environment-friendliness as a priority purpose, if the building density is too high or no environment-friendly lot-lands are assigned, they are not suitable for the needs of the Vietnamese farmers, who mainly focus on food, accommodation and agricultural production. However, since these Vietnamese lot houses are designed after the lot-land division is done, the Vietnamese farmers have to use them as their own agricultural housing, whether they like it or not.

When planning, this type of housing should be placed on the outskirts of the city, away from the village center, to reduce planning and constructional costs (unit cost/m²) and meet favorable conditions for farmers close to the agricultural fields. Moreover, it is appropriate to increase the land area from 150-200m² with having agricultural production simultaneously. In these days, a new type of farmhouse has emerged in recent years for residents who specialize in livestock, poultry, afforestation and aquaculture in the case of farmhouses with separate farm economic operations and farmhouses with aquaculture. This new type, although it accounts for a small proportion of the total farm type in Vietnam, still meets the economic conditions of production modeled on farms and horticulture, although it does not yet provide enough food and rest facilities for people.

Unlike a lot house, a farmhouse due to its lower floors blending with the natural landscape should be regarded as a garden house that is friendly with the natural environment.

Also, in terms of production management, Vietnamese collaborative farmhouses combine manual production with conventional agricultural production. These manual production farmhouses fall into two types. The first type is a house for those who engage in farming in their spare time as well as side jobs such as knitting, embroidery, and lacing, and has the same functional structure as the traditional house mentioned above except for the addition of a kitchen space. In other words, it is a separate building combined with production without a separate production space. The second type is a farmhouse for people who specialize in handicrafts in a traditional craft village, and is equipped with product showcases such as a separate production space, finished product warehouse, and raw material warehouse, in addition to residential and family living spaces.

The more developed farmhouse is the farmhouse combined with commercial services and commerce. This type of housing emerged after the introduction of the market economy for residents specializing in industry, agriculture, commerce, trade and exchange services. These farmhouses for service and commerce have the

same spatial structure as houses in the streets of urban areas, and are placed along village roads or in 'downtowns' in 'urban areas' to create village houses.

These farmhouses combined with commercial services have recently developed into farmhouses combined with agricultural tourism services, as Da-Nang became famous as a tourist destination in the 2010s, they are farmhouses that practices agriculture or handicrafts with the additional function of providing tourism services (a type of homestay tourism). These farmhouses with suitable products depending on whether they are farming or doing traditional handicrafts, introduce the process of doing related work, and have a space that introduces the food culture, which is a combination of tangible and intangible cultures of the village, along with local special cuisines.

If there are no large families in Vietnamese multi-family housing, this is not a type of housing used by multi-generational families in the past, where the land is subdivided so that children can build separate small houses, but it is a housing of a blood family designed by dividing the land into detailed family units where clans live together. The center of this group consists of a traditional house, a common yard for drying and a well, surrounded outside by block-type member houses or 2-3 story duplex villas with pitched or tiled roofs, each house with its own garden and vegetable garden. Here, the traditional house remains a space symbolizing tradition, combining a place of ancestral worship, a common living space, and a dedicated library for reading only by family members. The common yard for drying is a place for weddings, funerals, drying of season crops, and family entertainment and a well is a common living space. Water can be pumped to each family's individual water tank for use, therefore, through this watering structure, while maintaining the traditional form and space of a farmhouse, it will satisfy the living conditions of a small family and at the same time do the productional conditions of cooperative economy agriculture.

The agricultural cooperative farmhouse is a type of farmhouse that has the same organizational model as the extended family group, but whose members are not necessarily of the same clan or lineage, but are members of an agricultural cooperative. Also, in the center of the site, an agricultural product drying facility, production / processing, and product storage are placed, and individual farmhouses are placed around the this productional center. The land on which these agricultural cooperative farmhouses are to be built is in a residential area, that is, a new rural residential area. These lands are far from central areas, close to production areas and close to fields.

The farmhouse connected to the garden is that it is a type of farmhouse where the land is divided into lots, but the yard and garden area are wider. The building density is 60-80% of the land area and the height is 2-3 stories. The farmhouse connected with the garden is for a growing family (2nd generation family). This type can be sold to farmers with a long-term commitment to the business.

The block farmhouse is a type of farmhouse building block with the second floor adjacent to it. The first generation living on the first floor of this block has a front yard, and the second generation living on the second floor has a staircase and a backyard. This type of farmhouse is for developing families with a long-term love of farming businesses.

The apartment farmhouse is A kind of farmhouse from an apartment available for rent or sale in a farm family. There are no combinations of side or mid- aisle units, each unit contains 8-10 households and has an area of 48-120 m² per apartment type ranging from nuclear to advanced family. The maximum height of the apartment is 5 to 7 floors, and elevators are not used. If the apartment is 7 stories high, the upper two floors are duplex apartments, each with separate stairs.

Communal farmhouse as dormitory type is that it is a multi-story a partment building with 5 to 6 floors without an elevator. The farmhouse is divided into many private rooms or groups of 2 to 6 people for single workers to rent (Hwang and Lee 2009)^v.

5. Comparison

5.1. Architectural Planning Theory Perspective

The comparison target Korean farmhouse is wooden and has a total floor area of 84 m², a first floor of 84.24 m², and an attic of 17.95 m².

On the other hand, Vietnam's farmhouse is 92 feet wide = 28 meters, 54 feet long on the right = 16.46 meters, 25 feet on the left = 7.62 meters, and the total floor area is 328.78 m², the first floor is 328.78 m², and there is no attic, so there is a difference of 3.91 times in terms of area, and the size of farmhouses in Vietnam is almost four times larger than that of Korean farmhouses.

Comparing the living room's orientation, South Korea faces south and Vietnam does not have a preference for a specific direction.

Nationwide, the floor space per house is steadily increasing, and the floor space per household and per capita are also increasing in South Korea (Hwang and Lee 2009)^{vi}. In addition, for Korean farmhouses, in the case of 1998 98-30-2-Na or 98-30-2-Ga in the Korean standard housing design drawings before 2004, extension plans are proposed, but since extension cannot be made on the first floor, the second-floor expansion plan is being proposed. The reason is that it seems to be because there is not enough space for the front, rear, left and right extensions to be added on the floor. In contrast, in the case of Vietnamese farmhouses, despite the fact that the size of farmhouses is more than four times larger than Korean farmhouses, the basic plane is a straight shaped arrangement, and there is a patio as a wide courtyard to allow additional space for expansion at the rear of the main mass and sufficient space was left on the rear and left side of it (Fig.1, Fig.2, Fig.3). This is similar to patios found in farmhouses in Spain and South America, and is about the same size as patios in South America where several households live together for necessitating huge scale man-power. One characteristic is that the atrium of an ancient Roman farmhouse, the prototype of the patio, was developed into a patio through the Islamization of the Iberian Peninsula, where Spain is currently located, and the openness unique to the atrium was lost. Modern farmhouses in Vietnam that have adopted such patios have also preserved the privacy of residents by planting trees taller than the first floor to block the openness between the patio and the outside (Fig.4). Also, just as the patio of a Muslim house faces the direction of Mecca, the direction Muslims pray, the patio of a Vietnamese farmhouse has a specific direction is to aim for a place where Buddha is

enshrined in a farmhouse. Vietnamese farmhouses rarely have Buddhistic decorations on the outside. Vietnamese farmhouses look similar to individual Muslim houses often have patios facing the interior atrium, are surrounded by walls, and have little or no decoration. On the other hand, farmhouses in Europe, including Spain, look outward-oriented by having a representative decoration symbolizing the family at the front entrance.

Within the family house, there is again a space separate from the public space, the latter being the most private space generally reserved for women and children. After all, only the head of the family has unrestricted access to all rooms and spaces in such private rooms. This is in contrast to the European concept of connecting different spaces and accessing them freely and easily (Hwang and Lee 2009)^{vii}. In this respect, the patio of a

modern Vietnamese farmhouse is different from the European concept. As seen above, unlike the concept of preference for south facing of the main entrance in Korean farmhouses, Vietnamese farmhouses do not have a preference for a specific direction such as south facing. Patio in Vietnam (Fig.1), unlike Muslim patios that focus on prayer and fellowship, is a space that is placed close to the living space of the employees of the farmhouse to process and prepare the farmhouse's actual products for sale. Also looking at the layout of the space, there is no restriction on the movement of the employer's family, who is the owner of the farmhouse, but the employees, who are workers on the farm, cannot easily access the space where the employer's family resides because it is separated by a common space, such as the living room, dining room, and kitchen. In other words, it can be seen that there is a differentiation from the employer's family circulation.

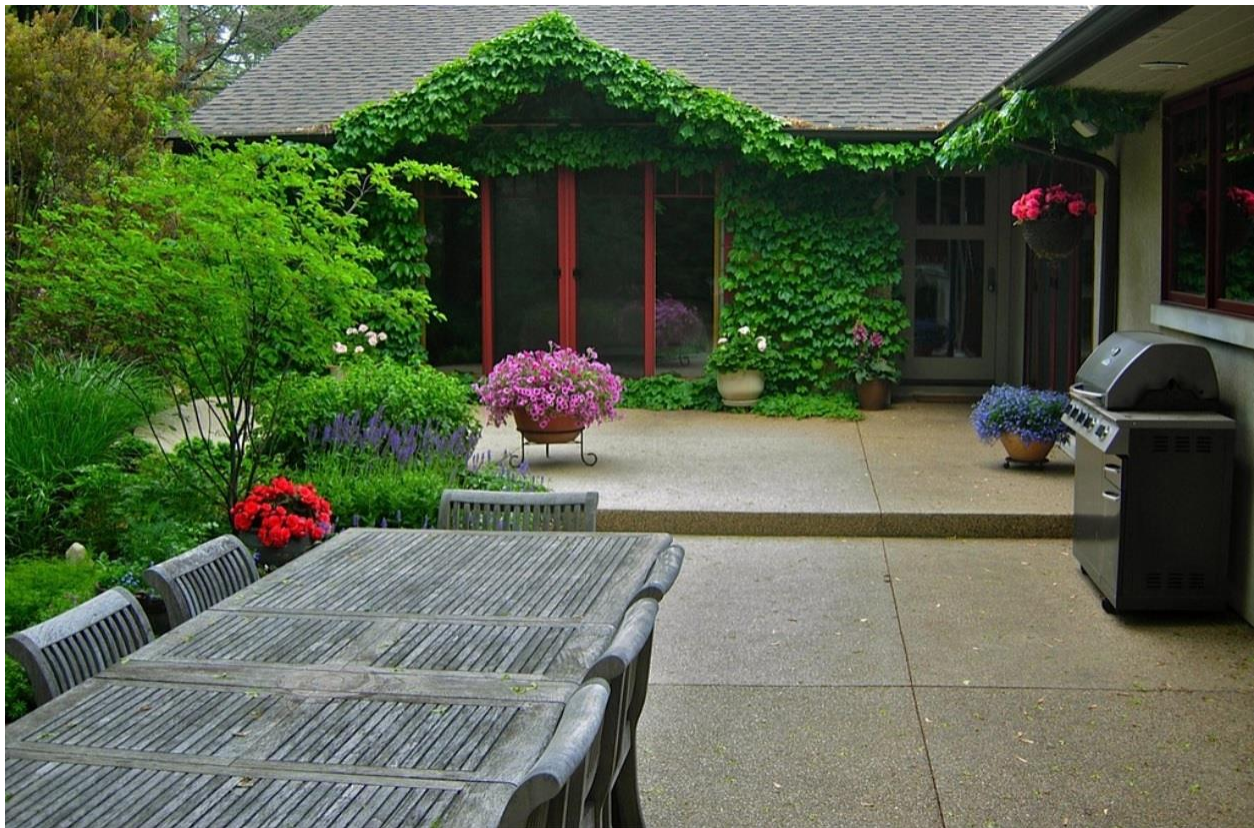


Fig. 1: Courtyard (patio) of Vietnamese farmhouse

5.2. Comparison of drawings

5.2.1 Common components and differences in floor plan

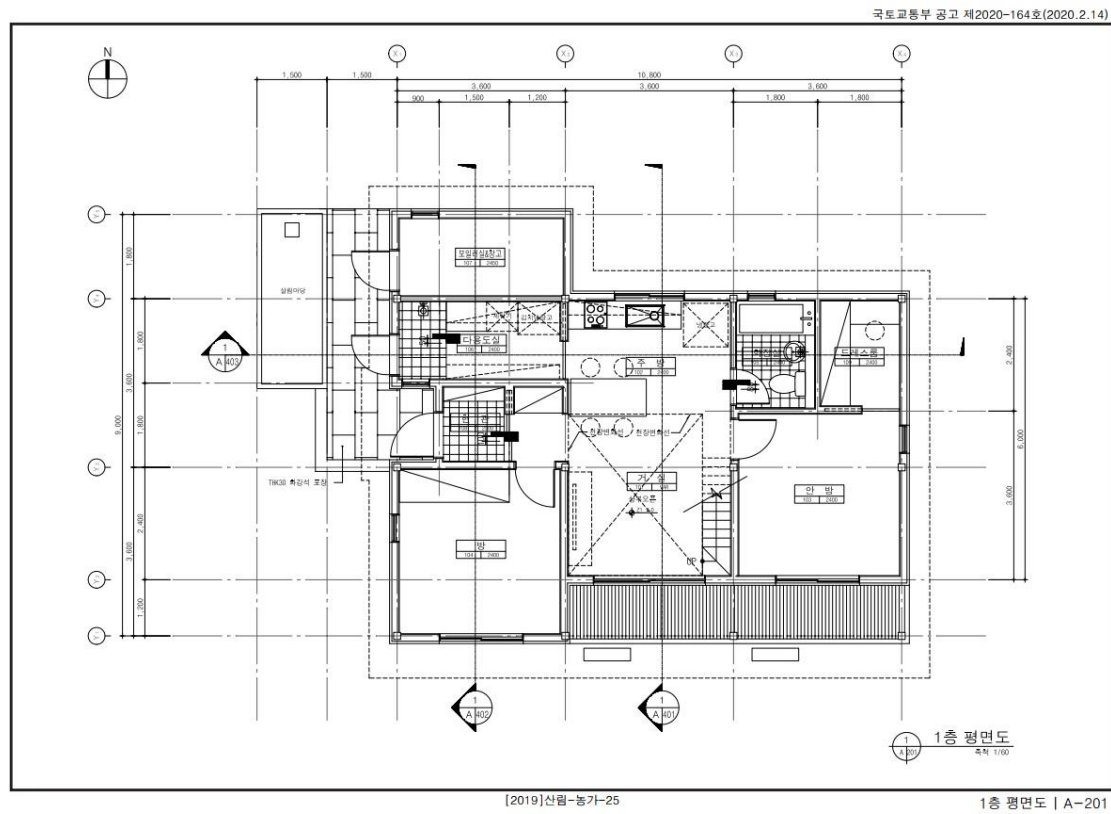


Fig. 2: Floor plan of the Korean wooden farmhouse of financial subsidizing standard types [2019-Forest-Farmhouse-252021-01-02]

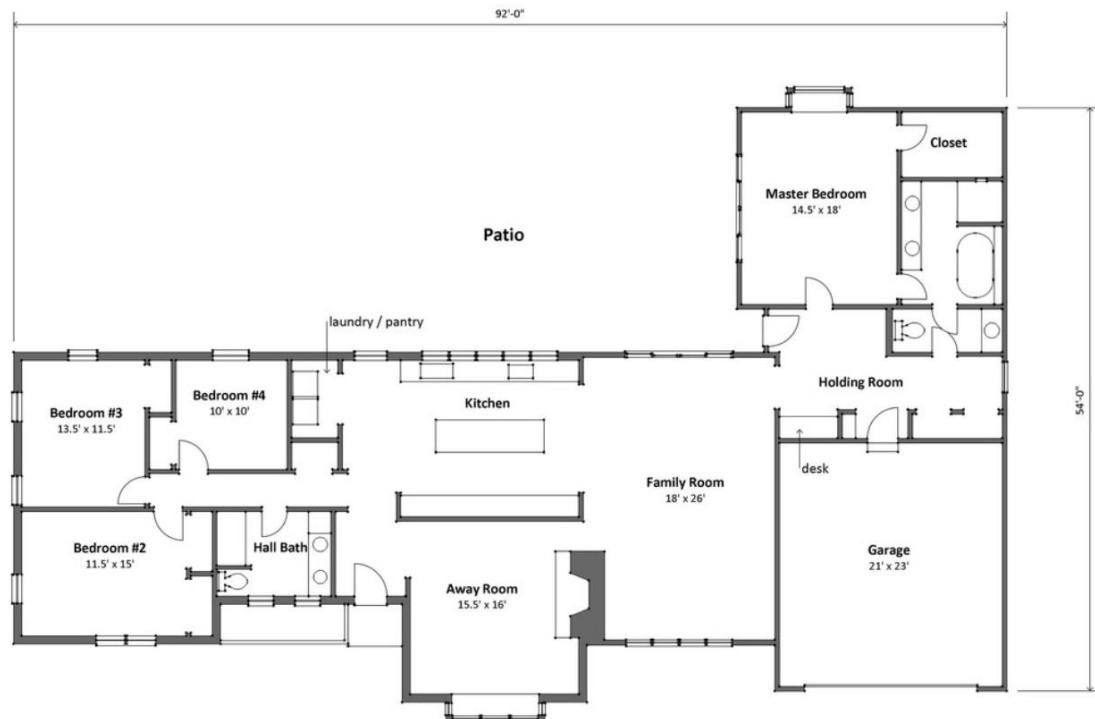


Fig. 3: Floor plan of the Vietnamese farmhouse

In the Korean farmhouse (Fig. 2) and Vietnamese farmhouse (Fig. 3), the common parts of the house floor plan are Living Room + Kitchen (L+K), Room (Bed Room 1: RB1), Bedroom (Bed Room: RB), Toilet (Toilet, CR (Comfort Room), Restroom), dressing room (RD), entrance (Entrance: E), utility room (RU: Utility Room), and boiler room & storage (RBO & S).

On the other hand, parts that are not included in the floor plan of Vietnamese farmhouses are a utility room (RU: Room Utility) and a boiler room & storage (RBO & S).

On the contrary, parts that are on the floor plan of a Vietnamese farmhouse not only the floor plan of a Korean farmhouse are only in the dressing room (RC: Cloaking Room), male master bedroom or female master bedroom aka Anbang, holding room, guest room, but also it has a bath room with bathtub, a waiting room, a guest room, and a family living room connected to the kitchen.

5.2.2. Characteristics and Differences of Traffic Lines

Looking at the types and areas of rooms along with the following figures <Fig 4, 5>, Korean farmhouses have three main entrances (entrance, utility room entrance, boiler room and warehouse entrance) and all facing west. But the window of the largest living room faces south. On the other hand, Vietnamese farmhouses have an entrance and a garage door on the front, and the front faces the east and the rear faces the west. There is a separate entrance that the landlord can enter alone, and he enters through the patio, which is the courtyard. Therefore, there are three main entrances that can be entered by walking, and they exist both in the front and in the back.

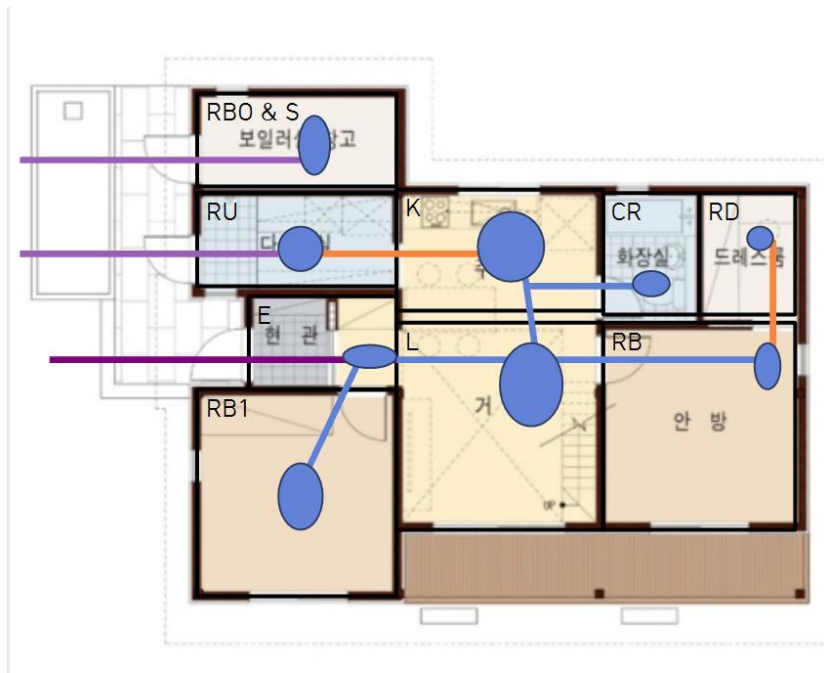


Fig. 4: Gamma analysis of relationship among the spaces on the floor plan of the Korean wooden farmhouse [2019] Forest-Farmhouse-252021-01-02

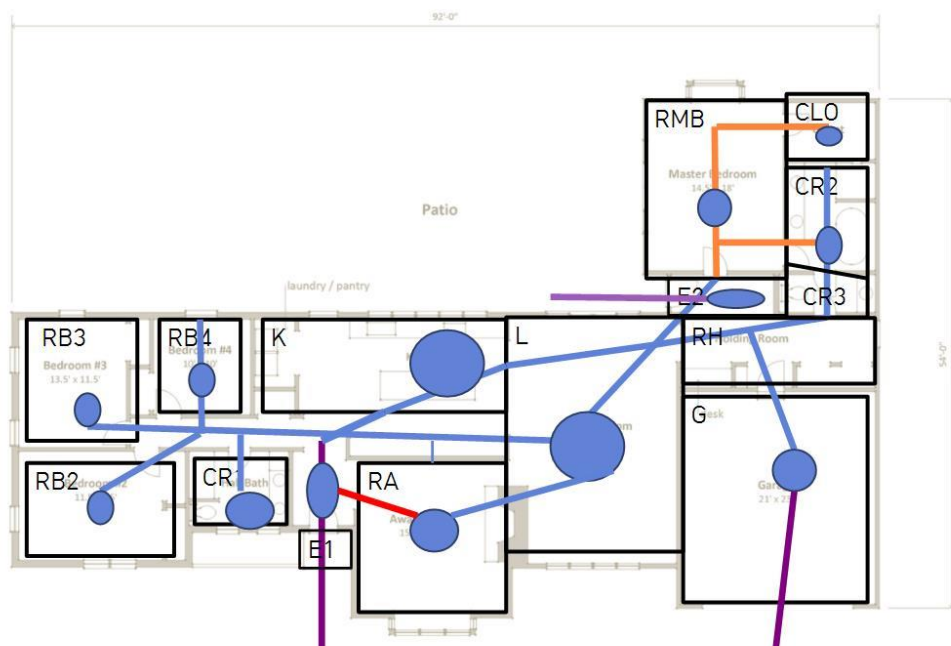


Fig. 5: Gamma analysis of relationship among the spaces on the floor plan of the Vietnamese farmhouse

5.2.3. Gamma Analysis of Differences in Entry Methods and Traffic Lines

Firstly, it is seen in Korean farmhouses by entering through the living room (L) from the front door (E). Secondly, it is seen in a Vietnamese farmhouse by entering through a guest room (RA; Away Room) from the entrance (E1), and the purpose seems to be to separate the circulation between guests visiting the farmhouse and users residing in the farmhouse. It is a space that acts as a kind of filter. Thirdly, it is specially seen in Vietnamese farmhouses to enter from the entrance (E1) to the integrated space composed with a living room and a kitchen (LK), the visitor must enter through the RH (Holding Room) first. Likewise, the guest room and the waiting room are spaces that separate traffic lines by acting as a kind of filter.

Fourthly, seen on the farmhouse in Vietnam, the method of entering the living space (L or LK) directly without the entrance (E) is a traffic line of entering the living space through the guest room (RA; Away Room).

Fifthly, it is seen in Vietnamese farmhouses by entering the master bedroom (RMB) from the waiting room (RH: Holding Room) without an entrance (E). Sixthly, it is seen in Vietnamese farmhouses by entering from the garage (G: Garage) to the waiting room (RH: Holding Room). Seventhly, as a circulation connecting the waiting room (RH) and the family living room (RF) of the farmhouse in Vietnam, this traffic line is a line for guests or employees of the farmhouses to meet the host's family members or the host of the farmhouse. Eighthly, as a space connecting the rooms (RA) and the family living room (RF) of the farmhouse in Vietnam, it is a circulation line for the host's family to check the guests visiting the farmhouse. Ninthly, it is the traffic line from the family living room (RF) to the kitchen (K) for the host family to eat. Tenthly, the utility room (RU: Utility Room) can be accessed from the kitchen (K: Kitchen) indoors only. When the extended spatial space grammar rule is applied, it can be combined with the kitchen only in Korean farmhouses. Eleventh, spaces that can be accessed directly from the outside without passing the main entrance (E) are the utility room (RU) and the boiler room & storage (RBO&S) only in the Korean farmhouse.

5.2.4. Unusual traffic lines emerging from spaces that do not have each other and their hidden meanings

In the Korean farmhouse, there is a traffic line leading from the master bedroom (RMB: Master Bed Room) to the dressing room RD (RD: Dress Room: Closet). On the other hand, in the Vietnamese farmhouse, the traffic line from the master bedroom (RMB: Master Bedroom) to the dressing room (CLO (Closet: Dress Room (RD))) is accessible only from the master bedroom (RMB: Master Bedroom) of the farmhouse employer. This means the dressing room is in fact only for the employer and cannot be used by the employees of the farm. It seems to have been influenced by the feudal system of modern Vietnam. Secondly, it is the round-trip route from the living room or master bedroom (RMB: Master Bedroom) of the Vietnamese farm employer to the bathroom 2 (CR 2: Luxurious Comfort Room; luxurious bathroom

(Toilet)) including one or more bathtubs, mainly used by the farm employer (Master).

Thirdly, the traffic line of roundtrip between bathroom 2 and toilet 3 (CR3 (Simple Comfort Room; simple toilet; bathtub is omitted)), this toilet has a structure that can block general users by locking the door from inside the bathroom by the master's family members. Fourthly, general users use toilet 3 (CR3 (Simple Comfort Room; Toilet; simple toilet; bathtub is omitted))) in the waiting room (RH (Holding Room)) to meet the landlord of the farmhouse in Vietnam and the master family, who are users of toilet 2 (CR2) and the general users can be blocked by locking the door by the host family members using CR2. This is arranged so that general users to meet the landlord can use the toilet when waiting for a long time. Fifthly, this is a round-trip line from the family room (RF (Family Room)) of the applicable Vietnamese farmhouse, as the living room of a Korean farmhouse (L: Living Room), to the waiting room, 'RH (Holding Room)' to meet the landlord. Sixthly, the traffic lines going back and forth from bedroom 2, 3, and 4 (RB2, RB3, RB4) to bathroom 1 (CR1 (Hall Bath; Simple Comfort Room; simple toilet with omitted bathtub), distance between traffic lines is the shortest, and overlaps severely on a two-dimensional plane, causing unwanted collisions and physical struggles between users easily and the total three traffic lines occur in a small space. Seventhly, it is the traffic line of employees of the farm to the kitchen to cook and eat. These are RB2 - LK, RB3 - LK, and RB4 - LK, prone to congestion. Eighthly, it is a circulation where employees of Vietnamese farmhouses visit each other for friendship, which is a common occurrence in athletes or students' dormitories. These are RB2 - RB3, RB3 - RB4, and RB4 - RB2, circulation lines that need to be widened considering the degree of congestion during extension of the farmhouse. Ninthly, the Vietnamese farmhouse has a laundry room / pantry attached together, and there is no door between this complex space and the kitchen, open structure. On the other hand, in Korean farmhouses, the boiler room & warehouse plays the role of the food storage room. A direct entry from the kitchen (kitchen) to this storage is blocked by a wall, so the user has to go out of the building unconditionally.

Tenthly, in the Korean farmhouse, the kitchen and living room are in one space, but in the Vietnamese farmhouse, there is a partition wall between the kitchen and the room (Away Room), which is a load-bearing wall, so a person cannot see the cooking situation in the kitchen at all. When walking between the spaces, a user can pass through only entrance (E1) or family room (RF) and the traffic line is formed by this path but, whereas in the family room (RF), corresponding to the living room of a Korean farmhouse, which is a space only for the employees' families, there is no partition wall, so the cooking situation can be easily seen and a circulation is formed. So, this is in order for guests in the away room (AR) to eat in the kitchen, and they must pass through the family room (RF) or enter the vestibule, which is a part of the kitchen in front of the front door (E1). This is interpreted as an unspoken meaning that a person must obtain permission from the farmhouse owner, the employee's family, to eat. The summary of the above items is as shown in the table <Table 1> below.

Table 1: Differences between the Korean farmhouse and the Vietnamese in entering their farmhouses, movement flow and spaces

	South Korea	Vietnam
Common factors	Living room + kitchen (L+K), Bed room (RB1), Main room (RB), Bathroom (Toilet or Comfort room), Dressing room (RD), Entrance (Entrance: E) 1 unit, Utility room (RU: Room Utility), Boiler room & Storage (RBO) & S)	
Unusual elements	Room Utility (RU), Boiler Room & Warehouse (RBO & S)	Changing room (RC: Cloaking Room), master bedroom, holding room, guest room (away room), bath room with bathtub accessible only from the master bedroom
Common and similar traffic lines coming from common factors	EL	E1-RA, E1-RH-LK
Unusual traffic lines coming from common factors	K-RU, RU, RBO&S	RA-LK, RH-RMB, G-RH, RH-RF, RH-RA, RH-K(LK)
Unusual traffic lines from non-common factors	RB – RD	RMB – CLO, RMB – CR2, CR2 – CR3, RH – CR3, RF – RH, RB2 – CR1, RB3 – CR1, RB4 – CR1, RB2 – LK, RB3 – LK, RB4 – LK, RB2 – RB3, RB3 – RB4, RB4 – RB2,

5.2.5. Changes in usage patterns of Korean farmhouses compared to changes in usage patterns of Vietnamese farmhouses

Even in Korean farmhouses, young users do not want to share toilets (CR) with older users. Moreover, a separate toilet for visitors and guests is required to protect personal privacy recently.

5.2.6. Possibility of extension (refer to ‘space grammar’ according to functional structure and possibility of derivation of movement line)

As shown in (Fig.4, Fig.5), the probability of users’ staying together increases in proportion to the area of each space, and the momentary population density inside each space increases as they stay together. As the population density increases, the space narrowed by the increased population density according to the concept of individual basic space module dealt with in architectural planning theory does not satisfy the convenience required per individual user, so the need for extension increases. Therefore, in order to express the degree of need for expansion, the expected populational density in each space was symbolized as purple circles and ellipses in proportion to the planar shapes of the spaces. Among the

previously announced standard floor plans in 2004, 'Agriculture and Forestry-2004-33-A' shows that in the case of farmhouses that prefer low-cost when extending, concave and convex spaces created by polygons rather than rectangles are surrounded by outer walls. These spaces are generally spaces such as stairs or halls that connect individual spaces such as bedrooms, and are connecting sections that can support the structural stress of ceiling materials such as slabs without the need for additional columns and load-bearing walls when expanding the floor plan of the house. These are mainly reserved for future farmhouse floor plan expansion, and are used as axes that do not change in shapes when extending the floor plan, and was used as important pivoting points in extension.

5.2.6.1 Functional Structure and Extensibility

Looking at the floor plan of the designated Korean farmhouse, considering the possibility of expansion according to the functional structure, and considering the privacy and Confucian elements, which are the recent cultural combinations unique to Korea mentioned earlier, the wooden farmhouse covered in this study needs a second toilet (CR2) in the shortest path close to the entrance (E) for the users and visitors of the bed room (RB1). If the space grammar based on the movement of the space to be expanded is summarized as a gamma diagram, its formula ' Bedroom (RB1) + CR2'.

On the other hand, in the floor plan of farmhouses in Vietnam, the circles representing the density of the usable population in proportion to the size of the plane space of K, L, and AR are the largest ones. From the Korean point of view of building planning, the size expansion of K and L, which are common spaces for all users, is most likely, but, in Vietnam, the additional deployment of production personnel is more important than the expansion of common space and priority is given to the expansion of RB4 following RB1, RB2, and RB3. In other words, the expansion of the farmhouse scale, in which the additional deployment of production manpower takes precedence over the expansion of common space, is preferred, and the common space is satisfied as long as it is a space with a minimum area that can be used by the added production manpower. Hence, expansion of common space is considered after expansion of space for production personnel. If enough workers live in the paddy field area for agricultural production, the main focus of the farmhouse, it will be preferred to expand the space for the production of handicrafts or side jobs such as knitting, embroidery, and lace. In this case, the flow traffic line of the space to be expanded can be summarized by the based morphological grammar with a gamma diagram, and its formula, ' Bedroom (RB1, RB2, RB3) + RB4, RB5'.

5.2.6.2. Possibility of Derivation of Existing Traffic Lines

As the more the traffic flow, the spaces penetrated by the thicker the flow traffic lines should be selected as a priority for space expansion when considering the users population density. The traffic lines connected to the entrance door become thicker due to the large amount of common traffic to enter the house, and other internal traffic lines will be thicker by connecting circles with larger population density passing through spaces in the house after permitting more common traffics,

so the aisles are likely to be narrow and congested by thicker traffic lines, so related spaces and aisles should be considered as a priority for expansion. In addition, the space including the points where thicker lines intersect should also be selected as a priority expansion.

Looking at the floor plan of the designated Korean farmhouse, considering the possibility of expansion according to the possibility of derivation of the circulation, if an independent toilet (CR2) for the bedroom (RB1) is newly established, there is no reason of being thickened of necessary flow traffic lines because of no increasing on the number of users in pre-existing space, RB1. Therefore, there is no morphological elements in the floor plan that needs to increase the space of the room (RB1) and the entrance (E) affected by the increasing flow traffic lines. However, in this case, the reason for the establishment of the bathroom (CR2) is to expand by arranging it around the room (RB1) for the convenience of the user of the room (RB1), so the spaces around the room (RB1), such as a veranda or terrace, should be reduced and re-allocated.

In this case, if the form grammar based on the circulation of the space to be expanded is summarized as a gamma diagram, RB1-CR2 - E (if CR2 is installed between the room and the entrance and penetrates them) or RB1 - E - CR2 (in case of installation of CR2 around the entrance) or E - RB1 - CR2 (in case of CR2 installation inside the room (RB1)).

On the other hand, considering the possibility of expansion according to the possibility of derivation of flow traffic lines with looking at the plan of the designated farmhouse in Vietnam, if the number of users of bedrooms 2, 3, and 4 (RB2, RB3, RB4) increases and the above spaces are expanded, the users of the above spaces will spread into the entire spaces of the farmhouse, or increased number of users will use the toilets indispensably as a necessity for physiological reasons, eventually the thickness of the necessary flow traffic line becomes thicker than before.

Therefore, E1, CR1, etc., where the spaces are narrowed, are affected and become the spaces to be expanded. In this case, RB2, RB3, RB4 - CR1 - E1 are summarized as the gamma diagram based on the movement line of the spaces to be expanded.

6. Elevation Characteristic Comparison

Elevation of selected Korean farmhouse (Fig.6, Fig.7), the case where there is a main entrance and exit from the outside and the number of entrances and exits from the outside is the front. Conversely, the case where there is an entrance from the outside, but the number of entrances from the outside is small, is considered as the back side. In the case of Vietnamese farmhouses, it is the case that many people, such as employees and guests, enter and exit. (Fig.8, Fig.9) The following table compares the elevation characteristics of Korea and Vietnam (Table 2).

Table 2: Differences in elevations between the Korean farmhouse and the Vietnamese

	Korea	Vietnam
door height	40 cm off the floor	20 cm off the floor
window length	The vertical length of the window is about half the size of the door.	The length of the window varies, and the vertical length ranges from half the length of the door to 70%, 90% of the length.
sling	Horizontal 12 by Vertical 6	Horizontal 11 by Vertical 5
rain gutter	there is	does not exist
Chimney	does not exist	there is
skylight window	does not exist	there is
door	It consists of a single sliding door	Hinged doors and sliding doors are mixed, and the entrance with a large gate is a casement door, and the garage is integrated into the house, and a hinged door is used.
piloti	there is	does not exist
etc.	The size of the windows is small, the number is small, and the height from the upper frame of the window to the roof is long	The size of the windows is very large, so the indoor natural light is very good, and the electric energy used for artificial lighting can be saved. The number of windows is large and the height to the roof is relatively short.

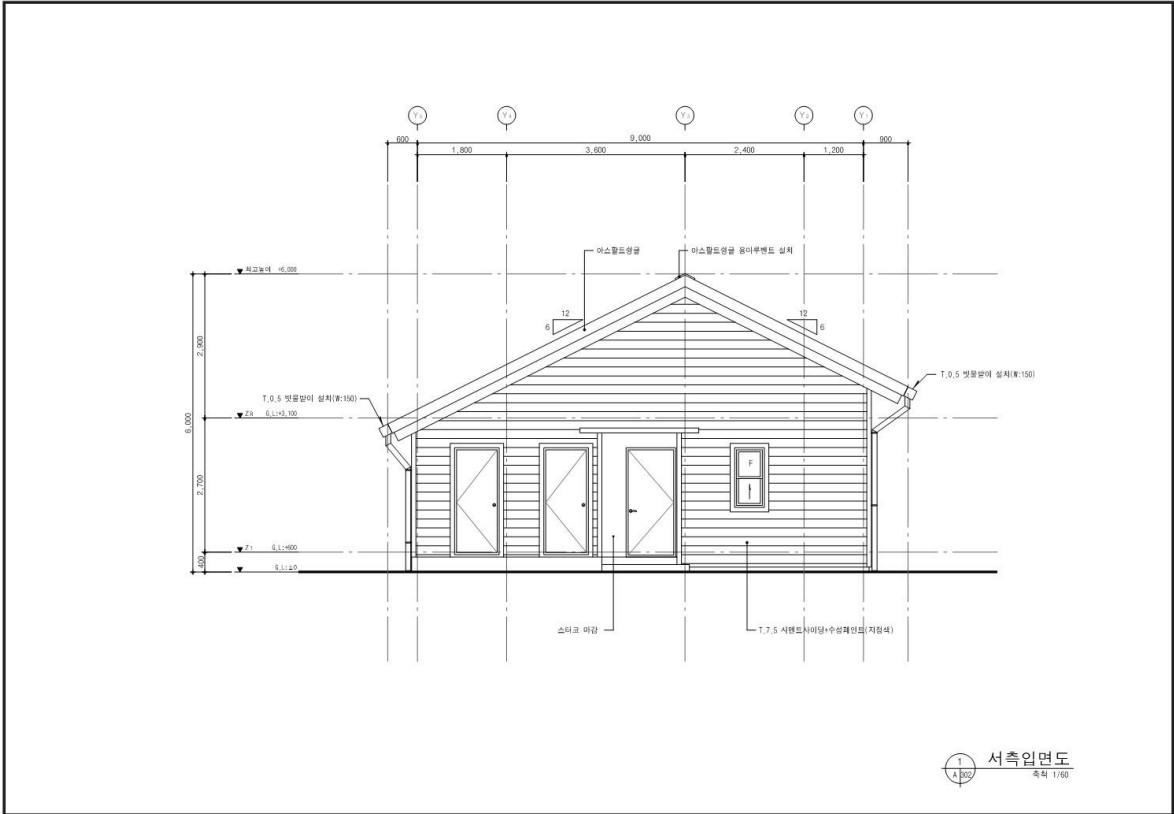


Fig. 6: Front view of the Korean wooden farmhouse of financial subsidizing standard types [2019-Forest-Farmhouse-252021-01-02]

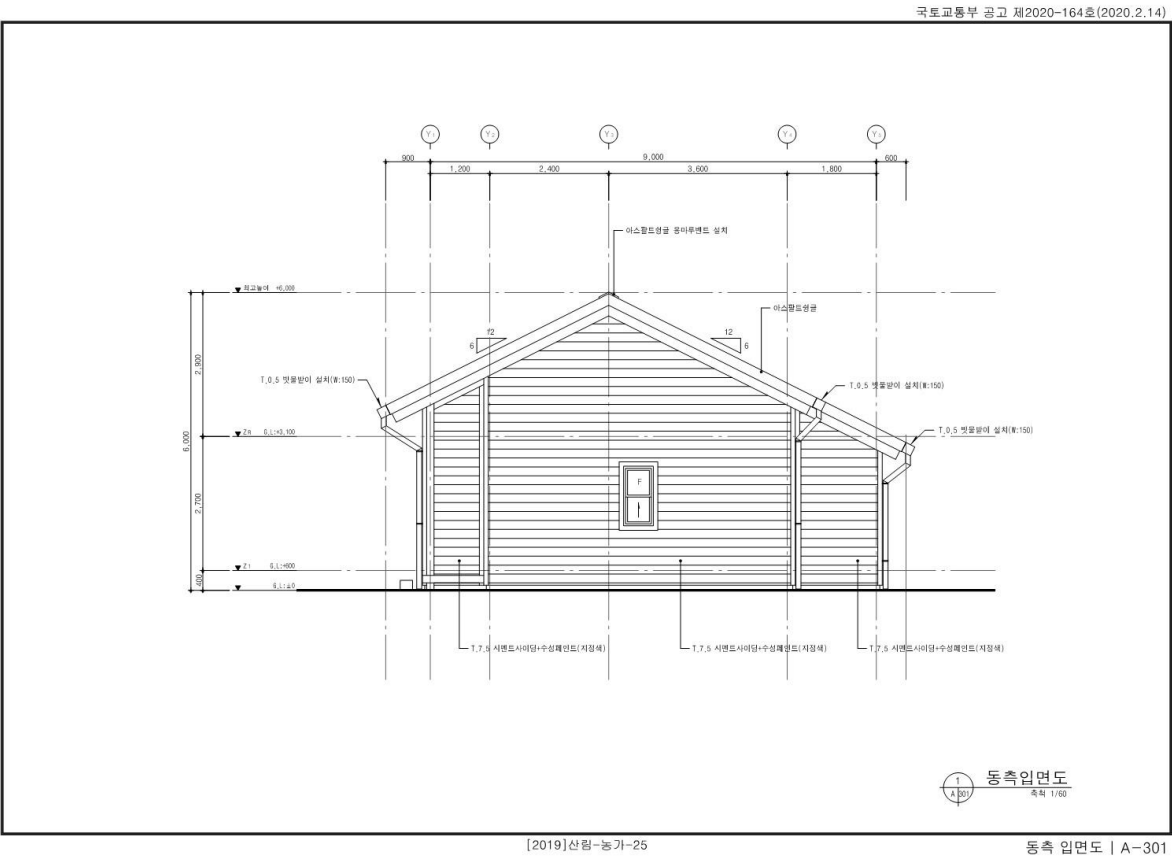


Fig. 7: Rear view of the Korean wooden farmhouse of financial subsidizing standard types [2019-Forest-Farmhouse-252021-01-02]

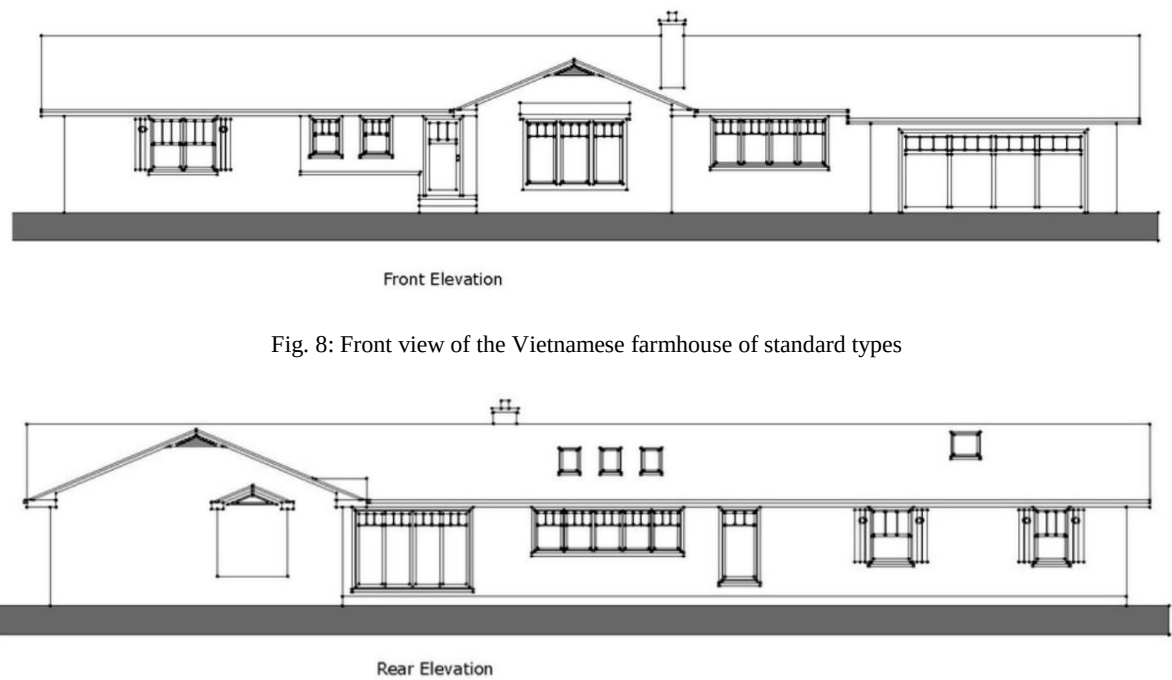


Fig. 8: Front view of the Vietnamese farmhouse of standard types

Fig. 9: Rear view of the Vietnamese farmhouse of standard types

7. Conclusion

Although the size of farmhouses in Vietnam is more than four times that of Korea, it is a 1- shaped arrangement, and a patio is placed in the rear and on the left side where the employees of the farmhouse usually live and allowing for extension with preparing agricultural products for sale. Unlike Korean farmhouses preferring south-facing, Vietnam does not have a preference for a specific direction, and the employer 's family, the owner of the farmhouse, has no restrictions on the movement line, but the farm's employees, who are workers, are separated by common spaces such as the living room, dining room, kitchen, and partition walls, so they cannot easily access the space where the employer 's family lives and their flow traffic lines are separated. Farmhouses in Korea are arranged in one direction, while farmhouses in Vietnam have three main entrances that can be entered by foot, that is, the front, back, and parking lot, all in different directions. In Vietnamese farmhouses, a man can enter the farmhouse without a porch, and step into the waiting room (RH) directly from the garage. It seems to be designed from a work-oriented culture by reducing unnecessary entry lines and time.

Compared to Vietnamese farmhouses, Korean farmhouses have a longer height from the upper frame of the window to the roof, giving them a solemn appearance.

A total of 14 times more unusual traffic lines appear in farmhouses in Vietnam, this is because Vietnamese farmhouses are large with much more users than Korean farmhouses, have a lot of employees, come out of the spaces for them, allocate a large space for guests separately, and use partition walls to divide the traffic lines of guests and residents. Expansions of living space for employees are prioritized in Vietnamese farmhouses because the purpose of additional deployment of production personnel stemming from the expansion of farmhouse production is rather than the expansion of common space. The Korean farmhouse in this study is a forest farmhouse, and the Vietnamese is annexed to garden.

If urban and rural farmhouses will no longer be separated by administrative boundaries, but begin to mix cultures, lifestyles, customs and habits. Unlike Hanoi, Hai Phong, and Saigon, the Da Nang area examined this time does not have large-scale industrial facilities and is a central area famous as a tourist destination. Accordingly, in rural farmhouses to meet the economic production

needs of individual households, dormitory types such as apartment farmhouses and communal "farmhouses discussed above almost do not exist, but there are six types of farmhouses: general farmhouses, farmhouses connected to gardens, farmhouses combined with agricultural tourism services (homestay service) , farmhouses combined with services and commerce, farmhouses in traditional craft villages (handicrafts) , and farmhouses engaged in part-time farming with other businesses. The future research will look at different regions of Vietnam and different types of farms.

References

1. Korea - Vietnam Agricultural Sector Establishment of Mid- to Long-term Cooperation Strategy <https://www.kiep.go.kr>
2. Kim, K. S., Kim, S. G., & Lee, S. J., (2004). Research on the Space Use Behavior of Rural Apartment House Farmers, Architectural Institute of Korea , pp. 42-53.
3. Hwang, Y. U. & Lee, J. W., (2009). Rural standard housing layout after 1990, A study on the characteristics of flat space, Architectural Institute of Korea Journal 11(4), pp. 169-176.
4. Nguyen, Thi. D. (2011) Studying and proposing solutions for transforming rural housing space in the Northern Delta in the process of urbanization, Ministry of Science and Technology Research Project - National University of Civil Engineering.
5. Vietnam Institute of Architects (2003). A model of rural residential community structure according to the trend of industrialization and modernization of agriculture and rural areas. Hanoi.
6. Nguyen, Thi. D. (2011). Rural Housing Architecture, Science and Technology Press, Hanoi.
7. Pérez Ordóñez, A. (2010). Arquitectura tardo-andalusí y morisca.
8. Bianca, S. (2001). Hofhaus und Paradiesgarten: Architektur und Lebensformen in der islamischen Welt. Beck. ISBN 978-3-406-48262-5), 2001, pp.244 – 255.

References¹²³⁴⁵⁶⁷⁸⁹

¹ Alejandro Ordóñez. 2008. "Arquitectura tardo-andalusí y morisca" [Late Andalusian and Moorish architecture] 48: 30-32.

² Bianca, Stefano. 2001. „Die Stadt als Haus. In: Hofhaus und Paradiesgarten. Architektur und Lebensformen in der islamischen Welt“ [The city as a house. In: Courtyard house and paradise garden. Architecture and ways of life in the Islamic world], München: CH Beck, ISBN 978-3-406-48262-5, pp.244 – 255.

³ Hwang, U. Y., and Lee, W. J. 2009. "1990년 이후 농촌표준주택 배치.평면공간 특성에 관한 연구" [Rural standard housing layout after 1990, A study on the characteristics of flat space], *Architectural Institute of Korea* 11 (4): 169-176.

ⁱ Ok K. Park, “경남지역 신축 농가주택과 표준주택안의 건축적 특성에 관한 비교 연구” [Comparative Study on the Architectural Characteristics of Newly Built Farm House and Standard House in Gyeongnam], *Architectural Institute of Korea*, (1992), 91-101.

ⁱⁱ Gyu S. Kim., Seop K. Kim, and Jeong S. Lee, „농촌지역 공동주택 농가의 공간이용행태에 관한 조사연구” [Research on the Space Use Behavior of Rural Apartment House Farmers], *Architectural Institute of Korea* 6, no. 1 (2004): 42-53.

ⁱⁱⁱ Un Y. Hwang, and Wook J. Lee, “1990년 이후 농촌표준주택 배치·평면공간 특성에 관한 연구” [Rural standard housing layout after 1990, A study on the characteristics of flat space], *Architectural Institute of Korea* 11, no. 4 (2009): 169-176.

^{iv} Hội Kiến Trúc Sư Việt Nam [Vietnamese Association of Architects], Mô hình cấu trúc cộng đồng dân cư nông thôn trong xu thế công nghiệp hóa hiện đại hóa nông nghiệp và nông thôn [A model of rural residential community structure according to the trend of industrialization and modernization of agriculture and rural areas] (Hanoi: Công ty Thiết bị in, 2003) [Printing Equipment Company] 128-135.

^v Un Y. Hwang, and Wook J. Lee, “1990년 이후 농촌표준주택 배치·평면공간 특성에 관한 연구” [Rural standard housing layout after 1990, A study on the characteristics of flat space], *Architectural Institute of Korea* 11 no. 4 (2009): 169-176.

^{vi} Ibid., 169-176.

^{vii} Ibid., 169-176.

⁴ Hội Kiến Trúc Sư Việt Nam [Vietnamese Association of Architects]. 2003. Mô hình cấu trúc cộng đồng dân cư nông thôn trong xu thế công nghiệp hóa hiện đại hóa nông nghiệp và nông thôn [A model of rural residential community structure according to the trend of industrialization and modernization of agriculture and rural areas]. Công ty Thiết bị in [Printing Equipment Company], Hanoi.

⁵ Kim, S. G., Kim S. K., and S. J. Lee. 2004. „농촌지역 공동주택 농가의 공간이용행태에 관한 조사연구” [Research on the Space Use Behavior of Rural Apartment House Farmers], *Architectural Institute of Korea* 6 (1): 42-53.

⁶ Heo, J., Jeon, J. H., Kim, H. S., Lee, J. H., Lee, H. B., Lee, S. D., Lee, H. S., and Choi, M. J. 2019. ”한-베트남 농업분야 중장기 협력전략 수립 연구” [Research on establishing mid- to long-term cooperation strategies in the agricultural sector between Korea and Vietnam], *World Regional Strategy Research* 19 (10). South Korea : Korea Institute for International Economic Policy.

⁷ Nguyen Dinh Thi. 2011 “Kiến trúc nhà ở nông thôn” [Rural Housing Architecture], Science and Technology Press, Hanoi.

⁸ Nguyen Dinh Thi. 2011. “NGHIÊN CỨU MÔ HÌNH CHUYỂN ĐỔI KHÔNG GIAN NHÀ Ở NÔNG THÔN VÙNG ĐỒNG BẰNG BẮC BỘ DƯỚI TÁC ĐỘNG CỦA ĐÔ THỊ HÓA” [Studying and proposing solutions for transforming rural housing space in the Northern Delta in the process of urbanization], Ministry of Science and Technology Research Project - National University of Civil Engineering.

⁹ Park, O. K. 1992. “경남지역 신축 농가주택과 표준주택안의 건축적 특성에 관한 비교 연구” [Comparative Study on the Architectural Characteristics of Newly Built Farm House and Standard House in Gyeongnam], *Architectural Institute of Korea*, 91-101.