AN ANALYTICAL STUDY ON THE FLOOR PLANS OF STEVEN HOLL'S RESIDENTIAL PROJECTS

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ABSTRACT

Steven Holl, an American architect who began his design career in 1975, has a unique way of designing. He is known for his many drawings, artistic expression, and distinctive conceptual designs. Steven Holl's designs start with watercolour sketches, a world-renowned architect whose projects are still underway worldwide. This study will examine the philosophy of Steven Holl's plan. It will also explore the aspects of his proposal of sustainable architecture, which he has presented in recent years. It will consider the coexistence of the theme of sustainable architecture with the works of contemporary architects to deepen our knowledge of architectural Design. In addition, the purpose is to clarify the modelling characteristics by classifying the outer shape of residential works using a plan view.

Keywords: *Steven Holl, Residential Projects, Sustainable Architecture*

INTRODUCTION

1.1. *Steven Holl, world-famous American architect*

At the age of 73, Steven Holl is still active, with offices in New York and Beijing. He is one of the world's leading American architects and has received numerous awards. Steven Holl was born in 1947 in Bremerton, Washington. Holl graduated from the University of Washington and studied architecture in Rome, Italy, in 1970. He then enrolled in AA school and also started his design activities. Steven Holl is an architect who cares deeply about the process and ideas that go into his work. The thinking of the phenomenologist Merleau-Ponty influences Steven Holl's design approach. Many works fuse the history and culture of each land, and they have geometric and characteristic shapes. Sketching is done at the beginning of the DesignDesign, and studies are done with 3D modelling tools and models. Using both a sketching approach and state-of-the-art digital tools, architecture with geometric shapes is created over time—rice field. Holl holds lectures and exhibitions all over the world, and in recent years there was an exhibition covering

past works in Japan. The classes and exhibitions were opened to the public from November 18, 2019, to January 18, 2020, when Steven Holl's MAKING ARCHITECTURE was held at the Archi-Depot Museum. Holl actively promotes his activities and emphasizes expressing design concepts in his own words. As shown in Figures 1,2, and 3, it is Steven Holl MAKING ARCHITECTURE exhibition.

Figure 1. Steven Holl making architecture exhibition

Figure 2. Steven Holl making architecture exhibition

Figure 3. Steven Holl making architecture exhibition

1.2. *Phenomenal architecture*

Architectural phenomenology is the philosophical study of architecture as an activity, like spatial experience. Architectural phenomenology, in contrast, is an intellectual and aesthetic movement within architecture that developed from the early 1950s to the late 1970s and 1980s and continues to this day. With its emphasis on architecture as human experience, architectural phenomenology stood in contrast to the anti-historicism of post-war modernism architecture. It helped historic buildings mark an essential turning point for many contemporary designers. It was a challenge to modern architecture that resulted in post-war postmodern architecture for the emphasis on history.

Regarding the development of phenomenology in architecture, American architects first began to study phenomenology in the 1950s at Princeton University under Professor Jean Labatut.

Speaking of Europe, the Milanese architect Ernesto Nathan Rogers advanced European architectural phenomenology through his influential editing of the magazine CasabellaContinuità. He collaborated with the philosopher Enzo Paci to influence a generation of young architects, including Vittorio Gregotti and Aldo Rossi.

By the 1970s, the Norwegian architect Christian Norberg-Schulz had been significantly influenced by Martin Heidegger's lore ontology. "Genius loci: towards a phenomenology of architecture (1979) Christian Norberg-Schulz was an essential reference work on architectural phenomenology for many

architects in the 1980s. In particular, the combination of text and images in the book makes it easy to illustrate how an architectural theoretical approach can be translated into DesignDesign.

Norberg-Schulz spawned a broad generation, including his successor at the Oslo School of Architecture, Thomas This-Evensen. In the 1970s, under Dalibor Vesely and Joseph Rykwert, the school became a training ground for several architectural scholars, including David Leatherbarrow, professor of architecture at the University of Pennsylvania. As the phenomenology of architecture became more established in academia, it influenced a more comprehensive range of fields.

The phenomenon of architecture has been a central or popular research topic in phenomenology; famous modern architects such as Daniel Libeskind, Steven Holl and Peter Zumthor were influenced by Juhani Pallasmaa ‘s phenomenology thinking and considerations. In recent years, the phenomenological orientation in architectural thinking has been strengthened by the work of a new generation of young scholars who have architecture as their major.

1.3. *Previous studies*

There are some studies about Steven Holl's architecture. This study focuses on the topic of design methodology. Eiko Tajima's research on the Design Method of Steven Holl: Through the Analysis of His Watercolor Sketches also concentrate on design methodology, primarily watercolour sketches.[1] And Koichi Konishi and Asao Inoue's Research on Stairs in Houses Designed by Steven Holl: Through the Comparison with Le Corbusier, Mies, Wright and Aalto focused on the residential work's DesignDesign compared with some great master architects.[2] Research on the architecture of Steven Holl has been actively conducted since 2000. In addition, there are many papers on design methods and those focusing on residential works.

As an example of research on production intentions, research on Isamu Noguchi can be mentioned. It is A study on the purpose of work as to Isamu Noguchi's garden. The case of Gardens for UNESCO.[3] This study reveals the essence of the landscape in Noguchi's architectural production activities. Placing Noguchi's work in a historical position and focusing on the work that was a turning point in production clarified the new modelling philosophy that Noguchi pioneered.

1.4. *Purpose of research*

This study aims to clarify the establishment of a theoretical framework for Steven Holl's design philosophy and the formative typology of phenomenological architecture. As shown in figure 2, it is Country with works of Steven Holl. And Holl has many jobs in the world. This study will be structured using discourses of Steven Holl's design philosophy. It will also clarify the position of design philosophy about global environmental considerations, as environmentally friendly architecture will become essential in the future. Steven Holl is well known as an architect who adopted phenomenology, and I will classify the forms of Steven Holl's distinctive architecture using the axis line in the external form. As shown in figure 4, it is Country with works of Steven Holl.

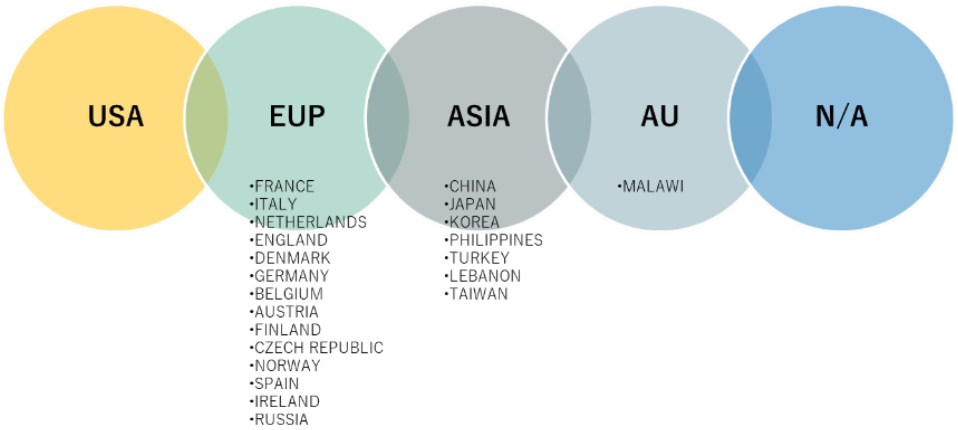

Figure 4. A country with works of Steven Holl

THEORY / RESEARCH METHODS

This research aims to clarify the design framework of distinctive architecture. It will deepen knowledge of the relationship between formality and architectural philosophy in the architecture of Steven Holl, which is in the category of unique architecture.

This study will use books to analyze the discourse on the design philosophy of Steven Holl. This study will examine the axis line of his residential works to analyze the external form.

Since the phenomenon housing project is an important research topic in phenomenology architecture, this study will classify the outer shape using residential works and clarify its characteristics. For the analysis of the external body, the axes are classified according to the formation of the axes that form the outer shape using drawings.

RESULTS AND DISCUSSION

1. Design process

2.1 Design flow at each stage of DesignDesign

This chapter describes the scheme of the phenomenal architectural Design of the Holl. In addition, this study will consider the essential components in the Design of Holl using a framework. Holl started design activities when he was a student, and at first, he was active in the United States and gradually expanded his field of action to the world. Holl sketches and expresses his ideas in the first stages of his

DesignDesign. It is Holl's daily routine that he sketches every morning. Graphics are critical to Holl, and his unique geometric shapes come from drawings first.

As shown in figure 5, it is Changes in the number of residential works and central chronological tables. Steven Holl was born in Bremerton, Washington, the United States of America, in 1947. He graduated from the University of Washington and studied architecture in Rome in 1970. Steven Holl is considered one of the most influential architects in The United States of America; Holl is known for his unique and original concept design of each project, taking advantage of the unique land characteristics of each task due to the way light is brought into the space and his artistic expressiveness. He specializes in projecting into contexts of historical and historical significance and has enhanced his architectural thinking with numerous works. Steven Holl has been awarded the most prestigious award in architecture. Since 2000, he has won the 2014 Premium Imperials, the 2012 AIA Gold Medal, the RIBA 2010 Jenks Award, and the BBVA Foundation Frontiers of Knowledge Awards (2009) for the first time in history.

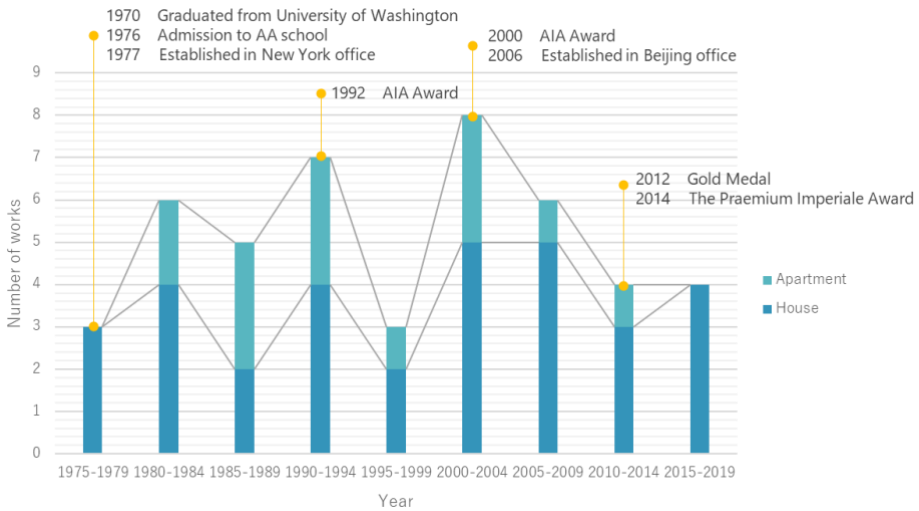

Figure 5. Changes in the number of residential works and central chronological tables

2.2 Design structure and components

Holl has spoken in his own words about ideas in exhibitions and interviews. Holl is known to have been influenced by the French philosopher Maurice Merleau-Ponty. The influence of Maurice Merleau-Ponty created porosity, an essential element in his story of architecture. Porosity consists of three different items: literal porosity, phenomenological porosity, and urban porosity. Ideas are constructed based on these concepts, expressed as watercolour sketches, and designed. Literal porosity is a primitive model of

architecture. Light is mainly used as an essential architectural material, and the volume of light is formed by the film, holes, and porosity.

It also defines the porosity of time and proposes that the experience changes with time and that the viewpoint moves depending on the architectural space.

These ideas are also applied to city planning. The idea is to scale down a huge city plan in the same way as when designing architecture. As shown in figure 6, it is the Design structure and components.

As they show, it turns out that there is a phenomenological process of thinking at the root of the Holl design, among which light is seen as symbolic.

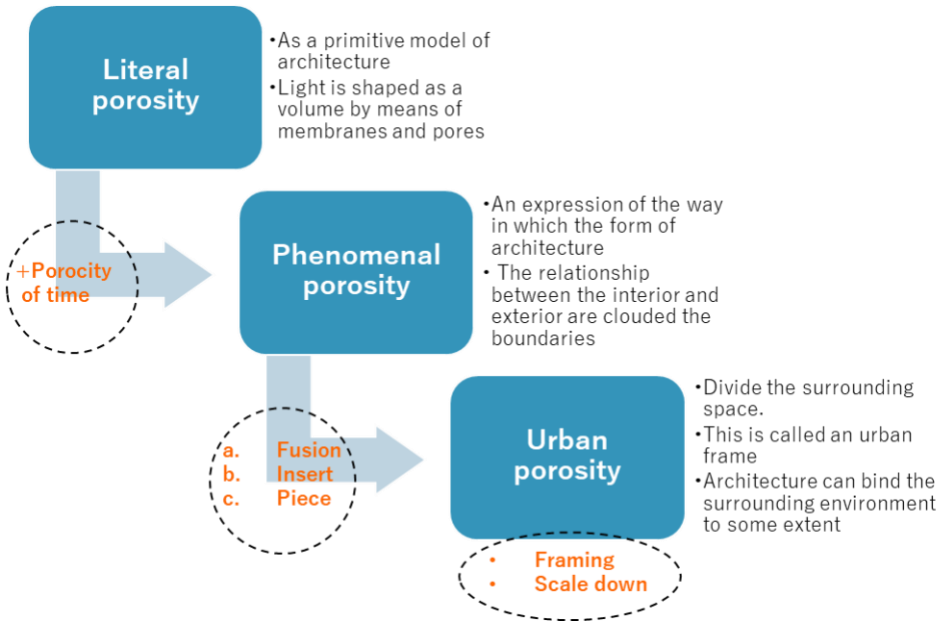

Figure 6. Design structure and components

2. Classification of outline figures

3.1 Research subjects and procedures

To analyze the axis line of the external form, the first step is to trace the drawing and draw the axis line along the outdoor building wall. The exterior outline is then created and classified according to the intersection of the axis lines. Table 1. shows the research target of axis lines analysis.

The figures used in primary geometry, that is, figures such as squares and circles, can be important not only to be constructed as a play of modelling but also to embody the designer's design philosophy. In this chapter, this study will analyze the floor plans of Steven Holl's residential works. This study will extract and classify the figures that make up the outer shape and main space in the floor plans of each house. It was subjected to trace in CAD; after conducting an outline, this study performs the types of graphical features. As

shown in figure 7, it is Procedure to analyze the floor plans of Steven Holl's residential works.

Table 1. Research target of axis lines analysis

No	Name	Year	Site
1	Steet to House	1991	USA
2	Tower of Silence	1992	USA
3	Imposition Villa	1992	Netherland
4	Y House	1999	USA
5	Little Tesseract	2001	USA
6	Oceanic Retreat	2001	USA
7	Writing with Light House	2004	USA
8	Nail Collector's House	2004	USA
9	Planar House	2005	USA
10	Turbulence House	2005	USA
11	Sun Slice House	2005	Italy
12	Porosity House	2005	USA
13	Swiss Residence	2005	USA
14	T Space	2010	USA
15	Daeyang Gallery and House	2012	Korea
16	Ex of in House	2016	USA
17	Space T2	2016	USA
18	Planar Villa	2017	USA
19	Horizontal House	2017	N/A

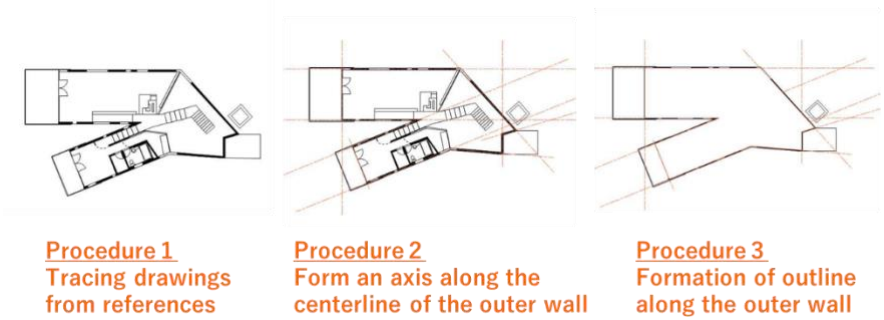

Figure 7. Procedures to analyze the floor plans of Steven Holl's residential works

3.2 Conclusions of the floor plans of Steven Holl's residential works

This chapter describes the features of the outer shape of the house in the floor plan. An outline was created based on the research subject, and the axis was analyzed.

The results are shown in Fig. 8. Conclusions of the floor plans of Steven Holl's residential works.

Euclid was the first to deal with the geometry of continuous planes in an axiomatic way. The basis of visual image processing is the extraction of the edges of an object, but the advantages of an object correspond to the lines defined by Euclidean geometry.

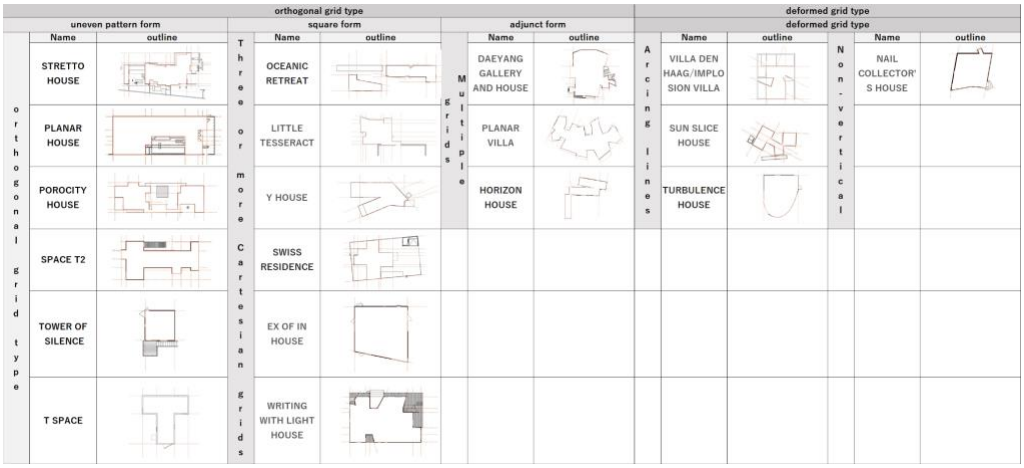

Figure 8. Conclusions of the floor plans of Steven Holl's residential works

The lines that make up the outer shape are orthogonal to each other, and the figure with the orthogonal grid is the orthogonal grid type. The non-orthogonal grid is the modified type. It is classified into three types: uneven type, square type, and additional type. The variable type is composed only of orthogonal grids and forms an outer shape like a collection of rectangles. Square shapes have three or more orthogonal grids. It is characterized by using it. It is also characterized by forming sloping sides in addition to the orthogonal grid. The additional type shall have a shape in which two or more square figures are combined. Next, the deformation Regarding the class, there are two deformed types, the oblique side type and the circular type. The diagonal side type is a figure composed of only the slanted sides. The circular type has a grid that draws an arc. The circular type If a grid draws an angle, it is classified as a circular type regardless of whether there is an orthogonal grid.

In summary, the figures that make up the plan view outline are classified into two types, the orthogonal grid type and the modified type, and finally, they can be classified into five types as feature types. The figures are uneven, square, additive, diagonal, and circular. As shown in figure 9, it is the Classification of the outer shape. Finally, it could be divided into five types as Classification.

Type	orthogonal grid type			deformed grid type	
Form	uneven pattern form	square form	adjunct form	hypotenuse form	circular form
Figure					
Example	SPACE T2	EX OF HOUSE	HORIZONTAL HOUSE	NAIL COLLECTORS HOUSE	TURBULENCE HOUSE

Figure 9. Classification of the outer shape

3. Proposals for sustainable architecture

4.1 External features in phenomenal architecture

Architect Steven Holl is one of the leading architects in the United States. He has left many works, from large-scale architecture to housing. He left a lot of watercolour sketches before designing, and this design process is exciting. It is essential as a process to put his concept into shape.

There is a philosophy of distinctive architecture that Holl shows as the basis for these graphic features, and their framework will be explained in the next chapter. As shown in figure 10, it is an External feature in distinctive architecture. Holl's residential works that adopt such a design method generally show two external components, and when subdivided, five elements appear.

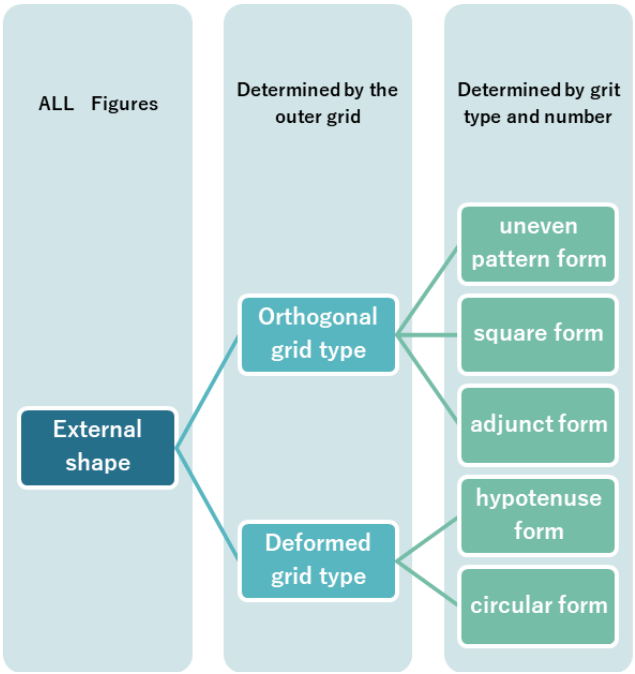

Figure 10. External features in phenomenal architecture

4.2 Design methodological framework

A discussion of Holl's discourse revealed the framework of Holl's design philosophy. Holl has come up with a strong concept that architecture is an art since he began his design work, but he is trying to contribute from the field of architecture to create a sustainable society. When choosing building materials, he tends to select materials calculated from the region and suitable for the climate. The keyword "environmentally friendly" has been added to Steven Holl's architectural works, which are expected to play an active role worldwide. Equations should be centred and numbered with the number on the right-hand side.

Also, as a characteristic tendency, bamboo has been used as a building material in architectural works after 2000. This study plans to use a bamboo frame to make the exterior and space using bamboo as the interior material. Which building material to use depends on the area's climate, but we are challenging to use building materials such as bamboo that have not been selected so far. As shown in figure 11, the design methodological framework.

In this way, by interpreting the architecture of Steven Holl from the word porosity, we can see that there is a single line in various spatial expressions. While inheriting the architectural methods from the modern era, the trend of Steven Holl, who presents the present in a new form, must continue to be watched by the world. As shown in figure 12, it is DesignDesign based impact.

The deciding power of modelling for Holl derives from phenomenological architecture, but the opposite approach can also be confirmed. It has an environmental aspect and consists of three parts.

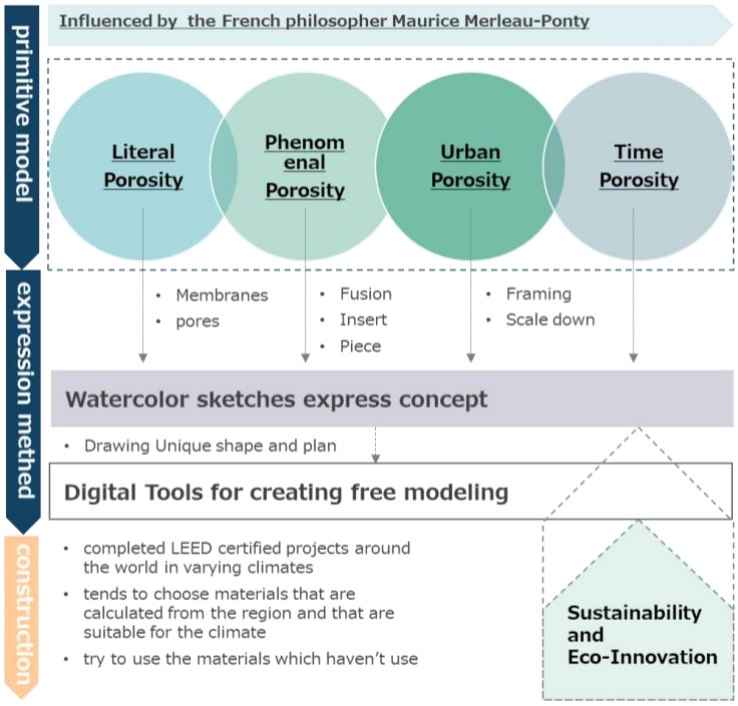

Figure 11. Design methodological framework

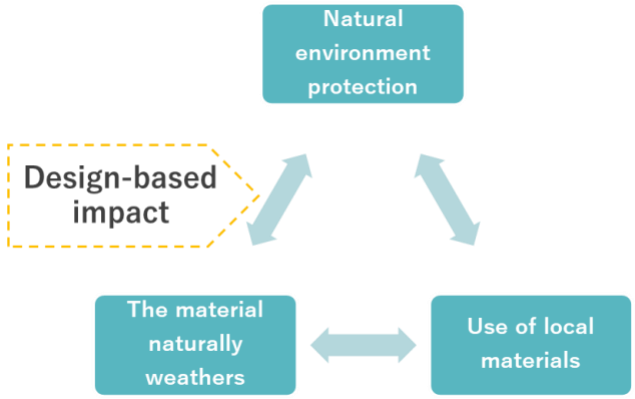

Figure 12. Design based impact

One is the attitude toward protecting the natural environment, the second is the use of local materials, and the third is the love for the weathering of raw materials. These environmental considerations are beginning to permeate as a basis for DesignDesign. In addition, he numerically evaluates the environment, such as LEED, and emphasizes that his architecture is a design aspect and an environmentally symbiotic architecture. Based on the above, this study considered the characteristics of the outer shape and the design philosophy of distinctive architecture.

CONCLUSIONS

This research was conducted on the architectural work of Steven Holl, a world-famous American architect who is also active in Asia, such as Japan and China. Five features of the outer shape were discovered, and the framework of the design philosophy was clarified. Most of the houses in the Holl are designed in the United States, and there is a clear difference between the housing design in Europe and the United States and the housing design in Japan from the viewpoint of climate and culture. There is room for advanced housing research on the formability of housing design in Japan. Since it is not enough to analyze the representation of the plan view alone to grasp and examine the peculiar shape of the Steven Holl, it is necessary to conduct a more detailed and accurate investigation using the cross-sectional view and elevation view in the future. Regarding the relationship between modelling characteristics and spatial characteristics, it is necessary to carry out multifaceted continuous research using VR.

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