1. INTRODUCTION

1.1 Purpose
This paper is to discuss the architectural sensibility that focuses on a qualitative correlation between places and bodies from the viewpoint of Kansei philosophy [1] by looking at one of the Modern architects, Le Corbusier (1887-1965). Our primary research goal is to examine the process of how his senses, as an architect, acquired through his journey, affected the idea of “roof garden” in Modern architecture.

Le Corbusier wrote his body experiences in the issue “Journey to the East” (Voyage d’Orient, 1911) before he began working as an architect. It closely related to his architectural theory, later advocated as “5 points in the new architecture” (“Les 5 points d’une architecture nouvelle”, 1926) which was based on the “Dom-Ino” (1914), a framework of columns and flat slabs.

Le Corbusier wrote his body experiences in the issue “Journey to the East” (Voyage d’Orient, 1911) before he began working as an architect. It closely related to his architectural theory, later advocated as “5 points in the new architecture” (“Les 5 points d’une architecture nouvelle”, 1926) which was based on the “Dom-Ino” (1914), a framework of columns and flat slabs.

In fact, Le Corbusier’s concepts of “wall” and “roof” can be seen in “Journey to the East” [2, 3]. On the other hand, we can also predict that “roof gardens” (“toit jardin”) (Fig. 1), one of his architectural theory in “5 points in the new architecture”, has also been inspired by “Journey to the East”.

Thus, in this paper, I clarify the changes of the concept from “garden” to “roof garden” by comparing “Journey to the East” with gardens that he produced.

1.2 Method
We compared the concepts of “garden” and “roof garden” by following the method applied in analysis of a “wall” and a “roof” [2, 3].

As the primary source for analyzing “Journey to the East”, we used Journey to the East [4] (Voyage) which Le Corbusier himself described his experiences of the trip. On the other hand, we used Le Corbusier & Pierre Jeanneret Œuvres complètes, vols.8 [5] (Œuvres) as the primary source for analyzing the theory of Modern architecture in Le Corbusier’s architectural works. From these primary sources, we extracted descriptions of “garden” and arranged the contents of descriptions with KJ method to extract themes [18]. Finally, we have considered about Kansei of Le Corbusier by comparing Voyage and Œuvres with the themes.

1.3 Reviews
There are many researches about analyzing the descriptions and sketches of Le Corbusier’s “Journey to the East” and his other journeys such as Italy, India, and America.
As a representative research, there is an analysis of trip experiences, which theoretically influenced Le Corbusier’s later design of architecture. There are also analyses of the reference system to an architectural design of historic buildings, which he found in a Journey [6-9].

Moreover, some studies analyze the formation of Le Corbusier’s self-formation through the empirical researches on the Journey itinerary and records [10-13]. These researches are comprehensive argument for conceptualizing and internalizing what Le Corbusier experienced on his journeys. In a word, they are inquiries about the formation of his intelligence.

Comparing with these researches, this paper focuses on the differences between *Voyage* and *Œuvres* as a methodology by referring to the architect’s sensibility that occurs when architect’s physical journeys are converted into the architectural concepts.

Furthermore, some studies referred to Le Corbusier’s “garden” as the history of gardens [14-17]. However, these studies only mention the style of garden.

### 2. EXTRACTION OF THE THEMES FROM VOYAGE

By extracting descriptions of the “garden” from primary sources, contents of the descriptions are sorted by the KJ affinity diagram method [18] as a brainstorming or a consensus building. In this paper, the KJ method was held by three researchers to categorize the descriptions in reference to the elemental similarity. At the time a decision varies in the researchers, discussions were held to clarify its propriety. When the judgments agreed, the KJ methods was conducted from the beginning again. This process was held until three researchers agree on all judgments of entire descriptions.

As a result of conducting the KJ method, descriptions of “garden” written by Le Corbusier in *Voyage* were categorized in three themes: “material” — focusing upon the garden plantings and the materials, “composition” — focusing upon the composition of material components in a garden, and “form” focusing upon the layouts of the garden in the building (Fig. 2). In the same way, diagrams of KJ method in *Œuvres* converged on the three themes and show an approximation to themes that was extracted from *Voyage* (Fig. 3).

### 3. ANALYSIS OF THE THEMES

#### 3.1 Description about “Garden” in Voyage

The descriptions of “garden” made by Le Corbusier in *Voyage* are confirmed mainly during the period of journey from Turkey to Atos (Fig. 4, Table 1). The subjects excerpted from *Voyage* are summarized in the following chapters [20].

#### 3.1.1 Material

The descriptions about “material” mainly concern on folk houses and Le Corbusier minutely describes soils, trees and flowers in the gardens. Moreover, he pays attention to natural architectural materials such as stone
plates, and minutely describes these materials in relation to the ambient environments.

### 3.1.2 Composition

Regarding “composition”, Le Corbusier describes geometric gardens of palaces and monasteries. In addition, he also analyzes customs and cultures in the folk house gardens and describe non-geometric gardens that adopted the natural environments peculiar to its land.

### 3.1.3 Form

Regarding “form”, Le Corbusier aimed at various kinds of architectures such as palaces and monasteries. He focuses on the styles of conventional gardens such as “courtyard (cour)” and “front garden (jardin, parvis)” and describes the sceneries peculiar to the lands and the relationships between architectures and environments.

### 3.2 Description about “Garden” in Œuvres

#### 3.2.1 Material

Similar to the descriptions in Voyage, descriptions of soil, trees, flowers and natural architectural materials are confirmed. In addition, Œuvres includes the descriptions of water and new architectural materials, which he adopts as a Modern architect.

**1) Natural fabric**

In the 1920s, in the early stage of his architectural productions, descriptions of slates are confirmed mainly in relation to gardens of houses. Le Corbusier referred to natural architectural materials as a factor in material to produce natural environments.

“Two hundred meters above it lie the spacious roof-gardens of these office-skycrapers, planted with spindle berries, thuylas, laurels and ivy. They are gay with beds of tulips or geraniums and the herbaceous borders of bright-eyed flowers that wind along their stone-flagged paths” [5] “Plan Voisin, 1925”.

However, after the 1930s, descriptions of natural architectural materials are not confirmed even though he continually had adopted the natural materials.

#### 2) New construction material

Le Corbusier had proposed a system of mass-production structure using “Dom-Ino, 1914” during his early career as an architect, and had started many projects using new architectural materials called Reinforced concrete (Béton armé) (Fig. 5). Hence the descriptions focusing on the new architectural materials, which were focused from earlier on his architectural productions, are confirmed mainly in housing.

As typically represented in Le Corbusier’s description of “Maison Citrohan, 1920”, he produced the homogeneous texture in quality without rationality by applying the uncovered new architectural materials for floor slabs.

“Only the cutting reveals the standardized floor structure according to a very clear formula about reinforced concrete. This first small house with ‘roof garden’ and structure in series, will be the key to research that will be spread along the following years” [5].

However, in the late 1930s, they focused more on natural materials, which covered new materials. Despite the fact that reinforced concrete structure was adopted in many buildings, records of new building materials do no longer appear.

#### 3) Soil, Planting

The records of soil and planting can be found throughout building productions. They are indicated in records on various buildings such as residential buildings, public facilities and monasteries.

Referring the typical record in the 1920s that described “Villas La Roche-Jeanneret, 1923”, soil and plants have been used for skeleton protections.

“turtles wander quietly; trees were planted: cedar, cypress, euonymus, okubas, China laurels, privet, tamarinds, etc..” [5].

![Figure 5: Roof Garden at the “Maisons Lipchitz-Miestchaninoff, 1914”](image)
Even after the 1920s, it is confirmed that the use of soil and planting for skeleton protections have been adopted in entire architectural productions from the description of “Couvent Sainte Marie de la Tourette, 1953”.

“The roof of the convent itself, like that of the church, will be covered with a thin layer of earth left to the vicissitudes of the wind, birds and other carriers of seeds, assuring both water-tightness and isothermal protection. Bell accessible from the roof; this roof is planted in grass which protects the concrete from movement due to extremes of temperature” [5].

4) Water

Between 1920’s and 1930’s on which the beginning of Le Corbusier’s construction work, there were houses that had swimming pools on their “roof garden” although there are no clear written documents. On the other hand, there are some descriptions regarding basins established on “roof garden” of the premises of India where the environmental condition was severe.

A typical record as an example is found in description of “Musee, 1951” in Ahmedabad which shows intention for the skeleton protection and the effect of environmental function.

“It is assumed that visits to the museum will be made particularly in the evening and night-time; they will wind up on the roof which will offer a wonderfully flowered surface formed by more than 45 basins, of 50 m² each, all filled with water to a depth of 40 cm. This water is protected from the torrid sun by the shade of thick vegetation; each basin is strewn with leaves or blossoms floating on the surface of the water, the ensemble forming a checkerboard of blue, red, green, white, yellow, etc… The water of these basins is nourished by a special powder which induces enormous growth, far beyond normal plant size” [5].

On the other hand, thought the models of “Unité d’Habitation de Rezé, 1952” and “Unité d’Habitation de Berlin, 1956” shows that a geometrical roof garden was also projected (Fig. 7) after 1920s.

“I have decided to make beauty by contrast. I will find its complement and establish a play between crudity and finesse, between the dull and the intense, between precision and accident” [5].

This means that “managed roof garden” was adopted in the entire building production activities regardless of cities or suburbs, and in the latter term, it aimed at artificial space structure by arranging a sculptural form.

2) “Non-managed Roof Garden”

There are no records of “non-managed roof garden” (“toit jardin laissé à l’état sauvage”) in the articles written in the 1920s but descriptions is found after the 1930s,

3.2.2 Composition

While Le Corbusier focuses on “geometric garden” and “non-geometric garden” in Voyage, he does not refer about the construction of ground-level gardens. He rather refers to the “roof garden” in Œuvres and theorizes the construction regarding manners of planting in two techniques such as “managed roof garden (toit jardi surveillé)” and “non-managed roof garden (toit jard laissé à l’état sauvage)” [5].
which Le Corbusier subjects the residential houses in the cities and suburbs.

For instance, there is a description about his expectation to the ecological life living things to settle in the roof garden, as described in “Immeuble Nungesser et Coïl - Appartement L.C., 1933”.

“A neglected garden reacts, it does not let itself die. The wind, birds and insects provide seeds. Some find their supportive environment. The roses have rebelled and have become very large rose hips. The lawn has become grass, cynodon. A cythise was born; a fake sycamore. Two sprigs of lavender have become bushes. The sun is controlling as well as the wind (up there). Plants and shrubs are moving and settling at their leisure, according to their needs. Nature has reasserted itself. Since that time, this garden is left to its fate. Nobody ever touches it; mosses cover the earth, the earth becomes depleted, but their vegetation find their way ... “ [5] (Fig. 8).

3.2.3 Form

In addition to what Le Corbusier took particular note of in Voyage, Œuvres shows descriptions about the traditional garden forms such as “courtyard” and “front garden”, and his interests about “hanging garden” and “roof garden”

1) “Courtyard”, “Front Garden”

The records on “courtyard (cour)” and “front garden (jardin)” can be seen in residential buildings built in the 1920s and after. Le Corbusier left a record that focused on the relationship between “courtyard” and buildings, and also on views from “courtyard”, such as “Dortoir du (Palais du Peuple), 1926”.

“By covering this neglected field, was left free to meet the new dormitories and in front of the old dormitories of the People’s Palace, a sunny garden and vast areas of the Goblins” [5].

Similarly, a description of Paris from the “Villa Meyer, 1925” suggests that views from garden are the main subject of “front garden (jardin)’”.

“This garden is not ‘à la française’ but is a sausage grove where the groves of St. James Park make you believe that you are far away from Paris” [5].

After 1920’s, “court yard” and “front garden” was planned on construction works such as public buildings and residential buildings, but it was hardly seen as a direct description.

2) “Hanging Garden”

Many indications about “hanging garden (jardin suspendu)” which were provided in the space around the middle level of the residential buildings are frequently used in the 1920s (Fig. 9).

A typical indication is described in “Immeubles-villas, 1922”.

“with hanging gardens, each apartment is in reality a small house with garden, located at any height above a floor” [5].

In addition, the importance of “hanging garden” is suggested by showing their relations to courtyards in “Villa Stein/de Monzie, 1926”.

“By establishing a roof garden, we put away the expansion of the concrete slab. In winter, the garden insulates from the cold. The garden is a logical complement to the flat roof” [5].

However, after the late 1930s, descriptions of “hanging garden” were no longer found.

Le Corbusier has indicated “Un immeuble à Alger, 1933” as

“our shading proved ineffective and should be replaced by blades: this time vertical and arranged perpendicularly (a) or obliquely (b) to the front, the whole being arranged by the orientation of the facade. The screens thus created were a significant architectural extension, a kind of balcony or loggia” [5].

Thus, “hanging garden” accompanying brise soleil, which is a shading device, had gradually integrated, and it soon had become a projecting type of “loggia” (Fig. 10).
3) “Roof Garden”

The “roof garden (toit jardin)” is consistently adopted in the diverse building productions such as residential buildings, public facilities and monasteries. In the early building production era of the 1920s, as the typical form is seen in “Appartement de Beistégui, 1929”, Le Corbusier measured to break off confused surroundings in the urban areas by raising parapets higher.

“The solarium. If we stand on our feet, we can not see anything except the grass, four walls and the sky, with the blissful clouds’ movement” [5].

On the other hand, he intends to integrate natural environment and architectures from views of “roof garden”, as indicated in “Villa cook, 1926”.

“The reception is at the top of the house. On sort directement sur le toit-jardin d’où l’on domine les vastes futaies du Bois de Boulogne; We are not in Paris anymore; we feel like in the countryside” [5] (Fig. 11).

Even in the late 1920s, views, as a main subject, had been pursued. However, a new form that is mainly apartment buildings has been created by integrating a form of “front garden” and “courtyard” with of “roof garden”. In “Roq et Rob, 1949”, “roof garden” were projected on stepwise shape apartments facing the Mediterranean sea.

“In order to have the benefit of its climate and its superb outlook. The first task is to ensure a good view over the best of the countryside; moreover the country, which is to be seen, must be preserved and not built over in a haphazard fashion. The houses are crowded together but all have eyes (windows) towards the infinite horizon” [5].

In addition, the stepwise shaped residential terraces were purposefully called “roof garden”, and it obtained the views peculiar to surroundings, which he so far focused on “front garden”.

At the same time, he also refers “Unity is the source of beauty (L’unité est source de beauté)” [5] and “Integrating with landscape (Intégration dans le paysage)” [5] to indicate that he focused on the views from “roof garden” and a harmony of external landscape of buildings with surroundings (Fig. 12).

4. RESULT (Table 2)

The descriptions shown in Voyage by Le Corbusier were able to be extracted as three themes such as “material”, “composition” and “form”. In these themes, he focuses

<table>
<thead>
<tr>
<th>Table 2: Comparing Voyage and Œuvres</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material</strong></td>
</tr>
<tr>
<td>Natural Fabric</td>
</tr>
<tr>
<td>Soil, Planting</td>
</tr>
<tr>
<td>New Construction</td>
</tr>
<tr>
<td>Soil, Planting, Water</td>
</tr>
<tr>
<td><strong>Composition</strong></td>
</tr>
<tr>
<td>Geometric Garden</td>
</tr>
<tr>
<td>‘Managed Roof Garden’</td>
</tr>
<tr>
<td>‘Non-managed Roof Garden’</td>
</tr>
<tr>
<td>Non-geometric Garden</td>
</tr>
<tr>
<td><strong>Form</strong></td>
</tr>
<tr>
<td>Courtyard</td>
</tr>
<tr>
<td>Front Garden</td>
</tr>
<tr>
<td>‘Hanging Garden’</td>
</tr>
<tr>
<td>‘Roof Garden’</td>
</tr>
</tbody>
</table>

Positive Aspects of Journey
Negative Aspects of Journey
Ambiguous Aspects of Journey
on the relationship between sceneries particular to the land and the surrounding environments. Similarly, from the theme related to the “roof garden” of Le Corbusier’s shown in Œuvres, the same three themes of “materials”, “composition” and “form” are extracted.

For “material”, Le Corbusier had used the reinforced concrete during the 1920s to adopt the homogeneous texture excluding locality. Along with this, he also focused on the effects on skeleton protection created by covering not only the new architectural materials but also natural architectural materials, which he focused in Voyage, such as soil and plants.

On the other hand, after the 1930s, descriptions of the natural and new architectural materials are not confirmed. Although descriptions of soil, plants, and water — not referred in Voyage — are confirmed and are considered to increase remarkable effects of skeleton protection.

Regarding “composition”, Le Corbusier had made projects of “managed roof garden (toit jardin surveillé)” in the urban areas in the 1920s to create a geometric roof garden. However, descriptions of non-geometric gardens as referred to in Voyage were not confirmed.

Moreover, after the 1930’s, he studies about the relationships between building and its surroundings environment. He theorized “managed roof garden” and “non-managed roof garden (toit jardin laissé à l’état sauvage)” that is detected as pre-Modern relationships with the surroundings in Voyage.

Regarding “form”, he intended the view of the surroundings by describing the “front garden” and the “courtyard” in Voyage in the 1920 and the “hanging garden” and the “roof garden” in Œuvres.

Furthermore, since the 1930s, the “hanging garden” has been dissolved to form a loggia, thus any descriptions have not been observed thereafter, “courtyard” and “front garden” as focused in Voyage were not simply denied but have fused into roof gardens and eventually converged only into the “roof garden”.

As a result of analysis, Le Corbusier had grasped almost both affirmative and negative perspective of the “Journey to the East” throughout his architectural productions.

5. DISCUSSION

As mentioned above, the “roof garden” which Le Corbusier theorized included the concept of the traditional “garden” that he found during the “Journey to the East” in early stages of his architectural career.

On the other hand, during Le Corbusier’s Journey of his beginning of architecture plan indicated in “wall” and “roof”, he thought negative about the “Journey to the East” in the first half of his life, but he understood the Journey by both aspects, negative and positive, in the latter half [2,3]. However as for “garden”, the regard of Le Corbusier included the affirmative element from the start. That is because the “garden” which differed from a “wall” and a “roof”, could contain natural elements, the total denial of which was therefore difficult. Along with the innovative architectural structures, the most effective with which to combine natural elements was the “roof garden” for Le Corbusier.

In fact, in contrast with techniques of “wall” and “roof” to be developing variously onwards to the latter half of his architectural career, the “garden” proceeded to aggregate the landscape of the “roof garden” using traditional materials and compositions.

6. CONCLUSION

In summary, the process that the “Journey to the East” transforms into the scheme of architecture is a process in which the scene of “garden” encountered during the Journey intensively replaces by that of “roof garden”. It is not just a simile of reference to a structure of a garden. It is true that a “roof garden” is a denial of courtyard or front garden. However, a “roof garden” is rather an affirmation by indicating the sense that is the fusion of scenic structure with the vast land.

In other word, we can understand that, by proposing the structural frame system of Dom-Ino, scenery on the ground is transferred in a sensitive way into the ambiguous scenery seen from a “roof garden”.²

REFERENCES


² Le Corbusier pointed a roof garden as “new ground (un sol nouveau)” in his writings Three human structure (Les trois établissements humains) (references. 19)