

A Study for Flexibility in Dutch Residential Works

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ABSTRACT: The research is aimed at making design methods for the flexible house by analyzing 4 representative house works of Netherland Architect. In the Netherlands for the construction of modern residential architecture in a variety of areas, and the experiment is done, and construction will start on SAR topics in the Netherlands in a variety of modern architecture deployed in the flow. This study is to extract the design characteristics of flexibility from analyzing Dutch residential works. For this purpose, the four housings were selected and design elements like their concepts, elevations, plans, design methods, dimensional system, structure, utilities systems, area, shape of unit, fixed elements and detachable elements, etc.

Keywords: Netherland Residential works, Variability, Sustainable Housing, Design Strategies, Flexible Housing, Urban housing

1. INTRODUCTION

1.1 Purpose of this Study

Up to the present, a type of plane for Korean apartment house has likely been one or two on the same floor space. And beyond the same floor space, with time, the plane with small floor space has the trend of following after the plane type with big floor space, which is being uniform in a type of plane.

It is a supply-centered way of thinking to supply on a large quantity based on the assumption that One plane-One type of life in consideration of average number of residents.

Some construction companies, however, tried an experiment of variableness in recent years and introduced so-called “a Variable apartment” in a new town sale.

With this respect, we will analyze the planning scheme of an advanced variable

housing of Netherland, where there a variable housing theory was started and numerous experiments has been attempted.

The first step, a design concept and a method of approach about construction of variable space customized to the residents of the various each main house. And the second step is to study planned factors of the variable house.

Through housing works of an architect of Netherland, we are to extract viable factors for an ample living space and a building method which is right for Koreans.

1.2 The Contents of the Study

Centred on the works of Rem koolhaas, MVRDV, UN Studio among Netherland architects, four pieces of works showing features of Variability were selected and analyzed in terms of concept of Space and planning factors of Variability. Method of analysis adopted with this is comparative

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analysis of the trend with the contents of case studies to an item.

2. The features of variableness of Netherland Residence Building and the Theory of SAR

While Korean housing type is confined either an apartment or a multiplex house and therefore is limited in designing and in details, a housing of Netherland displays various architectural originality and creativity.

As for an experimental housing in Netherland, it has a long tradition.

The experimental housing program in the year 70s and 80s is to look for a unique solution to an urban housing lot, a type of housing and an external appearance.

This kind of solution appears in the diversity of main building construction and in the variability of plane inside the main house.

And these experimental housing illustrated a role of a display space and became the driving force of developing a new type of housing.

The beginning of variable space was a housing design with the feature of variability applied to the Schroder House of Gerrit Rietveld.

Since then, a full-blown open-housing was initiated by Habraken in 1960
Support: An alternative to Mass housing」.

Since then a variable housing combined open parts with an easy of replacement was being realized with the axis of SAR, a Foundation of building research and Open Building Association, and the participants are not only the system also the residents.

The theory of SAR (Stichting Architecten Research), by introducing Support & Infill System to the building, is a viable concept in which a resident's demand can be reflected to its full and various planes can be produced.

3. FRAME OF STUDY ANALYSIS

3.1 Diversity of Block Combination

A variability in a Space is a space plan utilizing space movement, separation and variable walls and structure with easy of combination. And also it is flexible in that separation, expansion and reduction of a space is possible.

In a broad sense, A variability shown in Netherland is can be interchangeable with "diversity."

Variability of Space extends not only to the inside of the main house, but to the outside and reflects variable life and has an effect on the combination of planes & Public space, an elevation, a mass type and to a complex type.

3.2 Variability of the main house plane.

From the two factors of Support & Infill perspective, it can be divided into fixed space and variable space in the plane inside the main house.

The degree of variableness is varying according to the combination of fullness of Support and Infill in which variableness is possible.

4. CASE STUDY AND ANALYSIS

The study covers the works of the most renowned and active architects with an international fame, Rem koolhaas, MVRDV and UN Studio and also covers a concept, which is made possible variable factors and various residing space ; design and space constitution ,material, method of structure, system of size and a public space .

This study will analyze into focusing concepts of the building composition and factors of the flexibility.

4.1 Outline of the Analysis

As like table I, Analytical Works are 4 representative housing of Netherland Architect.

Table I: Outline of the Analytical Works

Arch.	MVRDV	
Work	SILODAM	SANCHINARRO
Year	2002	2004
Floors	10	22
Units	157	15
Location	Amsterdam, NL	Madrid, Spain
Arch.	UNStudio	Rem koolhaas
Work	Water's villa	NEXUS World
Year	2001	1991
Floors	3	3
Units	48	24
Location	Almere, NL	Fukuoka, JA

4.2 Results of the Research

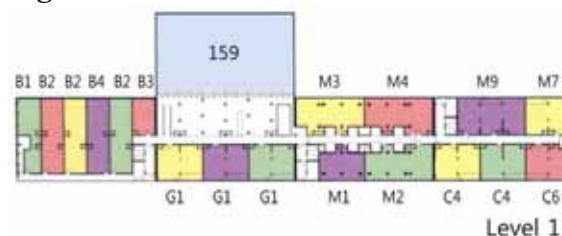
4.2.1 SILODAM, MVRDV

① A Characteristic of the space

A compound building, located on the coast of IJ river flowing through Amsterdam, has 157 rental houses with various spaces like business space, commercial facility and public space. With a special quality of a city is diversity in mind, the city is designed to accommodate a residing function as well as vertical residing space with various complex functions. And it has, as it seen with a various material and colour of elevation and opening formation, a combination of space formation condensed with various urban life and style. (e.g. Fig. 1)

In terms of elevation and space side, the main hall of 4-8 is unified into one style and ended with the same colour and material. And with the hall and passage coloured in a specific colour, each style is made possible to distinguish. And also to give diversity to the main hall, various style of depth, width, structure, story of high is considered. (e.g. Fig. 2, 3) Each factor gives diversity to the main hall. And it shows distinctively a story

and life of a city and a diversity of residing in a stacked elevation.

**Figure 1:** Main Facade

The basic sizes are width 5.4m, Depth 8.75m and the formation of each level with the centre of corridor (2m) and an overlapping figure, combining a half a block, a whole block and diagonal over two floors.

As fixed factor, the space for using water is centralized in the centre. (e.g. Fig. 4)

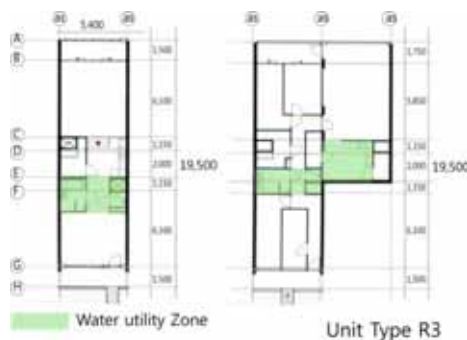


Figure 4: Fixed factor in Plan

Structure applied to wall and column can be in capacity various 157 unit types (see Table II).

Table II : Plan Factor

Width (m)	Depth (m)	Floor Hight(m)
5-15	8.75, 19.5	2.8-3.6

Number of room	Structure
1-5	Wall, Circle column

4.2.2 SANCHINARRO VII, MVRDV

① A Characteristic of the space

A new identity was given to a North-east SANCHINARRO in Madrid, Spain and is designed as a Landmark which expands to the neighbouring areas and a new city.

It is a by far bold approach by classifying various types of residing tried in SILODAM into several communities and combining into one building. The architects created a distinctive silhouette by grouping nine blocks. The articulation of these blocks

is apparent in the exterior palette, equal parts stone, concrete and tile (e.g. Fig. 5)

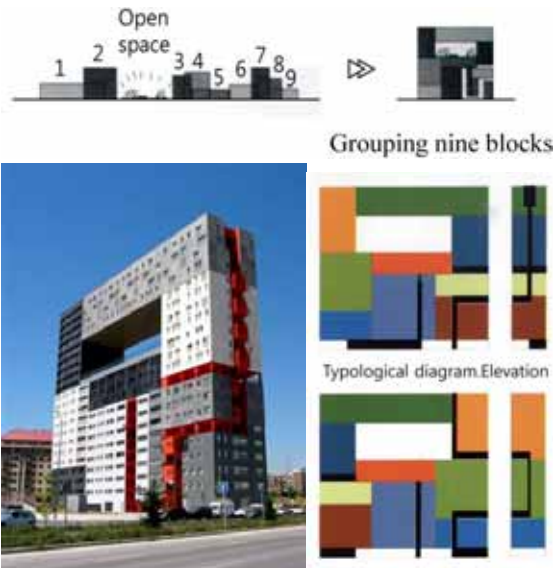


Figure 5: A concept of the building composition

② An analysis of Plan factors

It consists of various types of residing place by combining the over 23,000 m² area of buildings with the residents of different classes.

This building contains wide variety of compact housing types, in total 156 units. (e.g. Fig. 6)



Figure 6: South elevation & Typical Plan

The basic sizes are width 4.83m, Depth 9.1~14.7 m and water use space unit of Elongated column structure is placed on the centre of inside structure and therefore, using the rest of space is free.

Regarding the interior distribution, the maximum flexibility has been sought after, to propitiate, the identification that every

inhabitant must establish with his abode, modelling it to fit his particular needs and the dynamic transformations of our present demands.

Table III: Plan Factor

Width (m)	Depth (m)	Floor Hight(m)
4.83-6.14	9.1, 9.25, 14.7 etc.	2.9
Number of room		Structure
2-3		Elongated column Wall, column

4.2.3 WATER VILLAS, UN Studio

① A Characteristic of the space

WATER VILLAS, built as a part of Housing Expo in the suburbs of Amsterdam Almere, is one of those rarely built on a large scale in the works of UN Studio .

And it consists of detached houses and blocks of clusters. (e.g. Fig. 7)

The houses are made as a package and are considered with the greatest care according to a taste and life style of individual. The packaged of one’s choice can be developed to expand the basic housing type according to one’s demand. As best distinguishing mark, taking up a system style mass method by a standardized and industrialized production method and by giving a maximum individuality, this housing carries a meaning by suggesting a proper consensus between building method and habitability.



Figure 7: Main Facade

② An analysis of Plan factors

The basic unit of plane with a area of 60 m², consisting of two concrete modules, is width-6m, depth- 10m and height- 3m.

According to the number of participants, it could be 120 m² terraced houses and 180 m² duplex apartment. And the overlapping parts can be used as a roof garden or a balcony.

With the space unit of Width 6m, Depth 2.5 m made of steel prefab structure and added in Plug In type on the basic formation.

With facilities in the interior space along with kitchen, bathrooms are fixed and the rest are open plane, which gives maximum flexibility to the residents. As variable factors and by applying variable walls and a structure with easy of space movement, separation and combination, it acquires flexible space enabling a separation of space, an expansion and a reduction (e.g. Fig. 8).



Figure 8: South elevation & Typical Plan

Table IV: Plan Factor

Width(m)	Depth (m)	Floor Hight(m)
6	10	3
Number of room		Structure
3-4 etc.		Steel Prefab Structure

4.2.4 NEXUS WORLD, Rem Koolhaas

① A Characteristic of the space

By avoiding an uniform assembled housing lacking distinction and emphasizing in design and individual sensibility, the Nexus World suggests a next generation urban housing, which is a proposal of urban life and at the same time is a housing with a urban concept for Fukuoka street.

And as one of the solution on “City housing in future”, it is a new urban housing clearly exposing by reflecting individual’s way of life and sensibility on the urban space (e.g. Fig. 9).



Figure 9: Main Facade

② An analysis of Plan factors

A 3- story MAISONETTE type: the #9, 2LDK, 4LDK; the #10, 2LDK, 4LDK, 5LDK and it has a various area of from 155.75 to 321.78 m² (e.g. Fig. 10, 11).

The project consists of twenty-four individual houses, each stories high, packed together to form two blocks. Each house is penetrated by a private courtyard that introduces light and space into the center. The roofs of the domed Japanese cells are covered with glass. Each house offers a variety of spetial conditions and tectonic contrast; enclosed vs. exploding, intimate vs. open, public vs. private, high vs. light, concrete vs. abstract.



Figure10: Site Plan & Interior



Figure 11: Typical Plan(9-113, 4LDK)

Table V : Plan Factor

Width (m)	Depth (m)	Floor Hight(m)
7, 10.5	10, 14	2.9, 3.2, 5
Number of room		Structure
2-5		RC Structure

4.3 A Synthesis of the analysis

Like table VI, Through the four case studies, the diversity of the space formation and variability in the main house are summarized as in the below (see Table VI).

Table VI: Summary of the Analysis

1. SILODAM		3. WATER VILLAS	
Space Formation	A complex residing space with a 4-8 houses arranging in one unified style and arranged vertically space formation and combination condensed of urban various life and form .	Space Formation	Standardized and Industrialized housing with a basic size of 60 m ² and can expand to the size of 180 m ² according to the association.
Flexibility In unit	A fixed space like the water use space and core are centralized. plan combination using regular grid(W5-15m, D8.75m)	Flexibility In unit	With only fixed space of kitchen and bathroom, the rest is open plane for the benefit of residents. Adjustable variable wall installed
2. SANCHINARRO		4. NEXUS WORLD	
Space Formation	Wide variety of compact housing types, in total 156 units.grouping nine blocks. a city square with community space formation, 37m on the ground.	Space Formation	A wide space of more than 150 m ² , provide a courtyard and a terrace of open space with sun, air and also installed with a public and private community (LDK) facility on each level.
Flexibility In unit	Flexibility centred on the water use In unit space, core and fixed factor With the constant Grid (width 5-15m,depth 8.75m), plane combination.	Flexibility In unit	Being emphasized on the privacy, presents a modern life style by introducing open terrace. And in relation to distance and city, it induces interior space expansion.

From a diversity of space formation perspective, Due to the high density of population and individuality, coupled with a insufficient land, a worry and study of “a new type of assembly “was developed from which.

SILODAM and MIRADOR was the results of one of these. And with maximizing diversity of society, housing is being developed into a customized and industrialized according to the taste of individuals.

And the NEXUS WORLD #9 and #10 is a model of ironing out the relation between a futuristic city and a residence.

In terms of the variable side of the plane in the main hall, in the SILODAM and MIRADOR(SANCHINARRO), the water use space is placed and fixed in the middle with a narrow-front-plane type plane is featured.

By consisting of RC Set and Rahmen Set in the type of structure, it can accommodate various types of plane.

With the structure of Water Villa's made of Steel Prefab Structure on the area of 60 m² module plane, a type of wall easy to expand, reduce and vary of the space is applied.

5. CONCLUSION

The keyword shown from the Netherland housing is “diversity.”

Materialization of Diversity is being grouped from various angles and being realized both in terms of Building side-type of building, plane style, a way of approach, material to use and in terms of Urban life side- a way of sale and type of residents.

Findings show that to materialize diversity requires a strategic planning of more than a mixture of various things.

The findings of this study show that the common feature of each calling for a solution for future housing of Netherlander architects are originality, creative housing plane, housing association, complex construction fit for residents’ life and time

In conclusion, a residing building is not a commercial one but a residing place for clearing a path for diversity and respecting privacy. By introducing design techniques and approach method of Netherland to Korea and uniting the techniques of variability, quality improvement of residing space will be realized.

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