ARCHITECTURAL RESEARCH, Vol. 13, No. 3(September 2011). pp. 3-10 ISSN 1229-6163

A Study on Plan Structure Types and Characteristics of Wall Formation in Art Museum Exhibition Spaces

Jong Sook LEE
Lecture, Department of Interior Design, Baekseok Art Univ., Seoul/Semyung Univ., Jecheon,
Hongik Univ. Doctor course Architecture Engineering, Korea

http://dx.doi.org/10.5659/AIKAR.2011.13.3.3

Abstract The Characteristics of space are determined by several factors; however, the element that determines the physical characteristic of floors, walls, and ceiling is the structure. This study constructs a wall to analyze the direct effect that the layout of an exhibition wall has on the element of the wall followed by the structural process and visibility of descriptive analysis and examples of art museums that the shift from a perceptional wall to an experiential wall affected circulation. For elements and formation methods of the wall, first, it is made up of open and closed type exhibition spaces, and it can give abundance in qualitative space rather than a quantitative aspect. Secondly, the directivity of space changes according to the development of the visible axis, thus, directly affects the change in visibility. Thirdly, the difference between spatial structure and visual structure is the difference between the visual axis and spatial structure. The wall formation type followed by the combination method, the simple visible structure, which is the type that possesses the simple combination (Room, Zone, Cluster), repeatedly uses the same size of units of space that is orderly and has few spatial axes and the classification of simple type and simple cluster type, which has few visible axes, also exists. Also, with the complex structure of the maze type it displays the reiterated form of the cluster, which is the space with disorderly combination and has much visible axes and spatial axes. Also, these can be divided into three types: 1) Maze Cluster Type, 2) Cross Road Type, and 3) Open Flexible Type. These wall types lead the various changes in circulation, and even each of the arrangement qualities of the exhibitions should be researched according to its exhibition place type.

Keywords: Attribute of Wall, Combined System, Open-type, Closed form, Direction of Space, Visibility Axes

1. INTRODUCTION

The characteristics of space are determined by several factors; however, the element that determines the physical characteristic of floors, walls, and ceiling is the structure.

Especially the wall is important for the development of space; furthermore, in modern architecture, the idea of the wall is the expanded definition of border.

Therefore, the wall is a component of the architectural structure that one can internally approach from the definition of mass to volume. Also, one can interpret it with keywords such as connection and passage, shifting of direction, surrounding, separation, overlapping, etc. (Fig. 1)

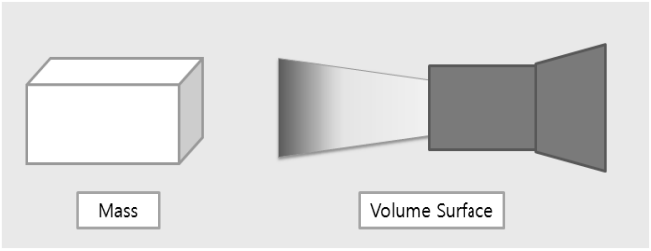


Figure 1. Meaning analysis of component

As the classical cultural facility, art museums are places that have fundamental elements of social education and culture. When classified as artistic, historical, natural, scientific, it belongs to the artistic museum category (Fig 2), and it is a place widely used to communicate information or recreation. It is becoming increasingly popular through the provision of cultural and leisurely opportunities and the increase of profit.

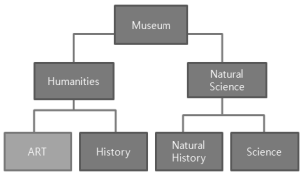


Figure 2. The artistic museum category

The two fundamental functions of exhibition space are perception of space and exhibition. (Fig. 3) The exhibition space is developed in various ways by the wall structure.

Corresponding Author: Jong Sook LEE, Doctor course
Architecture Engineering, Hongik University
Sangsu-dong, Mapo-gu, Seoul, Korea
Tel :+82 2 3474 7439 e-mail: leejsia@nate.com

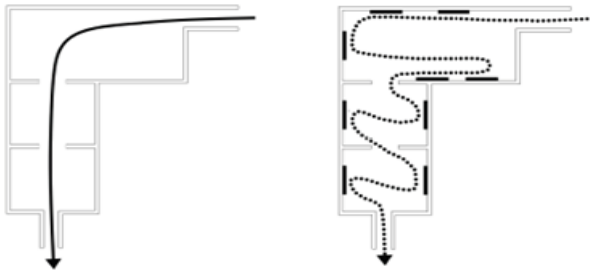


Figure 3. Essential function of exhibition space
Moo ho-Park (2005), "Study on the Correlation Between the Spatial Configuration and Visitors' Movement in Museum", Hong-Ik Univ. 30p

This study constructs a wall to analyze the direct effect that the layout of an exhibition wall has on the element of the wall, followed by the structural process and visibility of descriptive analysis. This study will also present examples of art museums that the shift from a perceptional wall to an experiential wall affected circulation.

The focus of the study is the visual importance and the qualitative evaluation of art museums that center their quality of exhibition on the wall.

First, this study investigates the change of art museums, characteristics of display space and modern art museum wall display, and the significance of exhibition walls.

Secondly, this study descriptively illustrates the comparison between open surfaces and closed surfaces according to its elements and components, the visibility and directivity of space, and the difference between the spatial structure and visual structure in wall construction.

Thirdly, this study arranges the relationship between visibility and circulation according to the different combinations of wall structures.

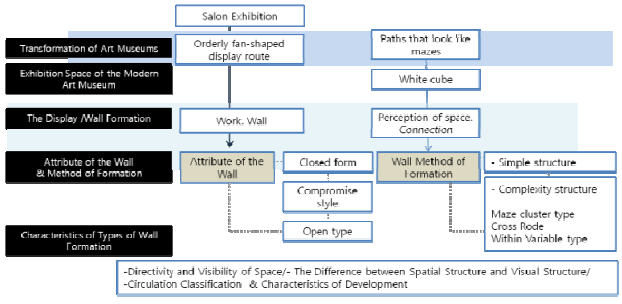
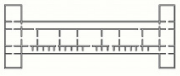
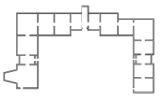
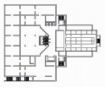
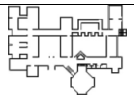
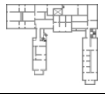
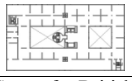
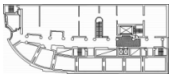
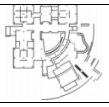
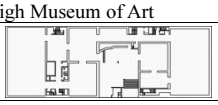
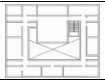
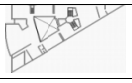
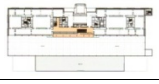
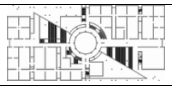


Figure 4. Progress of study

In order to explain these details, this study quantitatively evaluates the axis through the space syntax, analyzes the visibility of openness and isolation through the death map, and analyzes the tracking circulation in the existing thesis.

Table 1. Sample art museum

	
1. Sainsbury Wing	2. Tate Britain Clore
	
3. Alte Pinakothek	4. Neue Pinakothek
	
5. Neue Staatsgalerie Stuttgart	6. Gemaldegalerie, Berlin
	
7. Kunst, bonn	8. San Francisco Museum of Modern Art
	
9. Museum of Fine Arts,Houston-extension	10. Cy Twombly pavilion
	
11. k20 kustsammlung nordhein-westfalen	12. Museum of Contemporary Art, Helsinki
	
13. Neue National Galerie	14. Moderna and arkitektur Museet
	
15. Museu Fundaci Joan Miro	16. Lehnbachhaus Stadtische Galerie
	
17. Beyeler Foundation Museum	18. Yale Center for British Art
	
19. Seattle Museum	20 . Kunst Haus Wien
	
21. High Museum of Art	22. Museum Het Valkhof
	
23. Museum of Contemporary Arts_L.A.	24. K 21 kustsammlung nordhein-westfalen
	
25. MOMA (Museum of Modern Art)	26 Museum Fur Moderne Kunst
	
27. New Tate Gallery of Modern Art	28. Pinakothek Der Moderne
	
29. ABTEIBERG MUSEUM	30. Modern Art Museum of Fort Worth
	
31. Nelson Atkins Museum	32. Stadel Museum

I added the following table, which was classified quantitatively and qualitatively, from a study by a experimenter as a reference for this research process

Table 2. the following table, which was classified quantitatively and qualitatively

1	2006.12	Study on their Exhibition Contents for Presentation Methods in National History Museum KICA JOURNAL15	
		●	Surface area of the exhibition wall, density according to the size of the work
2	2007.10.26	A Study on Display Wall Composition Through Opening and Characteristics Visual Spatial Configuration in Room to Room Museum Proceeding of Conference in Architectural Institute of Korea(Planning&Design)	
		●	Distribution rate of people in each room and number of openings
3	2007.10.31	A Study on the Relationship between the Museum Display Wall-Focusing on the room type art museum KIID JOURNAL,64	
		●	horizontal and vertical development of exhibition space, form of unit space, and structure of space
4	2007.12.31	Analysis on Visual Configuration of an Exhibition Space in Art Museum-Focusing on an Exhibition Space Room to room KIID JOURNAL 65	
		●	Distribution chart of views and VISUAL ISOVIST
5	2007.12.1	A Study on the Wall Composition and Visual Configuration in Virtual Wall Display Space KICA JOURNAL 20	
		●	Lengths of the wall and opening, surface area and structural analysis
		■	Comparison between the difference of visual structure and spacial structure according to opening location
6	2008.10	A Study on The Composition and Characteristics of Wall through Visual Configuration Analtses Journal of the Korean Digital Architectural·Interior Association vol.8 no.2 Serial No. 14)	
		■	Development of the wall according to the height
7	2008.12	A Comparative Study on the Quantitative Analysis of the walls of art Museum KICA JOURNAL24	
		●	Spatial structure according to the number of openings
8	2009.3	A Study on Visitor's Circulation and Visual Configuration of an Exhibition Space in Art Museum KICA JOURNAL25	
		●	Agent counts output data
9	2009.6	A Study on Spatial Attributes and Presentation Methods affecting the Wall Composition of Art Museums Journal of the Architectural Institute of Korea (Planning & Design),v.25 n.06	
		■	Method of combination and development Territorial elements and viewing distance

● Quantitative analysis content
■ Qualitative analysis content

2. TRANSFORMATION OF ART MUSEUMS AND WALL SURFACE EXHIBITIONS

(1) Art Museum with New Concept

As the modern art museum shifts to a new concept, people are pursuing the pivoting process of existing buildings and using buildings for different purposes.

Also, art museums are portrayed as the cultural representative of public facilities in various ways. For example, they are places that play key roles in pursuing city regeneration and change in a social culture.

Because art museums for individual artists have been constructed recently, definite walls must be used in exhibitions in order to portray the artist's message more effectively. However, the exterior of the building can be modern.

Complex buildings such as the Pompidou Center, Getty Center, Smithsonian, and Ueno Park exhibition facilities are known for being exhibition sites that play the role of the symbol of a city.

Figure 5 suggests that art museums still reenact the classical surface form, which resembles the Pinakothek Method and effects followed by changes in the extensions and use such as Tate Britain or Tate modern

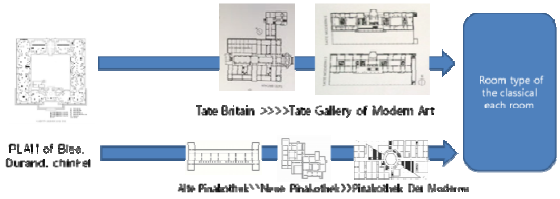


Figure 5. Room type's change and wall display

Thus, the typical core exhibition of the gallery that can be transformed from a typical art museum, which the historical description follows the juxtaposed exhibition, has changed to become the role of transforming a progressive exhibition and a linear route into a maze-like route through arbitrary combination of the gallery.

Table 3. Change of art museum

	Fixed Art Museum	Gallery which can change
Exhibition Arrangement Order	Chronicle (Historic Naereotibeu)	Juxtaposition which has various tendency to depend on each other
	Orderly fan-shaped display route	Paths that look like mazes
Exhibition method	Classical focused exhibition	Article of a changeable gallery

(2) The Display Properties of Exhibition Space and Walls of the Modern Art Museum

The modern art museum transformed its use of space from the former "Salon Exhibition (Fig. 6)" into the "White Cube (Fig. 7)" for a more artistic genre. The art museum can be classified into the "room to room" type, which the characteristics of space are exceptional, and the "open" type, which is the typical type in which the universal characteristics of the wall are noticeable.

(3) The Significance of the Wall in Exhibitions

The wall carries the significance of protection and safety through having the concept of quantitative length and the effectiveness of openings. On the other hand, walls of art museums are the method of developing the movements of visual expansion and exchange of


Figure 6. Salon Exhibition: Metropolitan museum 1900
Figure 7. White cube (Pinakothek Der Moderne)

glances throughout the visit.

Although the structure possesses the same physical parameters, the formation of the wall is the main factor that creates the flow of circulation development through the combination of the axis and opening. Also, it offers a different visual structure.

Formation of the wall develops its qualitative values and causes the "Enfilade" phenomenon through symmetry, asymmetry, rhythm, arrangement, conformity, repetition, etc., which are caused by continuity.

Qualitative standards include value, order, application and concentration of wall surfaces, the arrangement of the wall, the flow order of the event throughout the exhibition, visual structure, appropriate viewing distance, and secure boundary of territories.

The ideal form of exhibition is the "wall that forms the center," and it is developed by the quantitative critique on the importance of the wall.

3. THE ATTRIBUTE OF THE WALL AND METHOD OF FORMATION

(1) Comparison of Open Type and Closed type of Surfaces

The normal element of the wall varies depending on the method of unit-space formation in the exhibition system. For wall exhibitions the free surface of open type exhibition is possible for one-side, two-side, and three-side exhibitions, and four-side exhibitions vary depending on the elements of space. However, they are categorized according to its application of territorial occupation.

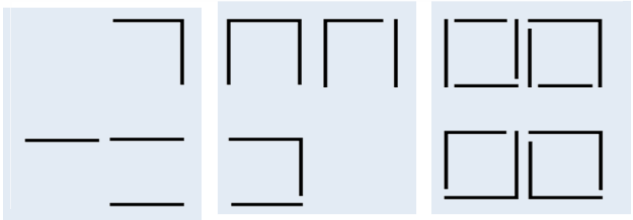


Figure 8. Formation Method of the Wall(Side1, side 2, side 3, side 4)

Architects often use the surface format created by Mies van de Rohe for open type surfaces because exhibitions focused on one-side or two-side surfaces are impossible for many walls.

Because the closed type surface contains blocked spaces, such as the four-side wall, it possesses much qualitative space for exhibition.

This is normally approached as the "Room Concept" of Architect Louis Kahn, but this technique is also evident in works of Robert Venturi, Mario Botta, and James Sterling.

Table 4. Open type and Closed form

TYPE	Representative art museum	Architect	Characteristic	
Open type		Mies van de Rohe	Display Prohibition wall	
Compromise style	Beyeler Foundation Museum, New Tate Gallery of Modern Art, Kunst, bonn  Modern Art Museum of Fort Worth	Le Corbusier	Public space	space ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ Display
Closed form		Louis Kahn Robert Venturi Mario Botta James Stirling	Display Possibility wall	

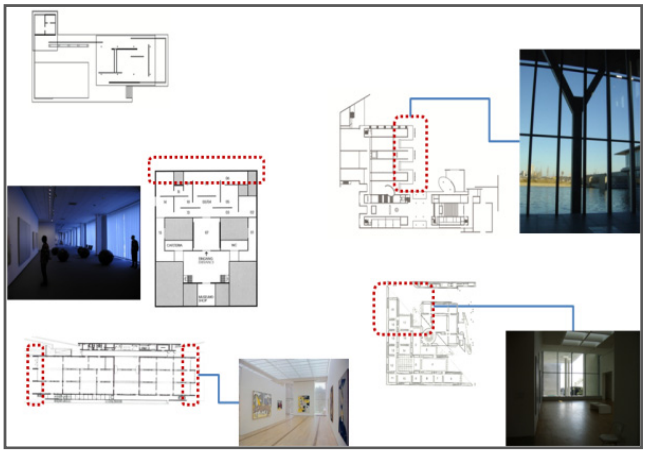


Figure 9. Aspect of Open Type Surface

To build a wall such as the one in the picture above, not only surrounding walls but also abundant amount of transparent and passable space is necessary. Therefore, exhibition is impossible in most cases.

The Pavilion of Barcelona and National Art Museum are prime examples of open type space by Mies van de Rohe. They are surrounded by glass, but the visible structure of the closed type, excluding the surrounding wall surfaces, has invisible space.

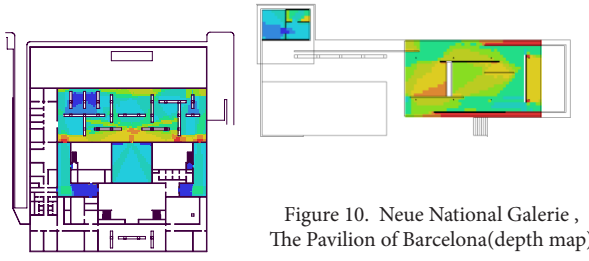


Figure 10. Neue National Galerie , The Pavilion of Barcelona(depth map)

(2) Directivity and Visibility of Space

The directivity of space is developed according to the axis of arrangement such as the following picture. In the exhibition hall, where the path develops into direction, the long connected walls are abundant in quantity, but it will probably provide a boring development.

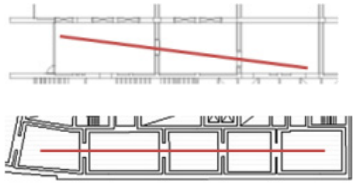


Figure 11. Beyeler Foundation Museum, Seattle Museum

Conversely, the horizontal repetitive arrangement presents similar lengths of walls throughout the exhibition because the length of the wall is divided into short lengths.

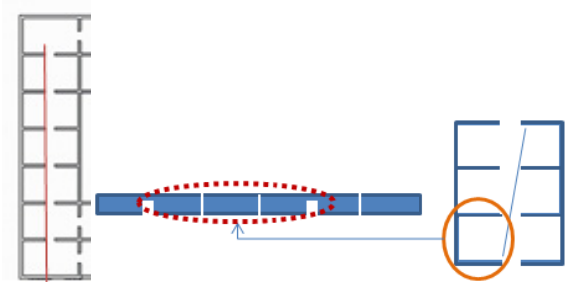


Figure 12. San Francisco Art Museum and Aspect of Type

Also, it demonstrates the visibility varied by the directivity of the space in which the entrances and exits are separated. The entrances and exits have harmonious horizontal development, symmetry, and many openings.

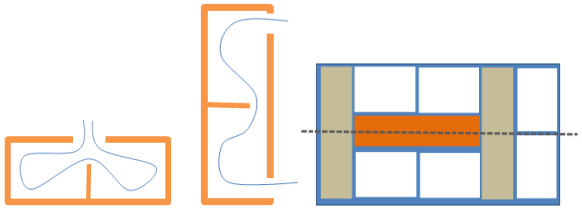


Figure 13. Entrance and exit agreement, horizontal development, separation of entrance and exit, vertical development. Many segments are created because of the many openings.

(3) The Difference between Spatial Structure and Visual Structure

The Figure above shows an example of when the visual axis is the same but the space convex is different. Also, it shows another example when the visual axis is different but the space convex is the same.

Among the spatial structure, the visual structure of the wall varies according to the wall formation, thus, clearly differs depending on the location of the opening. It is classified as the "axial line" of the Space Syntax Theory, but visible structure of the formation parts of the wall can be analyzed more closely with the depth map tool.

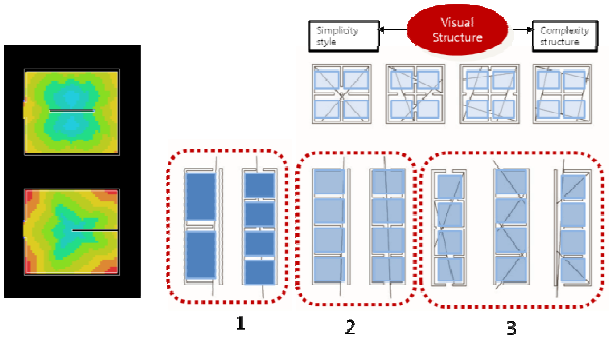


Figure14. Spatial Structure and Visual Structure
1.When the visual axis is the same but spatial formation is different
2. When both the visual axis is the same and spatial formation is the same
3.When the visual axis is different but spatial formation is the same

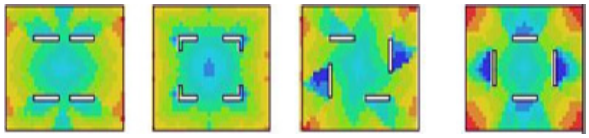


Figure 15. Visual Structure According to Wall Formation

Because the spatial axis is composed of spatial formations, it causes alterations in symmetrical forms or perpendicular spaces according to each of its combination relationships.

However, although the visual axis has the same spatial formation, the analysis element of the visual axis varies as isolated or open according to the arrangement of the wall.

Table 5. The Difference between spatial axis and visual axis

axis classification	quantitative factor	influence	qualitative analysis factor	result
spatial axis	spatial formation	combination	symmetry, perpendicular	horizontal and vertical development of individual room...
visual axis	arrangement of wall	segment	isolated, open	arrangement for emphasis on conversations, prediction of main route

Therefore, although spatial structure is identical, the change in wall formation varies the spatial experience, has a different number of axes, and affects the effects the sequence or visibility.

4. CHARACTERISTICS OF TYPES OF WALL FORMATION

(1) Wall Formation Classification of Combination Methods

The types of wall formation, according to the combination methods, each combines the spatial structure and circulation structure into R+R, Z+Z, and C+C aspects.

Exhibitions that use walls need to understand the distribution according to the flow of spatial formation, the division and unison of wall surfaces, and the placement of efficient surfaces for continuity.

Table 6. Outline of Combination Methods

Standard unit	Simple structure	Complexity structure		
Room	R+R	R+R+R	HALL Or Big Room Or ZONE Or Cluster	+R+R+R
Zone	Z+Z	Z+Z+Z		+Z+Z+Z
Cluster	C+C	C+C+C		+C+C+C

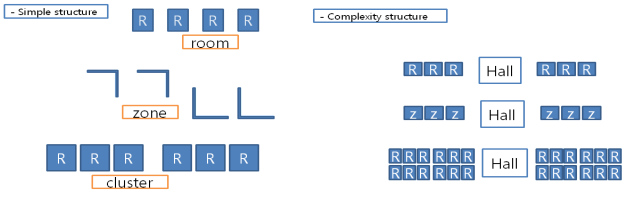
So, if the room is the smallest unit that forms the unit exhibition hall, then combination is the typical connection method of R-T-R. If the continual connection unit of the room is the cluster, the combination is C-T-C.

Also, in the open type surface, the part that connects the convex because of territorial problems is called the zone. The connection is classified into the Z-T-Z, which a collection of these can be called a cluster.

It can be classified more closely as exhibition-focused than the original exhibition formation of R-T-R, hallway connection type, or the open type.

Also, as they become more complicated, the surface unit increases from the simple structure to the complex structure.

Simple structure and Complexity structure



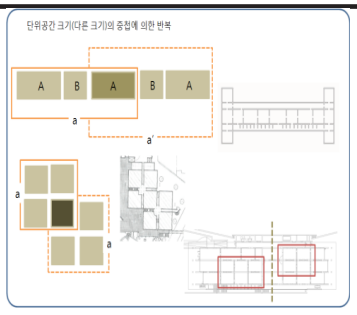
Cluster association mimetic diagram

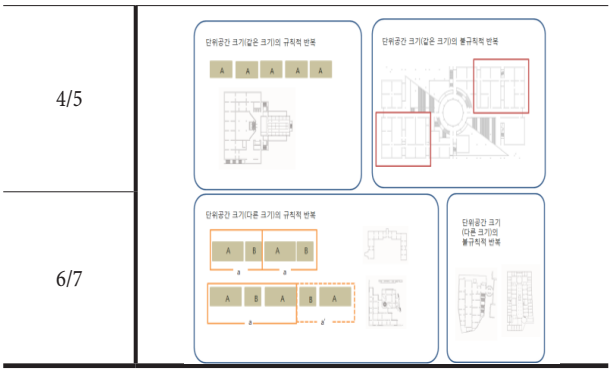
Figure 16. Association mimetic diagram of Simple structure and Complexity structure

The following is the example of the actual surface that follows these structures.

The simple structure is the modified form of the combination method according to the connection, and it can be called a complex structure.

Table 7. Various Examples of Simple Structure and Complex Structure

1	
2	
3	



Alte Pinakothek (Table 7.1) is a complex structure modified by the repetition or collection of simple structures. ABTEIBERG MUSEUM (Table 7.2) become complex by overlapping simple structure forms. Beyeler Foundation Museum (Table 7.3) obtains the complex structure by combining simple structures of the same size. 4 and 6 are simple structures, and 5 and 7 are complex structures.

(2) Visibility Structure and Characteristics of Development

The surface about the visible axis, as categorized in the 2007 research paper[2], is a surface with even axes, many visible lines, high integration level, but low articulation. The Neue Pinakothek and the Gemaldegalerie in Berlin are some examples. Secondly, Sainsbury Wing is a surface that has the visible axis of axis 1 and two to three assisting visible axes.

Lastly, it possesses few flaws, low integration level, and high articulation as the surface with a major axis of the basic circulation of the simple form.

Also, if the axis breaks, it changes the directions along the path, and if it does not, the detour is short and the sequence becomes longer.

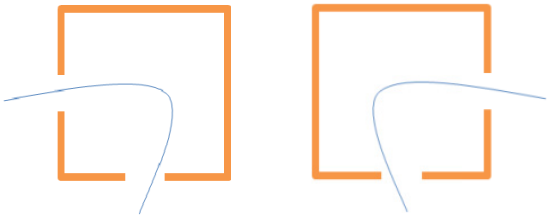


Figure 17. Change of path

The location of the opening can be divided into open and isolated. The openness emphasizes the work located at the end of the axis facing the front of the arranged entrance by matching the center.

The isolated opening speaks of the unorganized entrance, which is in a crossing condition, and it is a developing method that emphasizes the picture that is seen immediately after entering.

The unorganized entrances emphasize the frontal relationship between the picture that moves along with the guests'movements. Also, the Cross Road, which is not a single movement, connects many works of an artist into five rooms and shows an intersecting flow by connecting to each other.

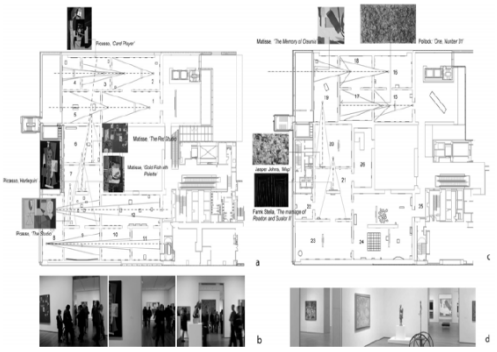
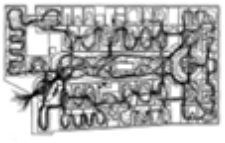
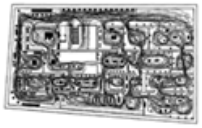


Figure 18. Museum of Modern Art/ Psarra, Sophia, Architecture and narrative : the formation of space and cultural meaning, 2010. 8

(3) Wall Formation Types and Circulation Classification

Types of wall formation is broadly divided into simple structure and complex structure. The simple type and cluster type complex structure are divided into flexible inner wall formation types of the Complex Cluster type and the Cross Road type. Each characteristic is organized in Table 8.

Table 8. Wall Formation Types and Circulation Classification

A. Simple structure	One way (unidirectional) There is no serial inspection circulation's cross Sequential inspection circulation	A-1.Simplicity style
		A-2.Simplicity cluster type (C1)
B. Complexity structure	Selective inspection circulation -choice of gallery -choice of rutes to a galleries	
B-1. Maze cluster type (C2)	 Gemaldegalerie, Berlin	
	Space group's sequential development that is similar to equal large axis' center /choice of routes	
B-2. Cross Rode	 Museum Het Valkhof	
	choice of galleries	
B-3. Within Variable type	 Neue National Galerie	
	Circulating round wall sequences of movement formation	

Moo ho-Park (2005), "Study on the Correlation Between the Spatial Configuration and Visitors' Movement in Museum", Hong-Ik Univ.107p, 110p, 113p admission

As the following, wall formation types can be divided into two types, and there are simple and cluster types and Cross Road and Inner Flexible types.

Table 9. Qualities and Classification of Wall Formation Types

Division	A.Simple structure		B.Complexity structure		
Characteristic	Organized Few visual axes and spatial axes Visual Structure		Maze-like Unorganized combination Many visual axes and spatial axes Fusion of clusters (overlapping) Invisibility Structure		
Classification	Simplicity style	Simplicity cluster type(c1)	Maze cluster type(c2)	Cross Rode	Within, variable type
	A-1	A-2	B-1	B-2	B-3
	Fixed Wall				Variable wall
axis	Axis formation of simple shape		Several uniform visible axes	Main visible axis/ two-three assisting visible axes	Various axis formations
	a		b	c	d

When dividing the chart above into visible structure and invisible structure, each can be classified according to the example art museums in the previous Table 10.

Table 10. Example art museum classification of wall composition type

Classification			Example art museum
A	1	S	8. SF
		D	5. SS/23.MF
	2-C1	S	3. AP/29. AM/30. MF
		D	19.CM
B	1-C2	S	7. KB/17.BF/18. YC 24 K21/28. PM
		D	4. NP/6. GB /11. WM/14. MM/16. LS/26 MM /
	2	S	2. TB /10. TM
		D	1. SW / 9. MH / 22. MV /25. MM/ 27. TM
	3	S	21. HM
		D	13. NN /15. MM /12. MH /20 . KH / 31. AM

Same Unit space = S / Different Unit space = D

The intuitive course with perceivable flows of circulation becomes the main route as you follow along the sight. Circulation is the element that is directly affected by the wall formation.

5. CONCLUSION AND SUGGESTIONS

The arrangement type is broadly categorized according to the combination method, the single line parallel type brings concentration, and the multi-row maze type brings dispersed glances.

Walls in exhibition spaces of art museums play the role of space formation and is an important element of volume for the concept of boundaries. This research analyzed an example with a descriptive approach according to the qualities and combination methods of the wall in order to deal with the visual importance and qualitative parts of walls of art museums that are wall-focused with the

established conditions of the wall.

For attribute and formation methods of the wall,

1) Open and closed type exhibition spaces can give abundance in qualitative space rather than a quantitative aspect.
2) The directivity of space changes according to the development of the visible axis, thus, directly affects the change in visibility.
3) The difference between spatial structure and visual structure is the difference between the visual axis and spatial structure. The wall formation type followed by the simple visible structure combination method, which is the type that possesses the simple combination (Room, Zone, Cluster), repeatedly uses the same size of units of space that is orderly and has few spatial axes. The classification of simple type and simple cluster type, which has few visible axes, also exists. Also, with the complex structure of the maze type, it displays the reiterated form of the cluster, which is the space with disorderly combination and has much visible axes and spatial axes. Also, these can be divided into three types: 1) Maze Cluster Type, 2) Cross Road Type, and 3) Open Flexible Type.

These wall types lead the various changes in circulation, and even each of the arrangement qualities of the exhibitions should be researched according to its exhibition place type.

Change in the height of the wall can be compared as the center of connected space that forms progressive exhibitions and space that connects clusters. (fig. 16) Also, it can be the open space that allows light to shine into the interior space.(fig. 9)

This shows that the wall formation tends to be open in exhibitions and in central spaces wall formation tends to have flow rather than stagnancy.

REFERENCES

Hanson, Julienne (1998), "Decoding Homes and Houses", Cambridge university press

Lee, Jong-sook (2008.12), "A Study on the Relationship between Art Museum Exhibition Wall Formation and Structure of Visual Space" Journal of the Korean Institude of culture architecture, v.24

Lee, Jong-sook and Lim, Che-jin (2007.10), "A Study on the Relationship between the Museum Display Wall Composition and the Visual Spatial Configuration", KOREA INSTITUE of INTERIOR DESIGN Journal v.16 n.5

Lee, Jong-sook and Lim, Che-jin (2007.12), "An Analysis on The Visual Configuration of an Exhibition Space in Art Museum", KOREA INSTITUDE of INTERIOR DESIGN Journal v.25 n.6

Lee, Jong-sook and Lim, Che-jin (2009.06) A Study on the Relationship between Art Museum Exhibition Wall Formation and Structure of Visual Space, Journal of the Architectural Institute of Korea (Planning & Design), v.25 n.06

Lee, Jong-sook, Park, Moo-ho and Lim, Che-jin (2007. 10), "A Study on Display Wall Composition Through Opening and Characteristics Visual Spatial Configuration in Room to Room Museum", proceeding Conference of Annual the Architectural Institute of Korea v.51

Lee, Sang-Hyun (2009), "A Study on The Peculiarity of Display Wall Composition in Exhibition Space : Focused on Art Museum for Paintings", Hong-Ik Univ.

Lee, Sang-Hyun, Lee, Jong-sook and Lim, Che-jin (2009. 10), "The Fundamental Research for the Significance of Walls in Exhibition Spaces and Hierarchical Correction", KOREA INSTITUE of INTERIOR DESIGN Conference proceeding, v.11 n.02

Moon, Jung-Mook (2004), "Analytic study on the Change of Generational Significance of the Exhibition Space of Art Museums", Hong-Ik Univ.

Park, Moo-ho (2005), "Study on the Correlation Between the Spatial Configuration and Visitors' Movement in Museum", Hong-Ik Univ.

Psarra, Sophia (2010. 8), "Architecture and narrative" : the formation of space and cultural meaning.

Psarra, Sophia, Wineman Jean and Xu, Ying (2007), "TRACING THE MODERN:space, narrative and exploration in the Museum of Modern Art", New York, Proceedings, 6th International Space Syntax Symposium, İstanbul

Seo, Sang-woo (2002), "New Museum Architecture", Museum architecture series; 4

(Date of Submission : 2011.4.10)