

A Rudimentary Research of Way-finding systems for public exhibition space

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Abstract: In this research, we discuss the way-finding systems for public exhibition space by universal design's way, and take National Museum of Natural Science in Taichung, Taiwan for example.

First is to collect and collate the relevant literature, to understand and find the relationship between the Way-finding system and the characteristics. Second, classify all signage inside the Museum of Natural Science in Taichung, Taiwan by doing field research and define its advantages and disadvantages. The field research is based on Natural Observation Method, observe the way-finding behavior of the visitors on site; and record the characteristics of the behavior; analysis the data from the result of field observation without prejudice of the existing condition. Base on the analysis; clearly define the different survey questions through information searching and decision-making for different ethnic groups. All the information above serves as the basis for the next phase, which is the interview.

Keywords: universal design, Way-finding systems, Way-finding behavior

1. Introduction

National Museum of Natural Science in Taichung, Taiwan (abbreviate NMNS below) is famous due to the academic and the rich collection of cultural relic. However, because of the complexity of its IT environment, the original signage system cannot fulfill the function expected, and had been revised many times, that causes confusion and many problems. Many visitors rely on asking the part-time worker (students), staffs or volunteers to find their way, which result in great inconvenience, especially for pregnant women, elderly, physical disabilities, children and foreigners.

This study suggests that the planning of signage systems for an environment should be based on user experience. It is particularly necessary to import The Universal Design concept into the planning. There are many different groups visit the NMNS, most of them are children, school groups, senior citizens, foreign visitors and so on. By grasping the needs of different users, the information would access to great effective, extensive and excellent result.

2. Literature review

Based on the project topic, we started to collect references and analyze them. All of the related references were sorted into three parts to be analyzed, which included the function and setting way of signage, signage design of the public exhibition, and SIGN object design of museum and the universal design concept.

2-1 The function and setting way of signage

2-1.1 The definition of signage

The characteristic of signage was the combination of words, patterns, arrowheads, and colors utilizing software. Information object used concrete shape and information to provide a visual design of identify, leading, explanation, and warning...ect. The research was presented by signage (normal information or message)[1], and divided it into : Identification sign, Direction sign, Orientation sign, Explanation sign, Regulatory sign.

2-1.2 The classification of setting way

The research classified SIGN objects according to manifestation (Figure 2-1), which were explained as follows:

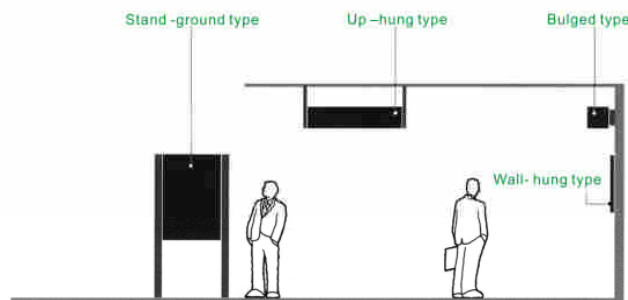


Figure 2-1 Setting way of SIGN

2-1.3 The consideration of signage setting

For reducing the possibility that visitors got lost, Information object during establishment need to take below into consideration : [2]

- (a) The visual guidance system determined the location, taking users' convenience as a precondition
- (b) Use any characteristics and inner devices in buildings' space.
- (c) SIGN object should be sited in decision making areas, like entrance, lobby, elevator, and cross of the hallway.
- (d) Design index sign for users of different aged.
- (e) Put more easily-read, direct, and attractive signs at appropriate distance.
- (f) The whole spaces' sign designs and settings should correspond to each other.
- (g) Avoid excessive SIGN objects in fear of visual confusing. (Only the most important information needs to be indicated).
- (h) The design concepts should combine with visual guidance.

2-2 The signage design of a museum

The essential contents of signage project are the symbol of the museum facilities and location, the guide symbol that shows the destination in sequence and the function of the place.

Therefore, in a museum or exhibition environment, way-finding should [3] enhance the experience, extend the brand, mesh with the architecture, exhibit finishes, and graphic palette, utilize appropriate communication tools for each message, give information, be flexible, elicit an intended behavior

So the symbol have to integrate the communication contents, facilities locations with humanity and objective picture and colors to make a system design.

2-3 The signage design of a museum and the universal design concept

The universal design (UD) concept hopes to start from the masses and consider with the need and characteristic of different groups of people to make the space planning friendly for most users. Except for consider with different ability of the users, also to meet the physical and psyche using situation of the users without more cost.

There is a close relation between The seven principles of UD and the signage design that we can see clearly from The seven principles of UD. The figure below shows the corresponding of the two. [4]

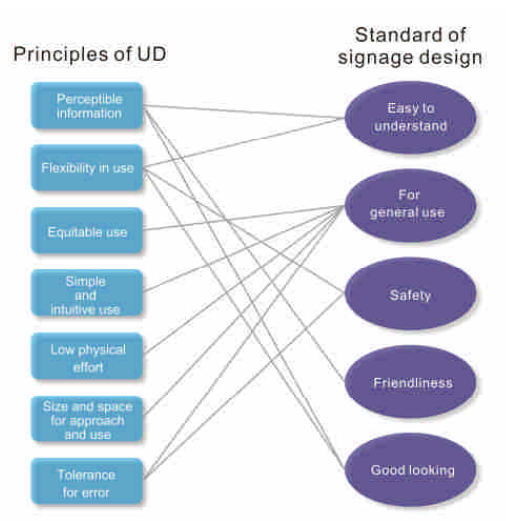


Figure 2-2 Relation between The seven principles of UD and the signage design

3. Research Methods

3-1.1 Classification of existing signage in the Museum

According to reference of signage types (2-1.1), we did the following classification about the existing signage in NMNS : Identification sign, Direction sign, Orientation sign, Explanation sign, Regulatory sign.

3-2 Survey of Signage Systems in National Museum of Natural Science

Survey is divided into two stages. First is to interview, communicate and discuss with the staffs, who are the most familiar to the environment of NMNS and are the people with the highest rate of interaction with the museum visitors, to understand their views of sign in the museum. Moreover, record the whole process by DV. The purpose is to make the analysis of the problem and grasp the actual situation easier.

Second is to understand the basic problems of the space function, objectives, characteristics, status etc. in NMNS. In this study, the choosing methods are observing and recording the using condition of visitors. The researchers

held DV and filmed behind the visitors, and record the visit process.

4-1 Result of National Museum of Natural Science survey

4-1.1 The existing condition of the first floor (including the human cultures hall, the globe environment hall, the life science hall)

The human cultures hall

- Oval-shaped central aisle is lacking of a clear reference point or objects for positioning, and the guidance for direction.
- Herb garden is marked wrong location on the museum floor plan, and there are not clear guidance notes.
- The toilets signage is not obvious and unified. The function of each exhibitions area is not clear; losing the purpose of setting information signage.

The globe environment hall

- The space and the equipment are arranged disorderly. The famous exhibits should correlates directly with the signage and environmental graphics, and put the graphics on the museum floor plan.
- There is no obvious signage along the walking path.
- The subject of the exhibition is not obvious, the temporary timetable damages the visual balance.
- The spaces with same exhibition subject are not in sequence, the subject of the exhibition is not obvious, and there is no signage for ticket booth at the entrance.

The life science hall

- The landmark (ex: mammoth) should correlates directly with the signage and environmental graphics, and put the graphics on the museum floor plan.
- Temporary display are arranged disorderly and not marked on the museum floor plans that cause visual imbalance.

Special Ex

- There are no signs to show each special exhibitions subject, and lacking of guidance information.
- There are too many exhibitions in the same area, information are excessive and located disorderly.

Gift shop

- Lacking of Museum identification systems, business hours and shop information.

4-1.2 The NMNS existing condition of second floor (including the human cultures hall, the globe environment hall, the life science hall).

The human cultures hall

- There is no guiding information on the Stairway entrance; temporary exhibition obstruct line of sight.

The globe environment hall

- The Opening hall has a good view, but there is no the guiding information.
- The signage of exhibition is not obvious and is hard to notice.

The life science hall

- There are more than one entrance in the Hall that causes confusion to the audience.
- It is difficult to identify the direction, because the Exhibition space was subdivided, yet not continuous.
- There is no clear guidance to the elevator

Restaurant

- There are discrepancies between the Museum tour guide floor plan and practical situation. There is no clear signage to and information about the restaurant, the audience cannot plan ahead the preferred walking path.

Mini zoo

- There is no obvious signage for guidance and explanation. Existing signage is too small to identify.

4-1.3 Summary of field investigation

We found huge discrepancy between the tour maps that NMNS provides for tourists to explore the scene and real 3-D space in the field. Although the tourists can read the floor plans easily, but they always lost the sense of direction where they are. The tourists need to find signage for help. Unfortunately, there is not enough signage, or located obviously. Tourists are often congested around the path of the human cultures hall, the globe environment hall, and the life science hall, to find out other exhibitions destination. Besides, tourists usually follow the flow of other tourists, which increase the level of chaos. Because of the periodical special exhibitions, which usually displayed along the corridor and intersections, the tourists tend to get lost in the complicated informational environment. In addition, there is no signage for all four of the main exhibition galleries, which confused the tourists further more.

In the overall planning of building space of NMNS, the exhibition spaces on the first and second floor are designed around the central oval open-air area. Tourists that often try to take the central oval open-air area as the reference position will find there is no signage at the entrance and intersection, or identification on the tour map to direct their way.

4-2 Interviews with staffs

4-2.1

Interviews with 6 staffs who are the group interact with the visitors the most, and list the interview contents under “Environmental effect”, “Psycho sensorial”, “Signage.” See Table 4-1

Table 4-1 Interview contents

Question type	Result of the interview	Percentage of the consent from interviewee
Environmental effect	The road to visit the museum is oval-shaped path, it's easy to lose the sense of direction	33.3%
	Science Center and Space IMAX Theater are the independent buildings, it's not easy to find.	83.3%
	It is not easy to find the popular permanent exhibitions (ex: the age of dinosaurs) .	66.7%
	Location of toilets and restaurant are not easy to find.	50%
Psycho sensorial	Because the signage in not clear, visitors always take directly information from the staff, therefore the setting of signage were meaningless.	66.7%
Signage	There is no unity of the style of signage which causes confusion	66.7%
	The style of signage is too rigid.	66.7%
	Characters on the signage are too small	66.7%
	Non-obvious signage setting	100%
	Location of toilets was not obvious	100%
	Short of mobile signage (for special exhibition use)	33.3%
Future expectations	There should be clear signage at every building entrance and exhibition entrance	83.3%
	Adding new tech (ex: LED) to the signage's design.	50%
	The design of signage should meet the needs of different styles of each exhibitions.	33.3%
	Signage should become graphic.	33.3%
	Signage design should be more creative.	33.3%

4-2.2 Summary of the interview with the staff

According to the interview of the staff of NMNS: Because toilets and restaurant facilities, Science Center and Space IMAX Theater are independent buildings; yet there are no clear signage, which lead the tourists to misunderstand that these two buildings are connected with the main building. This is on top of the list of the reason causing environmental confusing in the Museum. On the other hand, the popular permanent exhibition like The Age of Dinosaurs Hall is placed inside the life science hall, and there is no signage at the entrance of life science hall have caused the difficulty for the tourist to find.

The disfunctional design of the museum building cause the location not obvious enough is one of the reason contribute to the confusion.

Besides, the special exhibitions are always place around at the oval- shaped path, but there're no signs to show each special exhibitions subject that always make the tourists feel confused about where they supposed to go right now.

The fact that the Museum was constructed under different stages causes the different styles of signage, which were designed according to different architectural styles on each stage. The current signage lack of visual uniformity, and in vague colors because they were designed to accommodate the interior color and atmosphere of the museum. In addition, they were not placed in their most utilized spots, fonts were too small, and therefore they were not noticeable and readable to elders and teens.

Staff of NMNS suggest that the design of signage should be able to represent the NMNS's characteristic and spirit. The signage could be designed creatively according to each exhibition hall's style with new tech elements or graphic to make them more vivid and attractive.

4-3 Tourist investigation

4-3.1

Focus on the daily visitors of public people. With their consent, we used DV to film their way-finding behavior in the museum. Altogether 11 people in five different groups, including youth, middle age, elderly, and foreigners. According to the content of DV filmed, we list the following analysis chart under "Environmental effect," "Psycho sensorial," "Signage." See Table 4-2

Table 4-2 Tourist investigation's problem

Problem type	Critical point	Reasons cause problem	The groups that had problems
Environmental effect	The road to visit the museum is oval-shaped path	Tourist got lost easily and not sure about the exact location of entrances and exits.	Middle-age, elders
	Location of toilets and Elevator are not obvious	Not easy to find when people need to use.	Young people, middle-age, elders, foreigner
	Location of exhibition was not obvious (ex: mini zoo)	Not easy to find and often cause detour, have to ask for direction.	Elders
Psycho sensorial	Take directly information from the staff	Find the direct way when they got problem to find their way.	Elders
	Complex environmental information	Easy to miss the existence of the signage	Young people, middle-age, elders
Signage	Setting position are not obvious.	Need to pay special attention, to find the necessary signage.	Elders, foreigner
	There is no proper signage at the transition of floors	Easy to get confusing when change to the other exhibition.	Middle-age, elders, foreigner
	There're no signs to show each special exhibitions subject	Tourists can't understand the information of the special exhibitions clearly, and often cause detour.	Young people, middle-age, elders, foreigner
	Characters are too small	The tourists need to get closer to identify the signage.	Elders, foreigner, children

4-3.2 Summary of the tourist investigation

As a result of the road to visit the museum for the oval-shaped, with no obvious targets setting and many exhibition corridor billboards, the visitors are not only too confused to find their way to their destination; but also miss the existing signage and take directly information from the staff of the NMNS.

On the other hand of indoor signs in NMNS, there're many different kinds of ages, because of they change many times in the past 12 years. These signs' characters are too small and place too high, that causes the tourists need to get closer and raise their heads to clarify of them. And we also found out when the foreigner tourists use the floor plan maps to compare with those signs on the walls are easily get confused, they'll be hesitated and keep looking around, trying to find something obviously to help them to place where they are.

On the other hand of the problem that user group have, we can found that the elders group are easy to get confusing when they need to find the way, it cause them always search for help from NMNS's staff. The short of English language signage, could make foreigners confusing. Also as a result of the road to visit the museum for the oval-shaped path of the road, that can make tourists lose their sense of direction, especially for middle-age and elders group.

4-4 Interviews with visitors

4-4.1 Focus on the daily visitors of public people (the major target are the people without group . Interviewed the visitors 1 by 1 randomly, altogether 10 visitors from 10 groups. The groups are including youth, middle age, elders and foreigners. The following is the personal data table from the visitors who were interviewed, and we list the following analysis chart under "Environmental effect," "Psycho sensorial," "Signage." "Future expectation."

Table 4-3 Interview contents

Question type	Interview's question and critical point	Ratio of the question from interviewee
Environmental effect	the road to visit the museum is oval-shaped, it is easy to lose the sense of direction	40.0%
	Location of toilets and restaurant are not easy to find.	10.0%
Psycho sensorial	visitors always take direct information from the staff, when they cannot find their way.	30.0%
Signage	The type of signage are not in unify and located disorderly	20.0%
	The characters signage are too small	40.0%
	the color of signage is not obvious.	30.0%
	the setting position of signage was not obvious.	60.0%
	the signage for toilets was not obvious.	70.0%
	the signage for restaurant was not obvious.	20.0%
	Short of mobile signage (for special exhibition use)	10.0%
Future expectations	Every entrance and exhibition's entrance should put a clear signage, and also it can shows the information about the exhibition.	60.0%
	signage should indicate every exhibition area, and the relative position of the entrance and the exit.	20.0%
	the color of the signage should be high contrasted.	20.0%
	the place which the floor convergence or change, needs setting the clear signage.	20.0%
	the design of signage should meet the needs of different styles from each exhibitions.	20.0%
	Signage should become graphic, and the characters should be big and clear.	90.0%
	Signage design should be creative and attractive to children.	20.0%
	signage should be bilingual.	10.0%

4-4.2 Summary of the interviews with visitors

The interviews revealed that most of the people visited the MNMS are familiar with the environment already. Their visits are usually spontaneous without specific purpose.

Under the environmental effect category, the following are the aspects that the visitors thought be inconvenient: the oval-shaped path of to the exhibition spaces caused confusion and visitors often miss the entrances and exits. The location of toilets and the restaurant was not easy to find. Visitors always have to rely on Museum staff to find their ways, because existing signage are hardly noticed, therefore not helpful. The signage itself also has big problems, including font size, contrast of color, not in unity and improper location made them not accessible to visitor. On the other hand, the visitor's characteristic also cause affects to a certain degree.

Under the Future expectations of NMNS's signage design category, visitors suggested that the signage should be designed with more images, the size of fonts and color contrast need to be visible in order to facilitate the museum's main ethnic groups, which are children, senior citizens. The entrance and the transition place from floor to floor should be clearly marked by signage. In addition, exhibition information needs to be clearly identified, in order to reduce the confusing level.

5. Conclusions and advices

5-1

The following are the summary of the critical points about the way-finding system of NMNS, based on field investigation, tourist investigation, and interview with staff:

Environmental effect category:

- The fact that the Museum was constructed under different stages causes the different styles of signage, which were designed according to different architectural styles on each stage. Lacking of visual uniformity of the current signage is one of the reasons to bring confusion to visitors.
- As a result of the museum building itself, the road to visit the museum for the oval-shaped path of the road, combined with the non-obvious signage setting and set up the exhibition corridor billboards, that might cause too complex environmental information to enable tourists to find out the direction with confusing arising from the path and also easy to ignore the existence of the signage.
- Science Center and Space IMAX Theater are the independent buildings, but there're no clear signage, and the museum floor plan didn't mention it either, might caused the difficulty for the visitors to find.
- Besides exhibition, the people's livelihood, such as toilets and restaurant facilities, which lead the tourists confuse. Not only because the location not obvious enough but also lack of clear signage.

Psychosensorial category:

- Because of that visitor can't find the way easily through obviously signage, mostly they take directly information from the staff of the NMNS by asking them.

Signage category:

- Because there are no obviously signage for special exhibition and popular normality exhibition, and also no exhibition information in each exhibition entrance, so no matter the visitors had been to NMNS before or the first time, are always confusing about the certain location they want to visit or the information they need.
- The current signage are not easy to read, because of the setting position and the font size.

5-2

According to the critical points above, we made some advice that combine universal design with signage design and way-finding system in NMNS:

Environmental effect category:

- As the main exhibition place and the center of NMNS, the oval- shaped path should use high identification work or exhibit and graphed it, than put it into the museum floor plan to help people locate when they use it.
- As a result of the NMNS's special building type, the signage should be placed in which the floor convergence or change, and make it clear and obvious to shows information and relative coordinate form other exhibition hall.

Psychosensorial category:

- Besides good way-finding system design, it can through advertising, printed materials, the web site, billboards, film to increasing visitor experience and information about NMNS (including touring route) .

Signage category:

- The height when signage been setting and font size should consider “size and space for approach”, “perceptible information” that from the seven principles of universal design, to make different groups easy to recognize, and save more physical power when using signage.
- The signage’s location should be more definitude, every main entrance and exhibition entrance should provide exhibition’s information efficiency.
- Signage could change form that base on each exhibition hall’s style or the environment image, but still need consistency overall.
- Signage should extend the NMNS’s brand through design, and it could connect with museum floor plan through graphic, to make visitor identified easily when they use the map.
- The signage about people's livelihood, such as toilets and restaurant facilities, should be placed obviously and the form should be unified.
- The color of the signage should contrast with the wall, to improve the significantly about signage.
- NMNS could provide museum inner space’s 3-D model to let visitor can compare it with museum floor plan

6. References and Citations

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