

A Study on the Application of Sound Effect of Exhibition Space in the Sound Signal Processing

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Abstract

The concept of the traditional exhibition space has been settled as a space that displays historical objects and objects with special themes to allow viewers to appreciate, understand and be impressed. However, in modern society where social science and culturally developed, people's emotions have changed in accordance with the times. Therefore, they require a more diverse and unique exhibition space than a static space. As it responds to this, there are more and more exhibition spaces that use animation and music and sound to digital images that fit the exhibits. In this paper, we study the application of sound effects systematically and rationally for a more efficient and modern exhibition space. As a research method, I used a method of suggesting a virtual exhibition space by appropriately applying a target sound and a background sound of a sound effect. The objective sound will make each exhibition stand out effectively, and the background sound will make the entire exhibition space of the theme stand out effectively. The exhibition space to which the sound effect is applied invites the imagination and the creativity to the visitor and can enjoy infinite impression. I hope that the sound effects will be applied to all exhibition spaces in the future.

Keywords: Exhibition space, concept, theme, sound effect, purpose sound, background sound

1. INTRODUCTION

The exhibition space is a space for exhibiting works of art, historical artifacts, or rare objects or unique objects. The exhibition is a spatial content that creates a suitable space according to the theme and object and draws the response to the audience by using effective presentation technique with suitable exhibition technique. The traditional exhibition method that we know is a way to hang out in front of the work or to stop and appreciate it when the object to be displayed is installed in the proper space. The problem is that these traditional methods are boring and fewer are looking for them. These problems are complemented by a method of actively informing viewers of the works to be exhibited with various sights and programs. In addition, the exhibition space evolves

into the idea of the space of participation by letting the audience participates not only in the space for viewing but also in participation. The museum is not operated only for the purpose of seeing the visitors, but various exhibition techniques are introduced to apply the exhibition techniques that the visitors participate together. In other words, various kiosks and smart media based on digital technology and web technology, commentary using storytelling techniques and explanation sheets and programs suitable for the audience are installed and transformed into an exhibition space where visitors themselves participate and experience here. In this way, the exhibition space has become a space where various contents are combined by exhibition contents experts, so that the future of the exhibition space is bright. In this paper, we will study the application of sound effects to the exhibition space in accordance with the efforts to develop and complement the exhibition space. The research method was based on the structural method of installing the acoustic system in the traditional exhibition space and the sound effect method based on the theme and objects of the works to be displayed. The structural approach of the exhibition space for the application of the acoustic system is focused on the installation of the speaker. We propose a speaker installation position to operate the ambience which is a sound for space and a speaker installation position to operate the objective sound which is a sound for an object. The acoustical approach focuses on composing the ambience and object sounds that match the theme and object. First, we examined the exhibition space and the exhibition planning, and conducted research on the application of sound effects[1][2].

2. EXHIBITION

The exhibition has a dictionary meaning that the various items are laid out in one place and seen outside. The exhibition began by showing viewers exhibitions related to art works such as paintings and sculptures. The meaning of the exhibition can be explained to the spectators that the intention of the exhibition planner is displayed to distinguish the intention of the exhibitor as academic or educational. The exhibition is a content that shows the works to the audience at a specific time and place and provides a space where mutual

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interaction can occur. The exhibition provides educational experience and enjoyment as well as experience through exchange between visitors and exhibits. In modern society, the stores, marts and department stores can also be defined as the nature of the exhibition space from the viewpoint of exhibits.

2.1 Exhibition Planning

One of the characteristics of the exhibition, which is a space-type content, is that the viewer is moving and experiencing the contents. Therefore, 'movement' which is a specific act of visitors is very important factor in the planning and production of spatial contents and the experience of visitors accordingly. Therefore, how to design the part about the movement of visitors is related to the success or failure of exhibition contents. In addition, since the exhibition is open to a large number of people at one time, it is cost-effective, and visitors can select exhibition contents appropriately considering their interests and level. From this point of view, consideration should be given to the location, structure, width and interior direction of the exhibition space according to the theme of the exhibition. It is also necessary to determine the purpose of the exhibition and to simulate about the audience according to the purpose of the exhibition and the level of the exhibit. It is also important to investigate the degree of interest of the exhibition topic to investigate how much the public knows about the exhibition topic and how much interest it has. Particularly in the trend of exhibition planning, it is essential to combine storytelling to create scenarios for the exhibition contents and to select works and graphic images to be exhibited. In addition, the things to be checked should be the exhibition space considering the convenience of the spectator as much as possible by analyzing the viewing order and the movement direction and distance of the visitors when viewing the exhibition.[3][4][5]

2.2 Type of exhibition

The exhibition will design the exhibition method focusing on the characteristics of the information about the exhibits and the themes of the themes of the exhibits. According to the characteristics of the information in the exhibition space, it is divided into educational exhibition and conceptual exhibition focusing on the subject. Depending on the spatiality of the exhibition, it is divided into indoor exhibition, outdoor exhibition, and permanent exhibition, planning exhibition, and special exhibition depending on the temporality. In addition, depending on the purpose of the exhibition, the type is determined according to which part of the exhibition, research, or education function is more emphasized. The exhibition has a strong educational concept of exhibiting works by themes and providing only basic information of the works. In order to convey the intention of the exhibition planning, various kinds of auxiliary media are used to construct the space. In order to provide visitors with information on exhibition works, kiosks and various kinds of smart media are installed, and the works are transmitted as commentary, text, and video. In addition, it creates a visual environment for the interior and lighting of

the exhibition space. If you divide the type of exhibition based on this foundation, you can divide it according to place, period, expression means and so on. Depending on the location, there are indoor and outdoor displays and moving displays that are visited. Depending on the period, there are regular permanent exhibitions, which are continuously operated for a long period of time, special planned exhibitions planned with special circumstances and themes, and temporary exhibitions, which are temporary exhibitions such as seasonal exhibitions. Depending on the means of representing the exhibition, there are: physical exhibitions, video displays, demonstration displays, power displays, sound displays, and experience displays.[6][7][8]

2.3 Planning and method of exhibition

Since the exhibition space is a special place where the works and viewers can interact with each other, it is necessary to thoroughly prepare the works from the stage of the exhibition planning. For the exhibition planning, storytelling for the work is formed and the scenario is planned based on the scenario. Scenarios based on storytelling should be planned based on the six principles. who is the exhibitor planner, When is the exhibition period and schedule, Where is the exhibition site, What is the exhibition theme and contents, Why is the exhibition purpose, How is the exhibition method. Be prepared based on all of these six principles. [9][10][11]

Table 1. 6-How to plan exhibition according to the principle

| How to plan exhibition | Contents |
|------------------------|--|
| Who | Some of them include the side that provided the exhibition works and the organizers of the exhibition planners. |
| What | The exhibition is planned by taking into account the exhibition work, the exhibition theme and contents. |
| When | The exhibition schedule will select the date and time of the exhibition considering the exhibition works and the audience. |
| Where | The exhibition place is selected considering the exhibition work and the audience. |
| Why | The purpose of the exhibition shall be established in consideration of the exhibition works and audience. |
| How | The exhibition method will be studied and implemented considering the exhibition works and audience. |

From this point of view, the exhibition methods can be divided into physical display, video display, demonstration

display, and power display. The physical display is an exhibit that shows the exhibits with simulated or model-like objects, or shows the works as they are. Image display is an exhibition using visual media such as laser, video, computer, etc., or using image media. Performances Exhibits such as performances show people by themselves. The power display is an exhibition using kinetic art or laser, in which the artist uses electricity or power through installation. Nowadays, it is planned to exhibit an exhibition where visitors can directly participate, such as touching with hands by touching with their hands, and an audio exhibition using audio media with images. The process of exhibition is from exhibition planning to space production. Next, you need to determine the object of the exhibition and the location of the exhibition. First, you should set the purpose and decide what purpose you want to exhibit. In order to determine the target audience and exhibition place according to the purpose of the exhibition and the level of the exhibition, it is necessary to investigate the interest of the subject of the exhibition and investigate how much the public knows and is interested in the subject of the exhibition.

Table 2. Existing exhibition method

| Exhibition method | Contents | Blank |
|-------------------------------|--|------------------------------|
| Physical Exhibition | The physical exhibition is an exhibition that displays the exhibits in imitation or model like the real one, or displays the works in real life. | General display |
| Video Exhibition | The video display is an exhibition that shows images using media such as laser, video, computer. | Special display |
| Performance Exhibition | The performance exhibition is an exhibition that shows things such as performance directly by people. | Event display |
| Power Exhibit | The power display is an exhibition using kinetic art or laser, in which the artist uses electricity or power through installation. | Specialized field exhibition |
| Experience Exhibition | The exhibition is an exhibition where visitors can directly participate by touching them with their eyes and touching them with their hands. | Event display |

Once these preparations are completed, a detailed exhibition plan should be established. Create scenarios for exhibition contents and select works to be displayed and graphic images and images based on the scenarios. Also, when exhibiting, it is necessary to organize the exhibition space by planning the

most reasonable and effective viewing sequence and circulation line as much as possible while considering the convenience of the spectator.[12][13][14]

2.4 Evolution of Exhibition Space

The exhibition space should be created in an environment suitable for the character and value of the work. Visitors should be able to freely interact with the works and focus their attention so that the messages and meanings of the works can be understood through voluntary experience. Accumulating experience of visitors is not only an exhibition but an overall environment in which exhibitions are held. The experience of the visitor mentioned here means the experience of the world different from ordinary experience. The exhibition is of great importance in providing space for mutual exchange through the meeting of museum and visitors. Historical museum exhibits relics artifacts and exhibits unfolding to the public, but in modern times, it is gradually evolving into a space of mutual communication. In the meantime, The visitors during that time were passive, visitors are actively participating in the exhibition and they are making progress in making use of exhibition space. As part of this process, the museum collects the needs and opinions of visitors through various methods such as public relations, marketing, and educational programs, and engages in active exchanges with the audience through the process of absorbing, modifying, and supplementing the planning direction and contents of the exhibition. Visitors no longer visit museums for the purpose of only viewing exhibits. To this end, museums are inviting visitors to participate in the exhibition by introducing a variety of exhibition techniques as well as conventional uniform exhibition cases or wall displays. It utilizes digital technology, web, kiosk, various smart media, commentary using storytelling techniques, age-specific explanations and programs. This is not a curatorial or knowledge-based exhibition, but a museum being transformed from the viewpoint of the visitor or the knowledge experience. In other words, the museum is gradually increasing its experience exhibitions, which provide visitors with the opportunity to play with exhibitions. In addition, some museums construct the exhibition facilities using 4D, VR, and AR, and the video facilities for their works. They use all the digital technology without any original works and organize all the exhibitions as experiential exhibitions like 'games' There are also cases. In addition, the exhibitions are not only displayed in the museum space, but also actively participate in moving exhibitions, which are kind of for the underprivileged or infants. Eventually, a series of changes mean that the viewing style of the museum is deviating from the existing methods. Through this, the museum is being transformed from the viewpoint of accumulating knowledge to the space of play where the audience participates.[15][16][17]

3. HOW TO APPLY SOUND EFFECTS TO EXHIBITION SPACE

In the exhibition space, which has evolved from the concept of the existing exhibition space to the exhibition space that participates with the audience, it is necessary to plan the

exhibition in a three-dimensional and realistic way. Currently, outdoor space has been developed as an exhibition space to display realistic exhibition by using exhibition space, exhibition of storytelling technique using images in the indoor space, and exhibition using 4D, VR, and AR. It is transformed into a space where learn to naturally acquire knowledge while not being forced to inject knowledge by decorating it as a play space for experiencing an exhibition space. For this kind of experiential exhibition space, they have tried to make space for exhibition (interior), image, and device to become realistic exhibition space. The reason is because it neglected the satisfaction of the auditory element which is the sensory organ which stimulates the most imagination and stimulates the richest sensibility among the human senses. To produce a realistic exhibition space, realistic sound suited to the image and space is indispensable. But so far, investment in sound facilities has been insufficient and overlooked its importance. Microphones, speakers, and amplifier systems are used at low cost and insufficient installation compared to space. A poor sound facility rather lowers the value of the sound effect. The sound effects give the exhibit a sense of life, so if it is a creature, it gives a feeling of living, or if it is a machine, it feels like it works. In other words, the sound effect makes the exhibition more realistic and memorable for a long time by appropriately highlighting the realism and the symbolism. It helps me feel as if I'm in that space at that time. But in a poor sound system it's hard to get good effects. In this paper, we try to study acoustic system configuration and sound effect applied to the developing three - dimensional exhibition space.[18][19][20]

3.1 Exhibition space sound system structure

The exhibition space is usually the place where the exhibition is displayed on the wall, and the bigger space is arranged in many places between the wall and the room. First, the layout of the speaker, which is the acoustic output in the case of a typical wall display space, is the same as that of Figure-1.

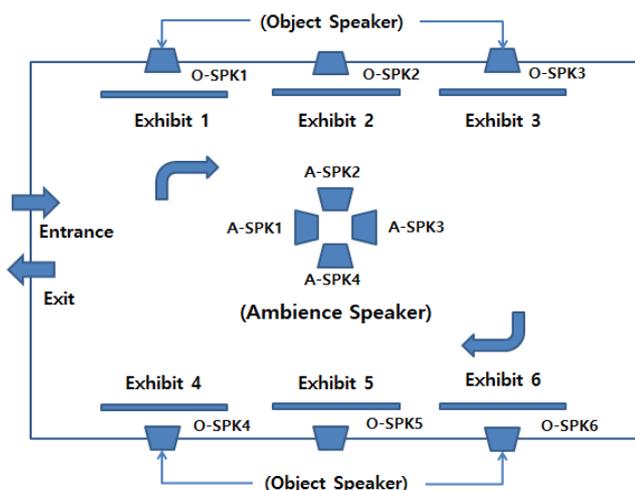


Figure 1: Exhibition Sound Plan I

On the ceiling in the center of the exhibition space, the environmental sound is depicted with four loudspeakers in four directions, and one speaker is placed on the upper wall of

each exhibit to describe the purpose sound. The environmental sound speaker consists of A-SPK1 ~ A-SPK4. The target sound speaker consists of O-SPK1 ~ O-SPK6. The environmental sound is so low that it does not interfere with the target sound of each exhibit, and it is laid in the background in the background.

Use the directional loudspeakers so that the target sounds do not interfere with other target sounds. It is recommended that the target sound speaker should be equipped with a sound shower type super directional speaker and the independent sound field technique should be used to protect the sound of each of the objects during the other purpose sounds. The Exhibit Sound Plan 2 in Figure 2 is a central type display, where the exhibits are placed in the center of the exhibition space. The wider exhibition space exhibits exhibits both in the center and on the wall, but in the exhibition sound plan 2 in Figure-2. In the center type display configuration, firstly, four speakers are arranged on the wall at the top of four corners of the exhibition space and utilized as environmental sound speakers.

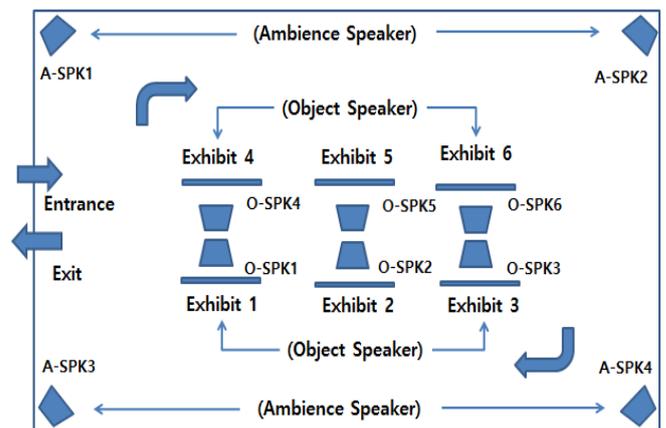


Figure 2: Exhibition Sound Plan II

In addition, the ceiling or special structure of the upper part of the exhibit is installed in each exhibition in the center of the room. In this case, of course, it is good to install the supersonic speaker with sound shower type for the target sound speaker and to protect the sound of each exhibit by using the independent sound field technique for the other purpose sound. Here again, it is important to set the sound leveling appropriately so that the ambient sound is used as background sound and does not interfere with the target sound. In the case of an exhibition space where exhibits can be displayed on both the center and the wall because the space is larger than the two exhibition plans, the exhibition sound plan 1 and the exhibition sound plan 2 can be merged and arranged. It is necessary to apply the example of plan 1 and plan 2 well and apply flexibility to suit the situation and reality of exhibition space and exhibition at that time.

3.2 Acoustic classification applied to exhibition space

The sound effect is a term derived from sound that is effectively used in various places such as broadcasting (radio,

TV), movie, advertisement, performance, theater, etc. However, have. Various sounds are needed in the drama or film of the broadcasting. Especially, symbolic sound and special sound which describe the specific situation or psychology in the advertisement play an important role. This sound effect can enhance emotions and enrich your life. If you hear the baby laughter, it will be fun, and if you hear the sound of the autumn grasshopper, it will be easy to understand if you experience loneliness. The effect sound associated with the story of the work can be used to enhance feelings of pleasure or sadness. The effect sound is divided into the background sound and the target sound according to the application standard. Background sound refers to a sound expressing the environment of a scene or a space, and a target sound refers to a sound having a purpose that occurs according to a behavior or situation of a person appearing in the scene. In the exhibition space, the background sound will be the sound that expresses the environment suitable for the genre and the theme corresponding to the exhibition theme of the exhibition hall. In the exhibition space, the objective sound symbolizes the sound It can be said that it is sound.[21][22]

3.2.1 Apply background sound

In the application of the sound effect of the exhibition space, the background sound should be appropriately applied to the space sound according to the exhibition theme. The division of space is very diverse. First, it will be classified into indoor space or outdoor space. Furthermore, it can be divided into space or space belonging to the earth. The earth is divided into land, sea, and sky. The land is divided into underground, ground, and mountain. The sea is divided into water and water. From this point of view, various spaces can be organized in the exhibition space according to the theme. The exhibition space according to the characteristics of the exhibition works can help to create the environment as the background sound of the sound effect. Figure 4 below shows three examples of the application of the background sound according to the theme of the exhibition space.



Figure 3. Examples of background sound for exhibition space theme

a is a photograph of a space museum in Gwacheon Science Museum located in Gwacheon, Gyeonggi Province, Korea. Since the space is originally vacuumed, there is no sound, but the background sound of the symbolic sound effect sound is applied in order to give real feeling to the environment composition of the exhibition space. b is a dinosaur museum in the Natural History Museum located in Seodaemun-gu, Seoul, Republic of Korea. The Mesozoic era, the age of dinosaurs, is divided into Triassic, Jurassic and Cretaceous. In this exhibition space, we imagine the environmental sounds of the Mesozoic era where the dinosaurs lived and apply the background sound of the sound effects. c is a lifestyle custom in the National Folk Museum in Kyungbok Palace in Samcheong-dong, Jongno-gu, Seoul, Republic of Korea. In this exhibition space, the exhibition environment and works expressing the life style of the people of Joseon Dynasty are displayed. As the room has a fireplace and the child is wearing a cushion, it is considered to be a winter night, so the sounds of the winter effect and the sound of night owl are applied to the sound effect background. If there is no

background sound, if the exhibition space is formed, it is necessary to accommodate the theme of the exhibition. Therefore, the viewer feels bored, unhappy, and fatigue of sight increases. However, if the sound effect background sound appropriate to the exhibition theme is appropriately applied to the exhibition space, it will be possible to re-create the space where visitors want to see the exhibition space frequently.

3.2.2 Apply the target sound

In the application of the sound effect of the exhibition space, the objective sound should be applied to the exhibition sound effect in an efficient manner. Depending on the exhibition works, there may be occasions when the works themselves make a sound, and when they can not make a sound at the moment, but in the past, they could not make a sound. In addition, some of the exhibits are fascinating and fantastical, and some of them have a symbolic effect. Furthermore, the

works to be exhibited are historically unique and can be applied to historical sound effects. Figure 3 below shows three

representative pictures of the target sound for each piece in the exhibition space.



a.

b.

c.

a. Gwacheon Science Museum (Space)

b. Natural History Museum (Mammoth Hall)

c. Folk museum (lifestyle custom)

Figure 3. Application examples of the target sound in each exhibition space

a is a photograph of a space museum in Gwacheon Science Museum located in Gwacheon, Gyeonggi Province, Republic of Korea. As you can see from the picture, there is a probe that shows the spacecraft before launch, explores spacecraft in space, and lands on planets. Each of these exhibits can have a unique sound. Before launching the ship, the sound of the ship is huge when it is launched. If you can describe the sound of the launch, you will be able to impress the audience. The spacecraft flying in outer space will be able to make the space feel real to the spectators if the space is vacuumed so that sound can not be generated originally but symbolically made sound and applied. The public will be very curious about the sound of the space probe. It would be interesting to hear the sounds of various space missions in cooperation with NASA (National Aeronautics & Space Administration), Korean Astronomy Institute of Korea, and Korea Aerospace Research Institute. b is the Mammoth Pavilion in Natural History Museum located in Seodaemun-gu, Seoul, Republic of Korea. The Mesozoic era where the dinosaur lived was divided into Triassic, Jurassic, and Cretaceous. It was the place where the mammoths lived early in the Cenozoic era from the next era to modern times. The mammoth is now extinct and can not even hear the real cry of dinosaurs. However, by scientific technique, we can study mammal's lung capacity, vocal cords and mouth structures as well as the method of vocalization of elephants, descendants of mammoths, and realize the symbolic virtual sound similar to the cry of mammoth as much as possible. c is a lifestyle custom in the National Folk Museum in Kyungbok Palace in Samcheong-dong, Jongro-gu, Seoul, Korea. The National Folk Museum of Korea is an exhibition space that displays Korean people's life history, customs and ceremonial occasions, and allows Korean or foreign visitors to know Korea more deeply. Korea is an agricultural country, so there are many farm tools, Buddhism, and people who believe in local faith. Especially Korea has a lot of tools related to ceremonial occasion because it is about to say that it is the branch of the oriental example with an emphasis on courtesy. Not all of these tools will be exhibited because they are sounding tools that people use, but if you hear the sounds that can be generated when

using each of the exhibits, more spectators will be able to see more realistic views. In this way, the unique sounds of each of the exhibits can be applied separately to the target sounds in the sound effects.

5. CONCLUSION

As it is now, there is no sound exhibition, and it is impossible for visitors to realize realistic scenes. The three-year-old is still looking at the concert poster, but when he listens to the concert music, he dances by waving his butt. The sound stimulates emotions in the human sense of the five senses, enhances imagination, and gives realistic sensations. Therefore, in the space where only the exhibits are displayed without sound, the viewer is bored and does not stay for a long time, and the speed of the viewing is fast. If you listen to the latter days after the viewing, there are many audiences in the exhibition space where the sound of each sound is applied to the background sound and the sound of the works that are appropriate to the theme of the works, rather than the exhibition space where there is no sound. Also, the time staying in the exhibition space is long, and feel better. A study was conducted to apply sound effects to the exhibition space. In order to apply the sound to the exhibition space, the method of arranging the speakers in the exhibition space and the sound effect to be applied were studied. We proposed Plan 1 and Plan 2 as speaker arranging methods and tried to arrange speakers for sound to match the exhibition space and the arrangement situation of exhibition. Plan 1 is a regular wall-mounted exhibition space and Plan 2 is an intermediate space. If Plan 1 and Plan 2 are combined, it will be a mixed exhibition space. Speaker placement is important, but high-quality professional equipment tailored to the size of the room will ensure a level of sound quality. After the arrangement of the sound system in the exhibition space was completed, we studied the sound effects that can be applied to the theme of the exhibition works. The sound effect sound can be designed to sound the background sound separated by the background sound and the target sound as the environmental sound, and to

make the exhibition work stand out as a purpose sound suitable for each exhibition work. The background sound and the target sound that are appropriate for the exhibition space during the sound effect can be obtained directly by the exhibition planner, the exhibition owner, or the sound effect specialist. Sound effects experts have many years of experience, experience and know-how accumulated sound effects data, and even new sounds can be designed using various sound equipment. If the exhibition planner and the exhibition creator mobilize imagination and creativity, it will be possible to apply the sound effect to all the various exhibition spaces and to experience the actual exhibition to the visitors. I hope that the sound effects will be applied to all exhibition spaces in the future.

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