Portable architecture studio recording video as solution for space limitation

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Abstract. Current development of learning technology requires facilities for video recording. These facilities certainly take space and a great cost. One architecture concept that can be used as a solution to these problems is Portable Architecture. Portable Architecture is expected to be a solution in land use efficiency to support sustainable architecture. Portable Architecture is an architectural object that can move or be moved and can adapt to changes in the environment. Portable Architecture in a video recording studio must be able to anticipate any changes in the space around its environment. Portable video recording studio can be reused in different places. Then Portable video recording studio devices must be able to reduce sound well, easily disassembled, having a good ventilation system, fit one person, and having video recording devices (backdrop, lighting, tripods, cameras, audio).

Keywords: sustainable architecture, portable architecture, studio recording

1. Introduction

Bina Nusantara University, a private university located in Jakarta, Indonesia, has implemented a distance learning system using online learning technology since 2000. As a university that all study programs using information technology-based learning system, the faculty must follow the development of the most recent learning systems. One learning system that is being developed is a learning system using video (VBL) [1]. Developing the VBL need facilities that can accommodate learning video production for all study programs at Bina Nusantara University. The facilities referred to are recording studios.

To build a video recording studio will certainly require a large space and adequate video recording equipment. Besides, it definitely requires a great cost. Bina Nusantara University certainly must provide the facilities so that the learning system using video can work well. The problem is the space to build the studio is very limited. The increasing number of students and study programs at Bina Nusantara University every year become an obstacle to the space limitation to build the studio.

This paper attempts to describe the concept of Portable Architecture for recording studio. The concept of Portable Architecture is expected to be a solution to the limited space to build a video recording studio [2]. Limited space and space layout that is always changing due to the need for facilities as a result of increasing study programs and students can be anticipated by using this concept.
2. Literature review

2.1 Definition of Portable Architecture

Portable Architecture is a building, a landscape a sculptural yet usable object or an interior space, any human-made which is brought into existence in a specific place for a limited time, though its impact may continue much longer. Portable architecture is the acknowledgement of unforeseen – and for this very reason almost uncontrolled – circumstances and presences. Architecture that is fickle, capricious, audacious, unexpected, reactive and glocal [3].

Portable Architecture is an architectural work that is in a place related to limited time. Those architectural objects can move or be moved and can adapt to changes in the environment. Paul Oliver sees Portable Architecture as part of Ephemeral Architecture. Ephemeral Architecture is a temporary form of architecture. He divided Ephemeral Architecture into Temporary Architecture and Portable Architecture [4].

At a first glance the two things are similar. Both Temporary Architecture and Portable Architecture occupy the site in a temporary period. The difference is when they are no longer on the site. Temporary Architecture cannot be reused, while Portable Architecture can be reused in different places, or in the same place at different times.

There are two important factors to be considered in designing portable buildings: the building must stand as fast as possible and have a simple spatial layout. The space is used for various needs and forms the atmosphere of space in each site it occupies.

“Their applications and uses are infinite, from dwellings for rural communities, emergency situations and infrastructure requirements to much more advanced and sophisticated context… Political, critical, and social architecture, intersected in the inhabitant city’s spatial leftovers, absent places, complex and extraordinary realities that are not accepted or that are often simply ignores, but that are always present in urban scenes.” [6].

It can be concluded that Portable Architecture is used in almost all fields. Many people who said that Portable Architecture had poor quality in terms of material and robustness [2], apparently does not make people ignore this system. From housing to infrastructure development, many use this system. Portable Architecture can be present in a place that might be forgotten or a place that is no longer used, and its presence certainly gives a new meaning to that place.

2.2 Portable Architecture Classifications

There are two classifications of Portable Architecture. It is classified based on its function and the way it moves [3].

2.2.1 Portable Architecture based on function.

Robert Kronenburg classifies Portable Architecture into three parts, namely role models, problem solvers, and specialists. These three types have different interests or needs. Following is an explanation of the three types of Portable Architecture based on their functions [2]:

a. Role Model. Buildings that become role models, namely buildings with permanent concepts and then carry portable properties as architectural solutions. There are 4 important points that make Portable Architecture a role model for other works, namely the opportunities seen, the benefits taken, the responsibility of the building to the environment and how to overcome the limitations of moving from this building. Following are the works included in the role model category, IBM Travelling Exhibition Pavilion by Renzo Piano and Karaza Theater by Tadao Ando in Japan.

b. Problem Solver. This second type acts as a solution to a need for space. In this type, 4 important points that make Portable Architecture a role model are not fulfilled at all. Many factors cause this, for example emergency needs or other things. Although the architect can do more in designing Portable Architecture, but they focus on solving problems. Following are the works included in the problem solver category, the works of Lorenzo Apicella, including the Hong Kong Tourist Association Pavilion, the Volvo Car Marketing Unit and the Trustee Savings Bank (TSB) Mobile Bank and Hospitality Facility. Hong Kong Tourist Association Pavilion has a concept that is used only in summer. Even so, this building has the ability to be in all seasons.
With a slight design refinement, the Hong Kong Tourist Association Pavilion finally succeeded in overcoming the hurdles of the season and other natural factors.

c. Specialista. In this type, the development of Portable Architecture makes the works that appear to be an innovative work. Innovative things that are the advantages of this type can be seen in the example below. The highlight of this type are works from FTL Design Engineering Studio including Carlos Moseley Music Pavilion, Cadila Mobile Theater, AT&T Global Olympic Village. Carlos Moseley Music Pavilion's design concept is to create a venue with high mobility, which can accommodate 30 outdoor shows to various cities. Rather than providing a complex structure to its construction, trailing as a means of transportation is used to be part of the system itself.

2.2.2 Portable Architecture based on how it is moved.
There are many systems that are used in Portable Architecture when moving, in general Robert Kronenburg divides it into 3 major parts [5]:

a. Movable buildings intact. This type of building can move without changing its condition. He moved in intact condition. Studio Aisslinger's Loftcube is an example of this category. The building with an area of 6.6 m X 6.6 m and a height of 3 m is placed on the roof of a multi-storey building in a city. The designer realized the possibility of endless land that could be built in urban space. The main obstacle of this type, often this building can only be moved using a helicopter or mobile crane.

b. Buildings that are incorporated in the transportation system. This type of building is integrated with its transportation equipment. An example of this type is Caravan. Caravan looks like a means of transportation, with tires on both sides. However, the inside looks like a home or office, where there are tools such as sofas, tables or even kitchen utensils that form the characteristics of the room such as the living room, dining room or kitchen. It provides the means of people to have their own home a journey or a vacation, without relying on a motel or hotel, and enables them to stay in places where none is available. Caravan varies basic fram models which may be little more than a tent on wheels to those containing several rooms with all the furniture and furnishings and equipment of a home. Seeing the picture above, the transportation constraints faced by Portable Architecture in the previous type, moving to the whole state have been reduced. With an integrated system, the Portable Architecture can move on its own, or with a little help from other means of transportation.

c. Buildings that can be assembled (assembled). For the third type, if the building is moved, the building is divided into sections. When it will be erected, it is reassembled into one whole piece. The easiest example is seen in a tent. Tenda is one of the Portable Architecture systems that has been known for a long time. Tents are usually placed in a fairly flat place, because of the comfort factor. When finished, the tent can be folded in such a way that it is easy to carry or move. The system used for tents is quite simple, using material similar to fabric, so it is not rigid but does not absorb water. The material is pulled in such a way that it can form a new space which is sufficient for shelter. For the area of space can be adjusted depending on the width of the existing fabric, the wider the fabric will certainly get the greater the area of the room. Examples of the use of this type in the post-disaster. Disasters that make people lose their homes, because it collapsed or burned. Evacuation tents are needed as soon as possible. The rapid construction of tents and the simple spatial layout in them make tents an effective and efficient choice in post-disaster cases. Seeing the example above, transportation problems are not a big obstacle. The building which is divided into several sections certainly facilitates transportation of this building. In seeing the space needed, this type is quite flexible. Because the system is assembled, adjustments can be made to overcome the existing space constraints.

2.3 Video Recording Studio
The development of information technology in the multimedia field is very rapid. Recording devices for video and audio are no longer large and require a lot of personnel to do the video recording process. Video recording for learning can even be done independently with a recording device that is
easy to use, and of course most people already use it today, such as smartphone camera devices, web cameras, and DSLR cameras or mirrorless cameras. To record a video there are five elements of the device needed, including [7]:

a. Backdrop. Backdrop is used as the backdrop of the main object in the video. The main thing to note in the use of backdrop is the size of the room and the ambience that you want to display. Backdrop can be a solid colored background or a set of furniture decorations.

b. Lighting. There are two main things that need to be considered in the use of lights for video shooting, namely portability and flexibility in terms of the outcome. The lamp used must be able to adjust the level of brightness (brightness) and color temperature (color temperature).

c. Tripods. Tripods are used on cameras so that video capture remains stable and smooth.

d. Camera. The camera is the most important device in video recording. There are several types of cameras that can be used to record videos for learning, including: video cameras or camcorders, Amera DSLR or mirrorless cameras, web cameras, document cameras, smartphone cameras.

e. Audio. Audio devices are important devices that must be considered so that the results of the quality of video content are better. Audio is very closely related to the sound suppression system and room acoustics, so the choice of material materials for space is one of the things that need attention. The benefits of sound dampening and scooping panels in the recording studio: improve sound quality both sound clarity and sound clarity, increase concentration when doing the recording process, not disturbed by outdoor noise. Material specifications for mounting sound dampening and acoustic panels:
- Sound dampening material: rockwool, glasswool, greenwool, softboard
- Acoustic panels: diffuser, basstrap
- Soundproof door
- Double glass

2.4 Portable Recording Booth
Portable recording booth is a mini recording studio device for recording sound. Some companies have mass-produced the device, call it Vocal Booth and WishperRoom. The devices they produce are devoted to small size sound recording studios. This device is easily disassembled, has soundproofing panels, and a ventilation system in the room.

From the results of the literature review above, the portable studio video recording device at Bina Nusantara University must have the following standards: can load video recording activities for one person, can muffle the sound well, is easily disassembled, has a good ventilation system, and has a device record videos (backdrop, lighting, tripods, cameras, audio).

3. Methodology
In the design of data architecture and facts is a matter which is the basis or source of ideas in the design. The design methodology used includes the study of literature, concept synthesis, and drawing. The synthesis of concepts carried out includes:

a. Study the amount of space
b. Knockdown and moveable system
c. Sound suppression system
d. Ventilation system
e. Device system in the studio

The results of the synthesis are made in the form of design concepts.

4. Results and Discussion
Activities inside portable video recording studio are video recording independently. The studio is a facility for lecturers or Subject Matter Expert (SME) at Bina Nusantara University to develop video based learning materials.
4.1 Dimensions
The dimensions of portable video recording studio space required based on the standard of human activity movement is as follows:

**Figure 1.** The dimensions study.

**Figure 2.** The studio has a room size of 1.8 m X 1.2 m, with a door width of 0.7 m, and a height of 2 m.

4.2 Knockdown and moveable
Knockdown is a construction of furniture products that are manufactured using removable or unloading systems. Strength in knockdown furniture is mostly derived from bolts or screws used to glue components between parts. The knockdown system is used to get portable video recording studio and is easy to move.

**Figure 3.** The panels are divided into 6 sections so they can be easily dismantled.

**Figure 4.** Use of 9 heavy duty caster wheels so the studio can be easily moved.

4.3 Silencer
The silencer system in the studio room is an important thing to note. The silencer types:
- Glasswool
- Rockwool and Greenwool
- Basstrap
- Double glass

![Image 5](image5.png)

**Figure 5.** The application of bass traps to walls and floors to reduce sound echoes in the studio

![Image 6](image6.png)

**Figure 6.** The use of double glass to reduce outside noise

### 4.4 Ventilation

Air circulation in the studio room must provide comfort for the user, so it needs a fan exhaust for intake air (intake) and exhaust fan to throw air out (extractor). The ventilation system as much as possible must be able to reduce the sound so as not to make a noisy sound. Ventilation systems must have intake duct and exhaust duct

![Image 7](image7.png)

**Figure 7.** To reduce the sound from the exhaust fan, we need silencer boxes and duct ducts that bend to minimize the sound.
4.5 Video recording device

The devices in the video recording studio consist of a webcam, laptop, ring light, microphone, pen tablet, document camera, back light. Video recording devices must be portable, so they are easy to install and easy to move.

![Video recording devices](image)

**Figure 8.** The video recording devices.

5. Conclusion

Portable Architecture is expected to be a solution in efficient land use to support sustainable architecture. Portable Architecture in a video recording studio must be able to anticipate any changes in the space around its environment. Portable video recording studio can be used again in different places. Portable video recording studio devices must be able to reduce sound well, easily dismantled pairs, have a good ventilation system, can load one person, and have a video recording device (backdrop, lighting, tripods, cameras, audio).

The concept of portable video recording studio still requires trials in its use and utilization. Need a deeper study of the use of materials, ventilation systems, and better knockdown systems.

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