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# Application of the Metaphor Architecture Theme in the Design of the Institute of Marine Sciences and Fisheries in Sibolga City

***Amy Marisa*[1*], *Arwanyah Raja Nauli Situmeang*[1]**

[1]*Architecture Departement, Faculty of Engineering, Universitas Sumatera Utara, Medan, Indonesia*

*Corresponding Author: amy@usu.ac.id

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**ABSTRACT**

The Sibolga Institute of Marine and Fisheries Science design is a college plan that organizes academic and vocational education in groups of science, technology, and arts disciplines focused on the marine and fisheries sector in Sibolga City. This design is reviewed based on the great potential of fisheries and marine in the Sibolga area. However, it has not been appropriately managed and optimally so far. In addition, the Sibolga Institute of Marine and Fisheries Science design is expected to answer the problem of limited educational facilities, especially in the scope of marine and fisheries science in Sibolga City. The study employs a descriptive qualitative method. Site survey and literature studies on metaphoric architecture principles serve as the primary data collection technique in the study. The application of a design with a symbolic architectural theme is expected to represent the function of the building. Therefore, observers and building users will have their ideas and impressions of the activities that occur in the building through the shape of the mass and the facade of the building. This study can benefit future studies that attempt to apply metaphoric architecture in their design.

**Keywords:** design, fisheries, institute, marine, metaphor

## 1 Introduction

Indonesia is the largest maritime country in the world which has been recognized and stated in the UNCLOS (United Nations Convention on the Law of the Sea), which was ratified by the countries of the world, as well as in the Juanda declaration, which has regulated matters relating to Indonesia's ownership as a country archipelago state. The territory of the Indonesian state is an area with waters surrounded by ± 17,508 islands and has a coastline of 81,000 km and the largest sea area in the world, namely 5.8 million km2, and is the largest archipelagic country in the world that has abundant wealth of marine natural resources [1].

The utilization of marine potential still has various challenges due to the limited quantity and quality of human resources and the low utilization of marine science and technology. So far, national development

orientation is still firmly focused on the mainland. Strengthening maritime education needs to be carried out and designed to produce professional human resources and develop maritime-based science and technology, which is expected to emerge an archipelago maritime culture. Not only in terms of quantity, marine and fisheries education products are also not competitive [2].

Sibolga City is a municipality located on the west coast of North Sumatra Island in Tapian Nauli Bay with a distance of ±350 km from Medan City, Indonesia. Geographically, Sibolga City is located between 1º 42'1º 46′ North Latitude and 98º 44′ – 98º 48′ East Longitude. Sibolga City administratively consists of 4 districts and 17 Urban villages with an area of 10.77 Km2 and 87,090 people (2017 Census). The administrative area of Sibolga City is 1077.00 Ha, consisting of 889, 16 Ha (82.5%) of land, 187.84 Ha (17.44%) of Archipelago land, and 2 171.6 Ha of the sea. The mainland islands included in the Sibolga area are Panjang Island, Sarudik Island, Poncan Gadang Island (Large), and Poncan Ketek Island (Small) [3]. Looking at the geographical conditions of Sibolga City, which has a reasonably wide ocean area, it can be ascertained that the marine and fishery potential in Sibolga City is very abundant. Unfortunately, the great marine and fishery potential is not accompanied by adequate educational facilities.

The Institute of Marine Sciences and Fisheries is one of the universities that organizes academic and vocational education in the scientific discipline group in the marine and fisheries sector with an education system regulated by the Indonesian Ministry of Education. The Sibolga Institute of Marine and Fisheries Science is designed to have an education level of up to a bachelor's degree (S1). In this case, the requirements and criteria for space are regulated by the National Education Standards Agency [4]. The implementation of national education is based on Pancasila and the 1945 Constitution of the Republic of Indonesia. The Institute of Marine and Fishery Sciences is planned to be located in Sibolga City because it is seen from the great potential in the fisheries sector, both capture fisheries and aquaculture, another factor in determining the choice of location is the high interest of the people in Sibolga City in terms of studies or researching matters related to marine and fisheries.

Institute of Marine Science and Fisheries is designed by applying metaphoric architecture principles. Muller's metaphor arises from the imagination, and architects translate the invention into built forms [5]. Using the metaphorical architecture concept in the building is to obtain a built form that represents the image or object closely related to the function of the building. Therefore, this study aims to apply metaphoric architectural concepts to the Maritime and Fisheries Institute of Sibolga City design.

## 2 Literature Review

Metaphor comes from the Greek, namely "meta" (above) and "herein" (shift / move). In Modern Greek, metaphor is also interpreted as "transfer" [6]. Thus, metaphor can be interpreted as transferring meaning and quality to another expression. While the definition of metaphors is as follows: (1) Metaphor means a practical thought for understanding an abstract concept, carried out by expanding its meaning by comparing it with other ideas understood [7]; (2) Metaphor in architecture is one of the creative methods that exist in the

design spectrum of the designer [8]; (3) Metaphor is a way of understanding something as if it were something else to better understand a topic under discussion. In other words, explaining one subject to another, trying to see one subject as something else [9].

There are three categories in the application of symbolic architectural themes, including [9] : (1) Intangible metaphors depart from concepts, ideas, human conditions, or certain qualities (individuality, naturalness, community, tradition, culture); (2) Tangible metaphors, i.e., metaphors depart from visual or material characters (houses as palaces, roofs of temples as sky); (3) Combine metaphor, a metaphor in which conceptual and visual are intertwined as the fulcrum of a design; (4) Architecture with the principles of metaphor, in general, can be seen if; (5) The shape of the building can transfer information from one subject to another; (6) The shape of the building can be seen from a subject that seems to be something else.

Here are some examples of buildings that apply the concept of metaphorical architecture:

**The Phinisi Tower** is located on the Gunung Sari State University (UNM) Campus, Makassar, Andi Prince Pettarani street (Figure 1). This building is located not far from the Grand Clarion Hotel. UNM is the largest public teaching campus in Makassar and even Eastern Indonesia. The design concept of the GPPA UNM building emphasizes the emphasis on local wisdom as a source of inspiration, which is a combination of the meaning of the UNM Logo, Makassar Traditional House, the philosophy of life for the people of South Sulawesi (Sulapa Eppa / four square), and the Pinisi Boat which symbolizes glory, pride, and majesty [10].

**The Sydney Opera House** is located in Sydney Harbor just to the south and close to the Sydney Harbor Bridge, New South Wales, Australia (Figure 2). The Sydney Opera House is one of the most famous buildings of the 20th century, built-in 1940 by architect Jørn Utzon which is divided into three stages, namely the construction of the upper podium, the structure of the roof, and the construction of the interior and construction. This building is shaped like a spherical shell and is also inspired by the sailing ships that often dock there. The Opera House is a center for Australian opera arts, the Sydney Theater, and the Sydney Symphony Orchestra [11].

**Figure 1** Pinisi Tower, Makassar State University
(Source: http://rumah-yusing.blogspot.com/ [10])

**Figure 2** Sidney Opera House, Australia
(Source: https://www.sydneyoperahouse.com/ [11])

## 3 Research Methods

The research method used in this research is the descriptive qualitative method [12]. The initial stage of applying the theme is to conduct a descriptive study of the characteristics and concepts of metaphor building from various literature. The conclusion from the descriptive analysis of the traits and ideas in this metaphorical building is then used as an analytical variable to be applied to the Marine and Fisheries Institute of Sibolga City design. The required data can be classified into two categories [13]. Primary data is data collected directly about the site location, existing environment, site boundaries, scenery, and climatic conditions. At the same time, secondary data can be obtained by studying literature on metaphors in architecture. The collected data is essential to identify the principles of metaphoric architecture and understand the way metaphorical architecture concepts can be applied in designing the Sibolga marine and fisheries institute. The data that has been collected is then analyzed to obtain design and visual ideas, which are then translated into a standard structure of the institute building with a metaphorical concept that provides value, effectiveness, and efficiency. In selecting a suitable location according to the design, this research starts by determining the Indonesian government regulations for higher education buildings and following the Sibolga City Spatial Detail Plan. After finding several sites that meet the rules, the data between these sites are compared to see which one can give the best results for the design.

## 4 Result and Discussion

### 4.1 Design Location

The location of site is located on Com. Yos. Sudarso street, Beringin City, Sibolga Kota, Sibolga City or often known as Fencing Beach (old port), is located on the west coast of the northern part of Sumatra island in Tapian Nauli Bay, + 350 km south of the city. Medan, the capital of North Sumatra Province with a geographical location of 01º 42' North Latitude to 01º 46' North Latitude and 98 44' East Longitude to 98 48' East Longitude, and its territorial boundaries in the north are bordering Central Tapanuli Regency, in the east bordering Central Tapanuli Regency, in the south by Central Tapanuli Regency and in the west by Tapian Nauli Bay/Central Tapanuli Regency (Figure 3).


(a) (b)

**Figure 3** (a) Site Location, (b) Site Size

Located at an altitude ranging from 0-150 meters above sea level, with a slope of land and urban areas that vary from 0-2% to more than 40%. Steep [3]. The design site area has a land height of 0-7m above sea level with a pretty hot climate, namely, the maximum temperature reaches 32°C, and the minimum is 21.6°C.

Meanwhile, the rainfall in Sibolga tends to be irregular throughout the year. The highest rainfall occurs in November with about 798 mm, while the most rain occurs in December, 26 days. High tide in Sibolga City itself with a maximum high tide of 1.1 m and a minimum of 0.4m.

### 4.2 Analysis and Concept

*Circulation*

The main access (primary) to and out of the site is on Com. Yos Sudarso street where pedestrians, 4-wheeled vehicles can pass this road to 2-wheeled vehicles with two-way road vehicles. From the results of the circulation analysis, it is found that the concept of circulation with the main entrance is in the middle area of the building right in front of Com. Yos Sudarso street can be accessed by 2-wheeled vehicles to 4-wheeled vehicles and pedestrians. Additionally, the front of the building on Com Yos Sudarso street was also given access for pedestrians in the form of paving blocks to more freely access the building (Figure 4).


(a) (b)

**Figure 4** (a) Circulation Analysis, (b) Circulation Concept

*Noise*

The highest noise source is in the east, namely Com. Yos Sudarso street comes from the sound of passing vehicles. Furthermore, from the southwest to the west with low noise sourced from ocean waves. Moreover finally, in the south and north, the noise is almost non-existent because the area is a low-intensity residential area. Thus the building will be conceptualized by providing a little space between the building and the noise source (Figure 5).

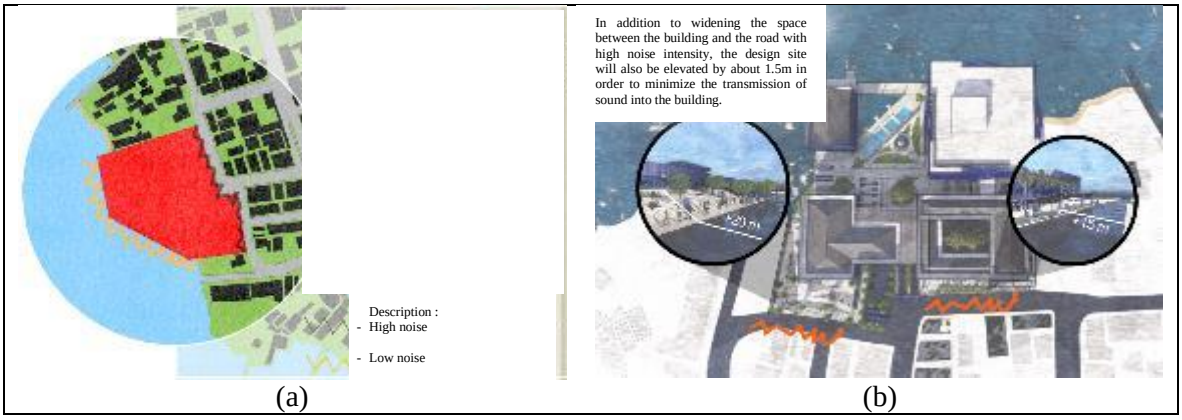


**Figure 5** (a) Noise Analysis, (b) Noise Concept

*View*

The view from the outside towards the site from all directions is relatively good, and the view from the site exits only in the north path, which is harmful because there are only residential areas. Thus the building will be conceptualized with a facade in front of Com. Yos Sudarso street and the structures' openings will be maximized on all sides of the building to enjoy the view (Figure 6).


**Figure 6** (a) View Analysis, (b) View concept

*Vegetation*

The vegetation on the site is in the form of banyan trees and weeds, which are pretty messy and irregular. The proposed concept will be to plant shade trees along the parking area, along the road leading to the inside of the building will be planted with palm trees as directions, and flower plants will be planted around the building to add aesthetics (Figure 7).

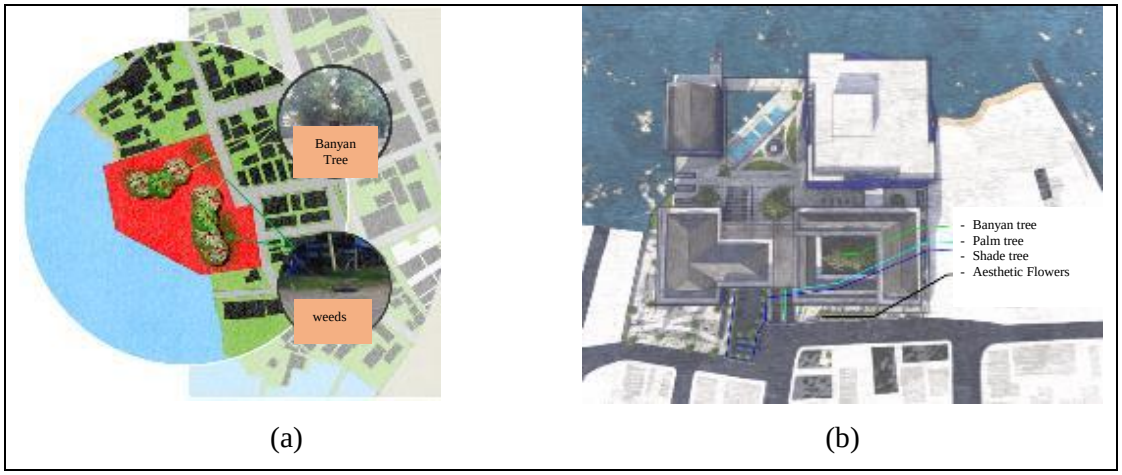


**Figure 7** (a) View Analysis View, (b) View concept

*Building Shape*

The shape of the building in question is an informative form so that the function of the building can be easily recognized. In this case, the application is carried out by designing the shape and facade of the building with a concrete metaphorical architectural theory approach (Tangible Metaphors), a fundamental representational theory that departs from the visual form and specifications of certain characters of a real object. The object used as a reference is the wave where the shape of the wave is taken because it is very closely attached to the function of the building and gives a good impression so that the building and its outer space or the site environment blend (Figure 8).

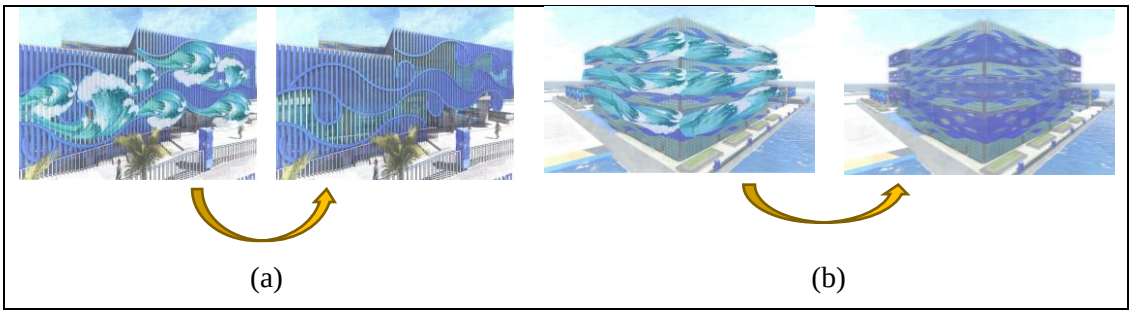


**Figure 8** (a) application of wave shape on secondary skin, (b) application of the wave shape to the building mass

The wave formation in question will be applied to the secondary skin design on the building facade. The repetition of the wave formation on the secondary skin gives a more dynamic impression on the face to get a more attractive overall shape (Figure 9).

(a) (b)

**Figure 9** (a) secondary skin as a facade builder, (b) secondary skin as a mass builder

The use of glass wall material around the building follows the transparent nature of water. Users can also feel the view like a water wave from the inside of the second skin that has been designed. The application of tones with shades of dark blue to light blue also implements the blue sea. It is made of an Aluminum Composite Panel (ACP), a rectangular panel combining aluminum plate and composite material (Figure 10).

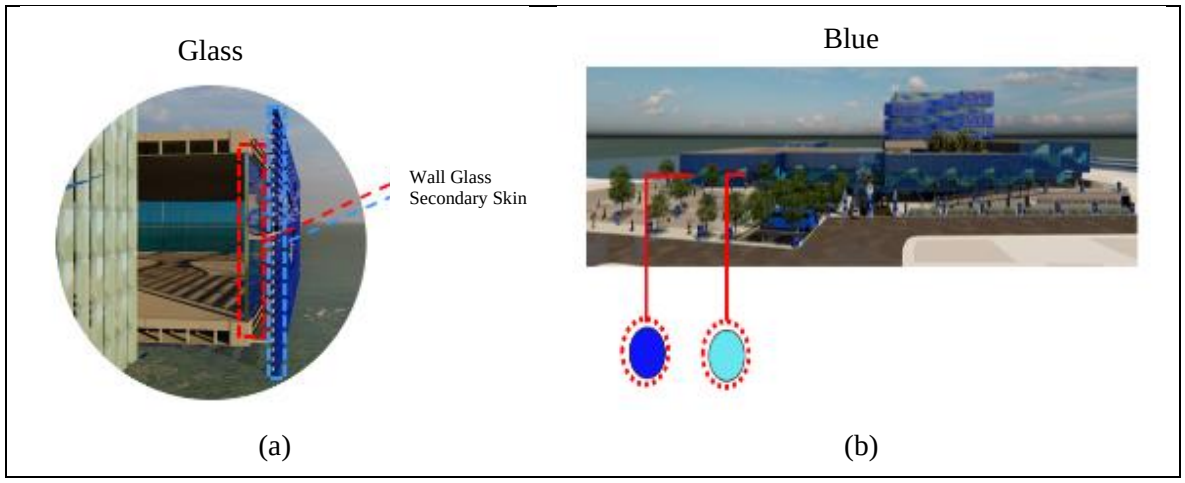


**Figure 10** (a) Application of the Metaphor on the walls, (b) Application of the Metaphor on the color of the building

### 4.3 Building Design

After collecting data, analyzing, and generating the design concept, applying the design concept, including the metaphorical architecture principles, to the Institute of Marine Sciences and Fisheries design can be seen in this section. The building site is divided into three parts. The first part of the building facilitates the circulation of vehicles and pedestrians to classify according to the privacy and use of the building (Building A). This building also accommodates the activities of administrative bureaus, libraries, canteens, and prayer rooms. Building B serves departmental, classroom activities, multipurpose facilities, and general laboratory activities. The last building (Building C) is aimed to facilitate laboratory activities related to marine sciences and fisheries (Figure 11).


**Figure 11** (a) Zoning, (b) Building A, (c) Building B, (D) Building C

Each side of the building will present the rhythm of the ocean waves, which are designed to be more dynamic [14]. The sea wave formation is implemented following the function activities in the building that want to create [15]. The figure is applied using secondary skin that covers the building. The use of the secondary skin is not only used as an aesthetic function but also as a form of response to the high level of sunlight reception on the site; the use of the secondary skin also functions as a deterrent to sunlight so that it does not directly enter the space in the building (Figure 12).


**Figure 12** **(**a) Front view, (b) Left view, (c) Back view, (d) Right view

From inside every room of the building, one can also feel the visual form of the ocean waves because each wall that limits the indoor and outdoor spaces of the building is insulated by a glass wall that allows room users also to see and feel directly the formation of ocean waves created by the use of the second skin (Figure 13).

(a) (b) (c) (d)

**Figure 13** (a) Academic bureau room, (b) Library room, (c) MUB room, (d) Classroom

## 5 Conclusion

Metaphoric architecture can be interpreted as an expression of form, manifested in the formation of masses, facades, and the meaning of buildings in the hope that it will cause a response from people who enjoy or use their work. In addition to the function of the building to be designed, it is closely related to the sea. The location of the design site is also directly adjacent to the sea, so the choice of a tangible metaphoric architectural theme by utilizing the analogy of the ocean waveform for the shape of the building is very appropriate so that the design can directly describe the function of the building and can blend with the space, outside the designed building. The theme of the building is applied in the design of the facade, the use of elements of the building's supporting facilities, and the use of materials adapted to the character and nature of the analogy of water or ocean waves. This study can benefit architecture students and architects interested in applying metaphoric architecture in designing a building. The successful application of tangible metaphoric architecture depends on the ability to capture the image or object, which can be related to the function of the building and translate it into the design of the built space.

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