

The Architecture of Dutch Colonial Office in Indonesia and the Adaptation to Tropical Climate

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Abstracts- Dutch colonization to Indonesian occurred for about 350 years. During this time, a lot of colonial buildings were built in Indonesia with various typologies and architectures which were developed in the era. It was the shape and typology of the building which was similar to the buildings in Netherland (17th century) or Europe and the architecture which was developed and influenced by modern architecture (20th century) that are developing in all over the world. In the early 20th century, Dutch architects started to work in big cities in Indonesia such as Jakarta, Surabaya, Bandung, Semarang, Medan, etc.

In its practice, the architects developed the building designs by considering the architectural character and local climate that is humid-tropical climate. The pioneer architects were CP Wolff Schoemaker, Henri Maclaine Pont, HP Berlage and urban planning architect, Thomas Karsten. These four architects were also known as the architects who popularized “Indisch” style [1]. The problem with tropical climate has been studied by the architects in Netherland and has been a component to design both private building such as house and public building such as office, hospital, school, worship place, etc.

For office building, especially, together with the development of modern architecture in many parts of the world, followed by the development of building technology especially concrete technology, the architecture of Dutch colonial offices become the area for Dutch architects to design the offices based on their ideologies. One of the mark is to design the buildings which are adapted to the tropical climate where the buildings are about to be developed.

Index term: Tropical architecture, adaptation, colonial offices

I. INTRODUCTION

The development of public building, especially offices, spurred in early 20th century along with the implementation of decentralization regulation which allowed the governors or city mayor to develop city facilities based on what was needed. Besides, by the implementation of free trade system in Dutch East Indies that allows free trade offices to open in big cities such as Jakarta, Surabaya, Semarang, Bandung, and Medan enable the rapid development of office building in those cities. The development of office building in these cities became a great opportunity of Dutch architect, mostly from Delft, to practice designing building based on the development of ideologies and architecture styles in that era.

Before 1990, the architecture in Dutch East Indies was dominated by colonial architectural style known as Empire Style. This style, popularized by Daendels in the end of 19 century, was originated from France and was freely interpreted in Dutch East Indies by considering the local environment and climate as well as the material availability on the area [4]. For almost a century,

Indische Empire Style was used for housing and public building that in the 19th century there was a uniformity of Dutch colonial architecture. By the arrival of Dutch architects in early 20th century, this style was criticized by, for example, P.A.J. Moojen who stated that Empire Style was an imitating work from Neo Hellenism style, a sadden and dull copy and example which only became a witness of a tasteless era and the absent of creation.

Based on the condition of Dutch East Indies architecture before the early 20 century and the experiences as well as architectural education in Dutch, these architects who worked in Dutch East Indies tried to develop various architectural designs which were adapted to the culture and climate in the local area also the international development of technology and architecture. The architecture styles growing in Dutch East Indies in the 20th century were, for example, transitional architectural design, art deco, de stijl, vernacular, modern and Indo European Style [1], [4]. The existence of buildings with various architectural styles appears

gradually based on the Dutch colonial architecture at that time. What was interesting for architecture at that time was the total renewal of architectural model which previously implemented “Indische Empire” style towards a modern colonial architectural design which was adapted to the local climate [4]. This article is a literature study on the adaptation of colonial office building toward the

tropical climate. The purpose of this study was to identify architectural elements that formed the Dutch colonial office buildings as a form of adaptation to tropical climatic conditions .

II. RESEARCH METHODOLOGY

This article is written based on the literature research on the development of tropical architecture on modern Dutch colonial architecture. The method used in the research is the literature review research method. The literature review is a complex process that can be defined as an interpretation of a selection of published and/or unpublished documents available from various sources on a specific topic that optimally involves summarization, analysis, evaluation, and synthesis of the documents [8].

Based on Onwuegbuzie et al. [8], the analysis method was used in the research is a within-study literature analysis. The analysis involves analyzing the contents of a specific work. In its most rigorous and comprehensive form, a within-study literature analysis does not merely involve analyzing the findings of a study or the major premise used in a non-empirical work. Rather, optimally, it involves analyzing every component of the work, including the title, literature review section, conceptual framework/theoretical framework, procedures used, results section, and discussion section.

The research used data from several kinds of resources, such as research articles, opinion articles, essays, article reviews, dissertations, books, internet websites and popular magazines. The data, then, analysed by narrative analysis method, by considering the potential of stories to give meaning to research findings, and treating data as stories, enabling reviewers to reduce data to a summary.

III. RESULT AND DISCUSSION

A. Dutch Colonial Architecture And Its Concern To The Tropical Climate

Indonesia is a tropical country, specifically humid tropical. This type of area is an area with tropical forest, monsoons and savanna with warm to humid temperature which is marked with a relatively high air humidity (often it is above 90%), high rainfall, and average temperature above 18°C (usually it is 23°C) which may increase into 38°C during the dry season. The gap between seasons is almost nonexistence except the period of less rain and more rain with strong winds [5]. The uniqueness of the environment with humid-tropical climate is marked with the relatively high humidity, temperature and the low speed and existence of wind [11].

The design for buildings in tropical areas are designed to fulfill the requirements of comfort for the inside room. The challenges to provide comfort to the inside room in tropical area is influenced by the nature condition and the tropical climate in the surrounding environment such as sun rays and building orientation, wind and air circulation inside the room, temperature and heat protection, rainfall and air humidity [2].

Historically, Indonesia has variances of traditional architecture which have anticipated the condition of humid-tropical climate such as the high angle of roof pitch to anticipate the high rainfall and solar heat radiation against the roof. The use of windows and doors with cross ventilation design for inside room circulation and elevated floor from the ground surface are to anticipate high humidity problem. The traditional house of Minangkabau (rumah Gadang), for example, has a high pitch roof with canopy, windows for natural air circulation with cross ventilation. Moreover, it is a panggung building of which floor is elevated far from the ground to reduce humidity. As does the traditional house in Java which has high roof pitch, porch with roof which serves as a transition room before entering the main house to penetrate the solar heat and to protect from rain. The windows and doors are designed in certain way to allow cross ventilation which provides comfort in the inside room.



Figure 1: Rumah Gadang, Minangkabau and Joglo, Java; the examples of Indonesian traditional houses which have concerned the tropical climate. (Source: Nas, 2009, <http://rumahadatkhadasdaerahjawa.blogspot.com/>)

The shape and layout of the traditional architecture in adapting with the humid-tropical climate have inspired the Dutch architects to develop the modern Dutch colonial architecture in various types of building [12] adds that the shape of colonial architecture is also compromised with the traditional architecture from Indonesia, thus it has its own identity and orientation. The wide opening, ceiling ventilation, and pitch roof, the existence of porch or gallery, and high density walls (heavyweight structure) are few of the specific characteristics of colonial architecture to maximize the natural ventilation during the day. The discussion on Dutch colonial architecture development during the colonial era involves the three progressive architects that are Wolff Schoemaker, Thomas Karsten and Maclaine Pont [7]. Even though disagreement on traditional architecture development exists, there is shared concern on the development of modern colonial architecture which considers the issue of humid-tropical climate as one of the aspects to consider in building design. It can be seen the early twentieth century that the architectural service is extended to fulfill the need of public building, commercial facilities and housing. The architects that mostly come from Dutch and work at private companies and/or at the Public Works Department under the colonial government, tend to apply neoclassical style, mostly with less modification to adapt with the local climate [6].

Based on Nas [7], the idea of tropical modern architecture development in Dutch East Indies was proposed by Wolff Schoemaker, an architect from Dutch East Indies, who expected to create a modern tropical architecture design in which design was improved by using the principles of Western architecture. The problems that were missed by the Dutch East Indies architects were the possibility of improvement in European style in architecture, a tropical style. Meanwhile, for Karsten [7], Javanese *pendopo* (pavilion) is an ideal shape: Different with European buildings, the climax from the room effects from the pavilion is the room-shape itself, regardless the ornaments. The climax is also seen in the exterior such as in the shape of the raised main roof. It exemplifies a holistic unity of great shape and meaning, expression and function [7]. In this case, one of the functions of the pavilion is to serve as a room to anticipate the issue of tropical climate.

B. The Adaptation To Tropical Climate Of Dutch Colonial Office In Indonesia

The consideration to adapt the tropical climate in designing colonial buildings has been stated by Handinoto [3], explaining that the colonial architecture in Malang during 1900-1915 had adapted the design to the local climate, especially against the solar heat and rain, and good ventilation. These problems were usually anticipated by building a gallery surrounded the building. Meanwhile, during 1915-1940 the characteristic of modern architecture was characterized by the use of flat roof, white color, etc. What is needed to be noted is that the colonial architecture design has considered the humid-tropical climate that, overall, this modern-characterized colonial architecture is totally different when compared with the modern architecture available in Dutch and Europe in general. Prianto et al, [9] mention that there are three principle perspectives of colonial architecture toward the humid-tropical climate in Indonesia. They include the perception of wind, sun and the influence of rainfall. The construction elements are made to address the problems of the stability of wind movement and rain protection, such as:

- Pitch roof to anticipate rainfall
- Corridor around the building to isolate heat, connect building and serve as shadowed area
- High ceiling with grids
- Ventilation system and windows which are opened widely and almost cover the wall of the building.

There are several cases of modern Dutch colonial offices in Indonesia which are designed by famous Dutch architect at that time which have considered the issue of tropical climate. The office of Nederlandsch Indische Spoorweg Mij (NIS) in Semarang (now known as Lawang Sewu building), which was designed by JF. Klinkkramer and BJ Quindag in 1902, is one of the first modern office buildings in Semarang. The main building mass is L-shaped with additional mass building in I-shape. The office rooms inside the

buildings are designed to have many doors but not windows. The window is only available in the highest room which serves as the hall. There are corridors surround the building to penetrate the solar heat and to freshen the air inside the building. This NIS building is designed by considering the tropical climate [12]. The characteristics of European architecture are still clearly seen in this building, which are seen from the shape and ornaments of the building. Nevertheless, the existence of surrounding corridors with the rooms with many doors portrays a massive adaptation to the condition of tropical climate. Javasche Bank office, which was designed by ED. Cuypers and Hulswit, was opened in Batavia (Jakarta). This building is characterized by Renaissance architecture marked by the ornaments[12]. The building has big doors and windows which harmonically designed to attain aesthetic function and optimum ventilation function inside the room. The elevated floor building from the ground surface and the high ceiling in the office are designed to attain comfort in the room. Behind the building, there is corridor with room which serves as circulation area and solar heat penetration and rain protection area [12]. The office building of Public Works Department (Gedung Sate) that was designed by J. Gerber in 1920 is an example of Indo-European style colonial office that is seen from the structure, scale and function, as well as the surrounding environment with the vast land that makes this building unique and becomes the area landmark nowadays.



Figure 2: NIS office which is known as *Lawang Sewu* Semarang. Designed by an architect JF Klinkkramer and BJ Quindag in 1902. Source: *Locale Techniek*, 7e Jaargang Nummer 2, March-April 1938, Bandung.



Figure 3: Javache Bank office, Batavia (now is Indonesian Bank office, Jakarta). Source: Sumalyo, 1993.



Figure 4: Public Works Department office (*Gedung Sate*), Bandung. Designed by an architect J. Gerber in 1920. Source: Nas, 2009.



Figure 5: Mayor Office, Surabaya. Designed by an architect C. Citroen before 1927. Source: Sumalyo, 2009.

The position of the building that is the middle of open space makes it an ideal condition as a building in tropical area. With the fresh air in its surrounding environment, the office rooms in this building are designed to provide comfort by the fresh air circulation inside the room. The mayor office building in Surabaya that was designed by C. Citroen had a long shape building with corridor in front of and behind the building. The leveled roof with hole is to make the room cool so that it can reduce the heat transferred through the ceiling into the room. There is a large space in the middle which serves as the room to welcome guests where air is circulated through the cross ventilation. The office building has a thick row of windows to allow smooth air circulation inside the room.

Yulianto [12] in his book entitled “Arsitektur Kolonial Belanda di Indonesia” (Dutch Colonial Architecture in Indonesia) writes about some modern colonial office buildings designed by Dutch architects who have considered the tropical climate as part of

their architecture design elements. The architecture elements of modern colonial office building in tropical area include the existence of alley or corridor with roof to penetrate the solar heat during the day and the protection from rain, window opening and wide door with a big volume of the space.

Almost all buildings, especially the big ones, have alleys which surround the rooms in the outside part. This part is multi-function that it serves as a connector and solar heat protection; as does the large roof with sharp pitch which sometimes consists of two layers with a gap to circulate the hot air. The rooms with high plafond are also one of the strategies to prevent heat inside the room. Therefore, it can be concluded that all of that particularities have made the characteristics of colonial buildings.

In Kota Lama Semarang, the office building of Jiwasraya Insurance is one example of a building that has been adapted to the tropical climate [10]. The office of Jiwasraya Semarang is the highest building in Kota Lama, the Old City of Semarang. The building mass is in L-shaped with a stairway in the central room is a 3-storeys void. The building is faced north right in front of Blenduk Church, which is the landmark of Kota Lama. The office building of Jiwasraya was designed by Thomas Karsten in 1918 with concrete-structure technology. The building mass in the south is surrounded by corridors, and a row of doors and windows are intermittently installed in the building wall. Above the doors and the lower windows, there are rows of windows which enlarge the open space of the building to smoothen the air circulation inside the building. The corridor or alley surrounding the building serves as circulation area outside the office room and as an area to penetrate the solar heat and to protect from rain which may enter the room. The building wall of the office with corridor is not thick (15 cm) with one type of window that is window glass. Meanwhile, the northern office room is a 2-storeys office. The wall is thicker (30 cm). There is a row of big windows in the building wall which consists of 2 layers. The outside part is window louvre whilst inside is window glass. The big windows are to ease the air circulation inside the room. The width of the building is not thick and the height of the ceiling is around 5.5 m. This condition makes a smooth air circulation inside the building and is able to provide comfort both thermal and visual comfort (see Figure 6 and 7).



Figure 6: The office building of Jiwasraya Insurance. The corridors are seen in the 3-storeys building. Source: private documentation



Figure 7: The corridor of Jiwasraya Insurance, as the area to penetrate solar heat and to protect from rain. The row of doors and windows are seen to support the cross ventilation inside the room. Source: private documentation.

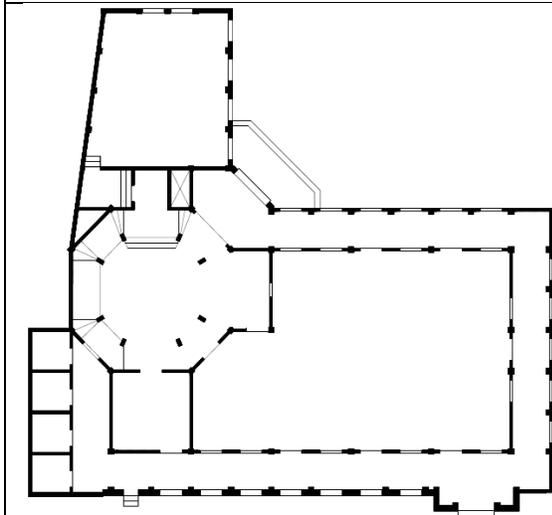


Figure 8: The typical sitemap of the 1st and 2nd floor of Jiwasraya Insurance office building. The corridor is seen to surround the main office room and the row of doors and windows to serve as the lighting system and cross ventilation inside the building. Source: private documentation.

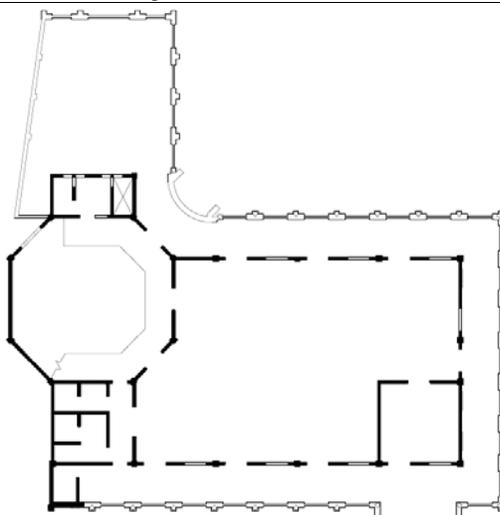


Figure 9: The sitemap of the 3rd floor of Jiwasraya Insurance office building. Source: private documentation.

IV. CONCLUSION

From the above discussion about the adaptation of Dutch colonial offices in Indonesia, it can be concluded that:

1. The design of Dutch colonial offices has considered the traditional architecture design to adapt itself with the tropical climate. The adaptation includes floor elevation, high pitched roof, wide window opening to ease the air circulation as natural ventilation.
2. The development of Dutch colonial offices style and variant from the early 20th century shows that all office buildings have made adaptation to the tropical climate.
3. The adaptation of the building design to the tropical climate in the colonial office buildings include the provision of corridor around the building for air circulation and for the solar heat penetration during the day, high pitch roof to make the roof cool and the use of wide doors and windows as well as ventilation to make the air circulation smooth which provides comfort to the building. The high ceiling makes the volume of the room large enough which reduces the heat inside the building.

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