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Study on The Influence of Colonial Architecture of Vernacular Environment

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Abstract

A traditional house is a symbol that represents a certain environmental area with their culture. However, there is a number of urban configuration in DI Yogyakarta that reflects the influence of Dutch colonization (1816-1941). This is characterized by a collection of contrasts and overlays of different forms of architecture and urbanism. This legacy of colonial architecture and urban planning has ignited different perspectives on the sustainable development of rural areas and the diversification of the rural economy. The purpose of this study was to examine and identify the Limasan house of DI Yogyakarta with a pyramid-shaped roof as its hallmark. Therefore, using a qualitative research method, that of grounded theory, the different influences of colonial architecture for sustainable design development in line with research objectives were investigated. The results showed the identification of factors that influence the well-being of buildings' residents and the interaction of the external and internal environment of buildings. This current study contributes to shedding light on the meaning and representation of Yogyakarta's Limasan house design with a scientific approach.

Keywords : Colonial, Vernacular, Limasan Design, Urbanism, Sustainability

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1. Introduction

Indonesia is a vast country with diversified climatic, topological, and sociocultural conditions. Yet each region has a vast knowledge base about resilient built environments, in the form of its splendid yet mostly unmapped vernacular built environments (Ghoreishi et al, 2021). Vernacular built environments in Indonesia are centuries old and have sustained many natural disasters, thus proving to be resilient. This embedded knowledge in the existing vernacular settlements has evolved over a period of time with a good deal of experimentation by the locals and thus has stood the test of time (Dayaratne, 2018). Considering the inherent resiliency, the vernacular built environments can be adapted appropriately in the changed sociocultural scenario. The study of vernacular built environments can generate an indigenous approach to the resilient design of contemporary built environments (Al-Kodmany, 2022) . Vernacular settlements at times were regarded as a romantic and engaging heritage from the past, but they have turned out to be remarkably enduring and thus resilient (Xiao-Ling Jin et at, 2022). Vernacular traditions that have been recognized and encouraged, appropriately supported and serviced, augmented, and complemented may prove to be the only realistic and sustainable solution to the housing and building demands of the future (Joohyun Lee et al, 2020).

In Indonesia, there is a Special Region of Yogyakarta as a province that gives historical power identity as one of its main well-known characteristics. Yogyakarta became one of the areas that are the center of history . Nugroho and Putri (2023), referred to_Yogyakarta's authenticity as an extrinsic process to emphasize its cultural connotations term "value" to the heritage of buildings at a given time and place. This implies that value involves understanding the nature of the valued object, intrinsic values –shape, textures, materials- of the original creation, or "static authenticity" the one once acquired by an object (Juan A. García-Esparza, 2019). One of the traditional residential buildings in Yogyakarta is the Limasan House which has a uniqueness with certain rules. Limasan buildings, according to old texts on Javanese architectural house buildings, are developments from Joglo-shaped buildings (Tohar et al, 2019). From the Joglo-shaped building then it-develops by doubling the size both on the long side and on the short side.

As a vernacular architecture, Limasan house consists of building elements that respond to its natural environment and represent the social and cultural values that the locals hold. Limasan house, to be specific, is more widely used in the Javanese residents compared to the Joglo house which is mostly owned by the upper-class community and the Keraton (Rohmah, 2020). It has simpler ornaments that represent the simple personality of the people. Although it has a slightly different room configuration and roof shape than Joglo, some historical sites have both typologies in the same location. For example, the Ndalem Ngabean Hotel and Resto. The Hotel is located at Ngadisuryan Street close to the southern square (Alun-Alun Kidul) of Yogyakarta. The hotel was previously built as the royal residence (Ndalem) for prince Hangabehi, the brother of Sri Sultan Hamengkubuwana VII (Zarkasi; Panindias, 2016).

So far, there hasn't been found any source that provides information regarding the year Ndalem Ngabean was built but we can assume the possible range of the built year by the life of Sri Sultan Hamengkubuwana VII himself. With that being said we can assume the Ndalem was built around the end of the 19th century to the beginning of the 20th century. The Dutch had already around by that time and signed the Gianti agreement that officialized the Province of Yogyakarta and started the sultanate of Yogyakarta (Jogjakota.go.id). Therefore, it is not surprising if there was found any influence of the Dutch Colonial Architecture to the architecture of Ndalem Ngabean. The Hotel in recent time consists of several masses, including a Joglo (Pendhopo as its main attraction) and a Limasan (used as the management office). As one of the remaining preserved Keraton site, Ndalem Ngabean holds an important role in keeping the historical value of Yogyakarta. The fact that there are indications of colonial influence in the architecture of Limasan may lead us to analyze and understand better the history of this Nusantara architecture house and the affect on the further development of Yogyakarta's traditional architecture.The principal purposes of this study were to:

- Search and determine the aspects of Limasan House in Ndalem Ngabean as a form of Nusantara architecture and historically significant building-

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-which was influenced by Colonial Architecture.
- Study the effect of Colonial Architecture features on the cultural meaning of the traditional Limasan House; and
- Analyze and assess the consequences of acculturation between Nusantara and Colonial Architecture to the cultural meaning of Limasan House.

2. Research Methods

The research method used in this paper is literature study and field study conducted at Ndalem Ngabean Hotel and Resto located in Ngadisuryan Street close to the southern square (Alun-Alun Kidul) of the Special Region of Yogyakarta. Furthermore, observation is made-to the object that is used as the study case which is Limasan House of Ndalem Ngabean Hotel and Resto to gather information needed to complete the paper. The observing time was done over three consecutive days to gather thermal information, building structure and configuration, material, and building typology, and was carried out during the rainy season.

3. Literature Review

3.1 Elements of Yogyakarta Vernacular Architecture in Limasan House

The Special Region of Yogyakarta is located in the southern part of Central Java. Astronomically, the Special Region of Yogyakarta is located between: 7°33' - 8°15' South Latitude, 110°5' - 110°48' East-

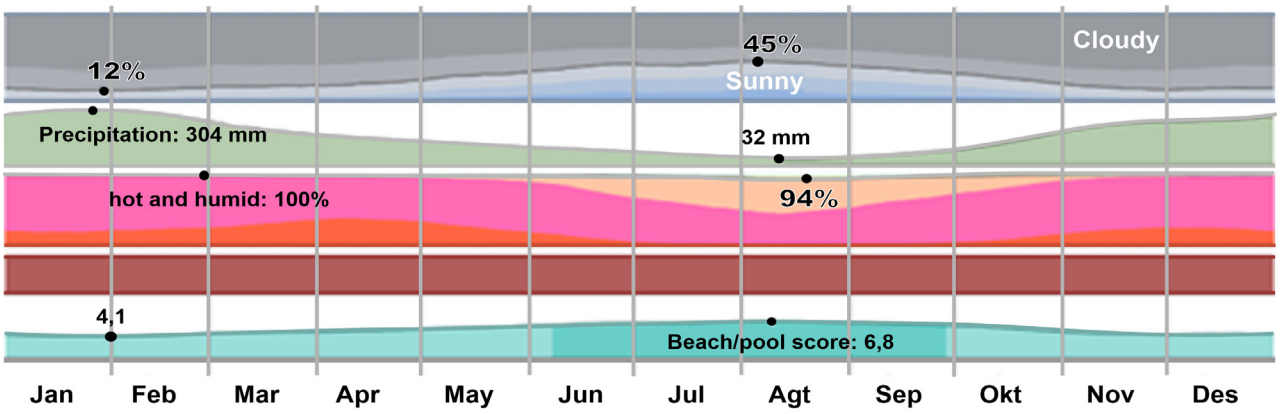


Figure 1. Monthly average weather in yogyakarta (Source: id.weatherspark.com)

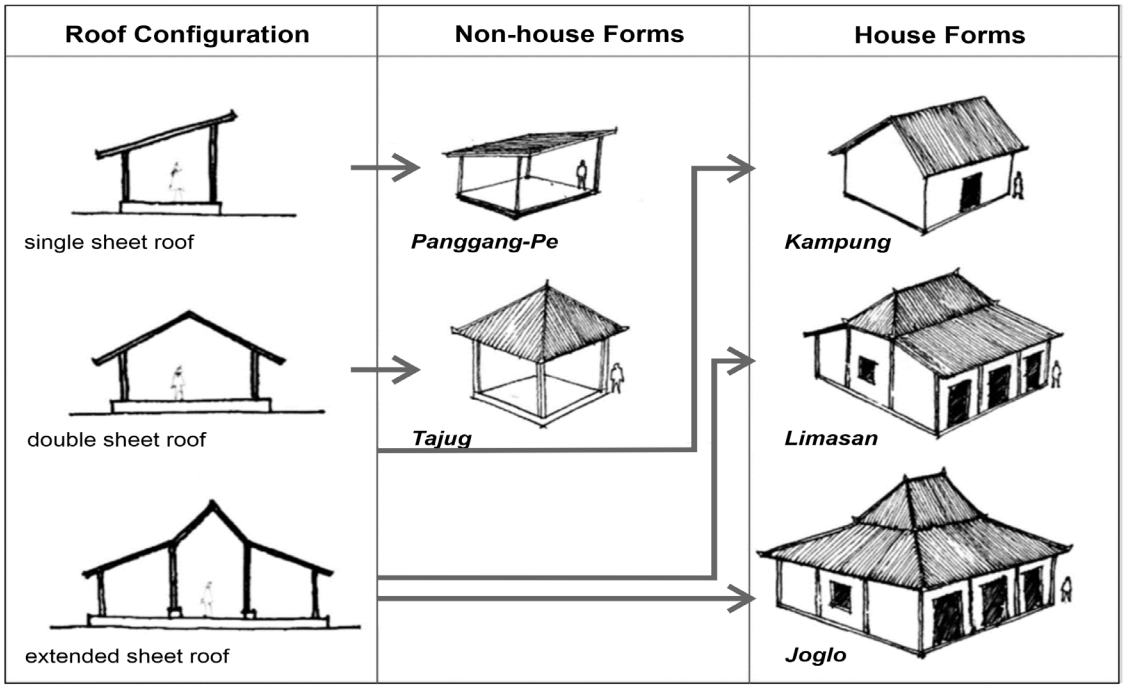


Figure 2. Primary traditional forms of javanese buildings (Source: Idham, 2018)

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-Longitude. It has a temperature range between 23°C - 31°C and a rainfall intensity range between 32 - 304 mm/h. The Special Region of Yogyakarta also has a monthly average humidity range between 81% - 90%. There are 2 seasons in the Special Region of Yogyakarta which is the summer season, starting from April to October and the rainy season from October to April.

The area of the Special Region of Yogyakarta is about 3.185,81 km2 and is divided into one city area and four districts, namely The City of Yogyakarta, Regency Sleman, Bantul Regency, Kulon Progo Regency and Gunung Kidul Regency. The Limasan House at the Ndalem Ngabean Hotel & Resto is located in the Yogyakarta City area. Yogyakarta City area is a small area sloping to the south with a mean elevation of 144 m above sea level. It has caused the city of Yogyakarta to not easily have puddles of water or flood.

In the Special Region of Yogyakarta can be found various of Javanese traditional houses with different typology. It can be distinguished mainly by the shape of the roof and the division of spaces. Starting from the highest level, the form arrangements of Javanese housing typology are Tajug (mosque), Joglo (noble class), Limasan (middle class), Kampung (ordinary people), and Panggang Pe (common people). Hence, the different types of Javanese housing typology indicates the social and economic status of the homeowner (Orbita, 2012).

Limasan House is a continuation of the development of the form of the existing building. Accordingly, there are 16 different types of Limasan Houses differentiated by the roof shape yet still-forming a similar building known as Limasan House (Wibowo, 1998). These roof variations are adjusted to the local customs of the region but still hold Javanese views of life mainly about living in a harmonious society (Rohmah, 2020).

Limasan House structures as well as other vernacular building structures are generally made from natural and domestic materials such as wood and stone. The structural configuration of Limasan House is also almost the same as Joglo yet there is no arrangement of beams called tumpangsari in the Limasan structure. The word limasan itself is taken from the word lima-lasan, which is adapted from the Javanese Language and is a simple calculation of the measurement of the structural elements: molo 3 m and blandar 5 m. Furthermore, if the molo is 10 m, then blandar must be using a size of 15 m (limasan = fifteen = 15) (Wibowo, 1998). Molo is the beam that is located at the very top and is considered the head of the building while blandar is the pillar that supports the roof.

The structural system in the Limasan House consists of several components that work simultaneously so each component has a function differently and consists of a column, beam, roof, and umpak that holds the roof. Correlating the meaning and the structure of the Limasan which is made of full walls (not an open space), it creates private space for many rooms such as senthong, pawon, gandhok, and pekiwan, and it represents that the occupants protect their privacy but still open to guests. The concepts of space in the Limasan House also show the personality of the Javanese people who have simple personalities and value harmony-



Figure 3. Compound House as an example of transitional colonial architecture floor plan (Source: Singapore: Archives and Oral History, 1984)

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-(Rohmah, 2020).

3.2 Elements of Colonial Architecture Style

In the context of the time period, Yogyakarta was under the government of the Dutch therefore the colonial architecture style carried specifically is the Indische architecture. This style then developed into Indische empire architecture, the more adjusted to local context version, after the reign of H. W. Daendels who brought the influence of the French empire architecture style (Handinoto, 2010). It was then developed further into transitional architecture style during 1890-1915 (Handinoto, 1998).

The floor is determined by symmetrical plan with terrace. Symmetrical shape offers easy spatial connections and the terrace is a form of adaptation to the local climate (Mahabella, 2017). The column style in Indische Empire style was heavily influenced by Greek architecture and the influence reduced during transitional era. The facade appearance consists of gevels and tower. The material used is mainly bricks for both columns and walls and wood for horses, frames, and doors. However, the use of glass material was not as popular during this era (Handinoto, 1998). The structural system uses bearing wall construction. The material and-



Figure 4. Lawang Sewu Facade showing transitional architecture features (Source: heritage.kai.id)



Figure 5. BNI 1946 building in KM 0, Yogyakarta (Source: kebudayaan.jogjakarta.go.id)

-structural system is used according to the original colonial building in the place it came from which are constructed to withstand the extreme weather of the subtropical climate.

4. Results and Discussion

4.1 Structure and Construction

The structures and constructions that formed in Ndalem Ngabean Hotel & Resto also give influence to the meaning of the Limasan House. The design consideration made in designing the Limasan House and the meaning contained determines how a Limasan House is built in accordance with the philosophy of Javanese society about simplicity. Some aspects of structure and construction that have meaning in accordance with this philosophy include:

4.2 Wall

The wall acts as a structural aspect. The wall at the pringgitan perimeter is 50 cm thick double stack brick wall and the rest of the walls separating the spaces are 15 cm thick brick wall. The thick wall provides a noise blocking feature, creating a private space for the user inside the house. The wall material and thickness also work as micro climating strategy to provide thermal comfort to the occupant inside the house.

Double stacked brick mainly respond to the thermal aspect as the colonials (Dutch) has 4 seasons which typically have lower temperature compared with the Limasan that have higher temperature. The original traditional Limasan wall is not supposed to be structural and the materials used are wood (Gebyok), bamboo (Gedhek), or brick (Tembok) (Kusuma & Damai, 2020). The full use of brick and the existence of bearing wall construction indicates that this aspect of Ndalem Ngabean's Limasan is influenced by Colonial Architecture.

4.3 Column

The structural system that supports the front part of the roof over the emperan space is wooden column and beam. The wooden columns are also connected to the wooden terrace fence similar to the traditional design. The columns in the connecting hall to the Joglo's pendhopo also have traditional wooden design with umpak (stone base) with traditional Javanese carving on it. Yet at the center of the Emperan, supporting the roof along with-

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(a) (b)

Figure 6. Ndalem Ngabean Limasan's Pringgitan wall (a) and Lawang Sewu's corridor wall (b) [Source: emakmbolang.com, 2015 (b)]



(a) (b) (c)

Figure 7. Ndalem Ngabean Limasan's wooden column (a), Ndalem Ngabean Limasan's concrete column (b), and Greek doric column (c) [Source: thoughtco.com, 2019 (c)]

-the bearing wall, there are two concrete columns. The design of the concrete column is similar to the colonial doric column with the visible vertical line work. This indicates the influence of colonial architecture on half of the structural system of the Emperan.

4.4 Ornament

The Limasan's ornamentation consists of simpler sculptures compared to Joglo that have much complicated ornament because of the philosophy and the culture itself. The Limasan House have fewer elements in the ornament so that the limasan won't show magnificency among the people around it. It is also to adjust with the economic capabilities of the users, who generally are ordinary people-with neutral degree (middle class) in society. The colonial architecture ornamentation is known forits doric pattern. Meanwhile, the ornamentation of this Limasan are traditional sculptures as its ventilation and patterned tile on its wall. This aspect of Limasan still maintained its original traditional design.

4.5 Roof

Roof is an important structure to withstand the Limasan House from rain and give thermal comfort to the users by blocking sunlight and having sloped shape to help minimize rain that forced onto the structure. Furthermore, it also minimizes the chance of structural damage by giving aerodynamics to the shape. According to the philosophy of the Javanese-

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Figure 8. Ornament Used in Limasan House

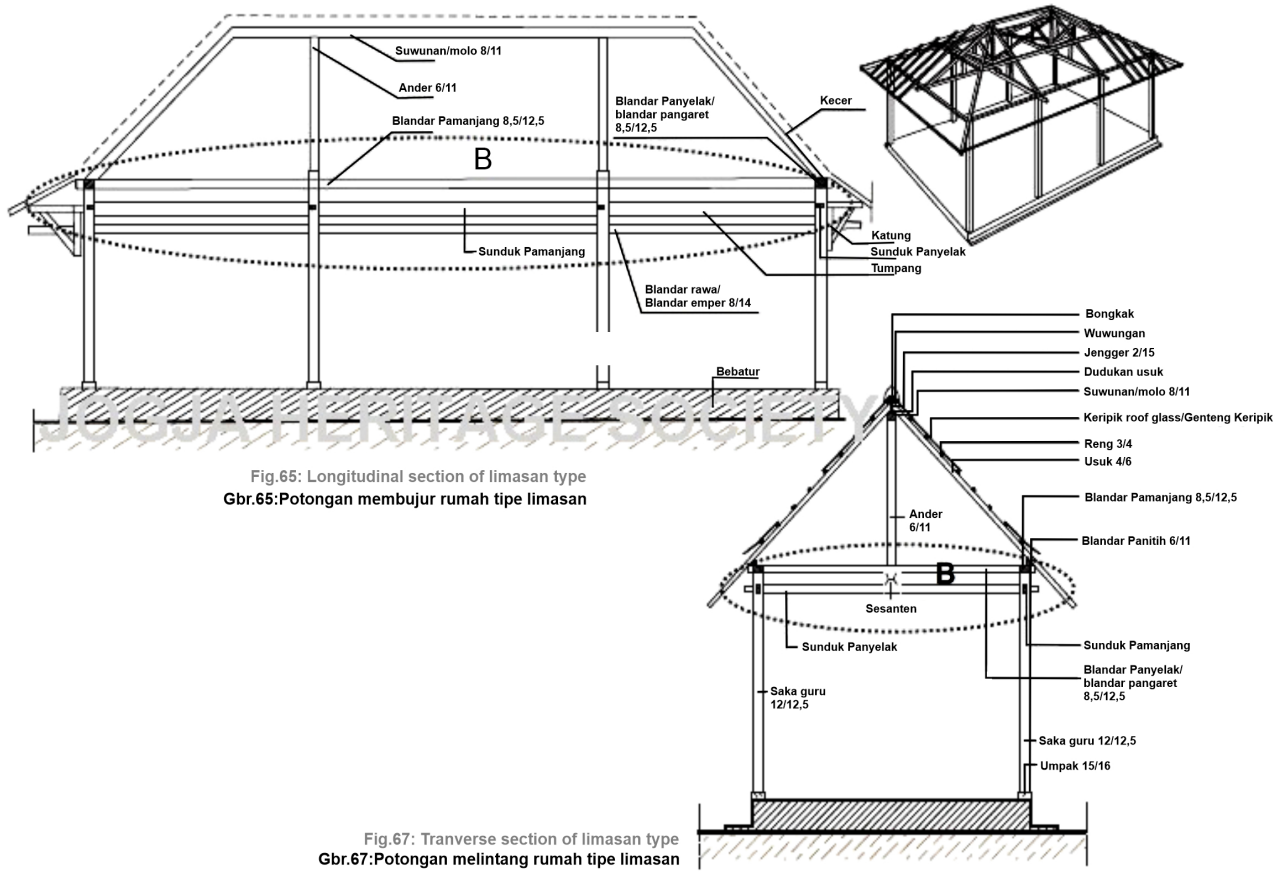


Fig.65: Longitudinal section of limasan type
Gbr.65:Potongan membujur rumah tipe limasan

Fig.67: Tranverse section of limasan type
Gbr.67:Potongan melintang rumah tipe limasan

Figure 9. Roof Structure of Limasan House (Source: budaya.jogjaprov.go.id)

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Figure 10. Inner Roof Structure of Limasan House



Figure 11. Limasan House's Roof

-people that have simple lifestyle, it affects the complexity of the roof structure of Limasan House by having less complicated by removing tumpang sari as part of the structure to reduce construction time.The location of the Limasan House in the Special Region of Yogyakarta, which has a tropical climate, influences the structure and construction of the house. The relatively high temperature in Yogyakarta requires that the Limasan House acts- as a shelter that is able to provide comfort to its occupants. Appropriate passive cooling should be integrated into the design to achieve air comfort. Roof and shading is the essential element for reducing solar heat, while openings and interior space arrangements are needed for air movement.

4.6 The Meaning of Limasan House

The meaning configuration of Limasan House in-

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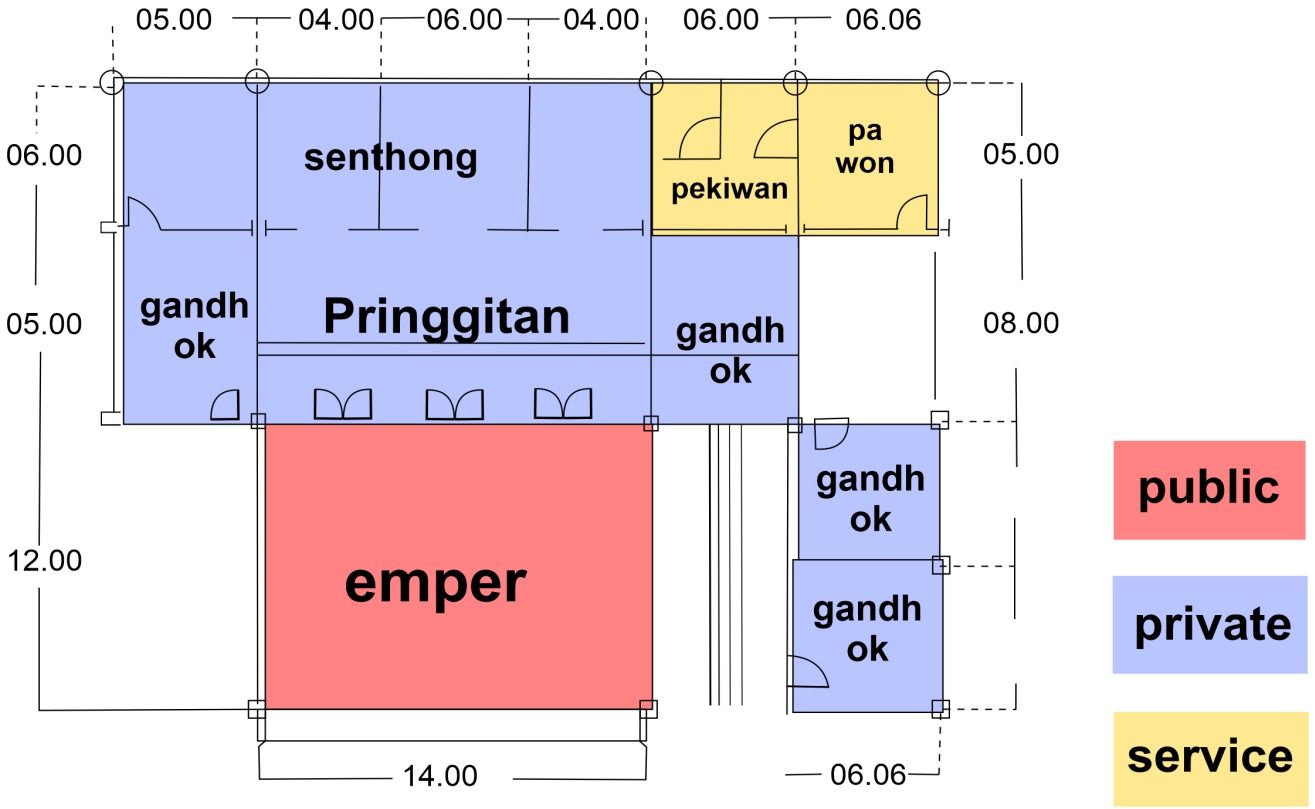


Figure 12. Spatial Pattern of The Limasan House

-the Ndalem Ngabean Hotel & Resto is divided into 2, the meaning from internal factors and from external factors. Internal factors are based on the elements of the building such as spatial pattern, wall, door & window, ornament, and roof. Meanwhile, the external factors are based on the Javanese view of life, beliefs, norms, and harmonization principles.

The distribution of Javanese traditional houses is Joglo, Limasan, and Kampung, influenced by spatial patterns so that they have certain meanings and symbolism. The simple personality of the people can be seen clearly in the Limasan House. Limasan House has certain spaces such as emper (verandah), pringgitan (transitional area), gandhok (storage area), pawon (kitchen), pekiwan (bathroom), and senthong (bedroom). (Fajrina, et al., 2017). The space configuration of the house is also arranged based on the zonation that is public, semi-public, and private. The walkthrough shows the hierarchy by passing through pendhopo, pringgitan, and senthong.

Limasan House design reflects on the Javanese humble personality. Compared to the more magnificent design of the Joglo house, the Limasan House tends to use simpler colors, ornaments, and materials. It also has simpler material usage-to reduce the construction time so it has more fast construction because the traditional Javanese house, especially the Limasan, has a neutral degree in terms of ownership (kasta). It also means that the Javanese in rural areas have humbler personalities compared to Javanese people who live in cities.

Javanese people have their own rules for regulating every attitude and behavior. They can't have an attitude of wanting to win alone and have bad habits such as kumpul kebo. This implies that Javanese culture actually has a noble value. The Javanese also have these norms which are the house is adjusted to the usual manners. The front of the house (emper) is made lower with the aim that the guests have manners towards the host.

4.7 The Effect of Colonial Architecture

One of the Colonial Architectural influences that are quite prominent in the Limasan House in the Ndalem Ngabean Hotel & Resto is the wall. Limasan House at first only used gebyok or wood and gedhek or bamboo as their walls depend on the resource available in nature. However, Limasan House in the Ndalem Ngabean Hotel & Resto uses brick as its walls and column instead of wood. The structural size also indicates the influence of-

-Colonial Architecture. The bearing wall in the Limasan house has a size of 50 cm which is bigger than other vernacular buildings originated in Ndalem Ngabean that use wood material. These large scale building elements give the Limasan House a magnificent impression that slightly shifted the view of life of the Javanese people which is simple. The finishing of the Limasan House also exudes a hint of colonialism by the use of white painting.

5. Conclusions

Nusantara Architecture after colonialism has differentiation because of the influence that affects how Nusantara architecture mainly builds around the colonialism era. For example, colonialism influences the building style and the use of materials in the Limasan House that is chosen to build. Colonialism also affects the structural aspect of Nusantara architecture, including the Limasan House. In Ndalem Ngabean's Limasan as the study case, it is shown that colonial architecture affects some features of the structure. The wall structure that originally consists of wood or bamboo and it changed to the use of double-stacked brick in the wall structure as it was built around the colonialism era. Another aspect that got influenced by the colonials is the disappearance of the low-height opening in front of the house (emper) that originally was made lower, so the guest can lower their body to respect the host as it was a culture in Javanese to respect each other. In conclusion, the influence of Colonial Architecture has positive consequences especially in terms of building durability and firmness. However, there are also negative consequences in reducing the Javanese value and traditional significance of the house.

Author Contributions

Data curation, T.C.J. and D.N.; investigation, T.C.J.; methodology, H.F.; supervision, H.F.; validation, H.F.; visualization, T.C.J.; writing-original draft, T.C.J.; writing-review & editing. D.N. All Authors have read and agreed to the published version of the manuscript.

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Reference

Al-Kodmany. (2022). Sustainable High-Rise Buildings: Toward Resilient Built Environment. https://doi.org/10.3389/frsc.2022.782007

Dayaratne R.(2018). Toward sustainable development: Lessons from vernacular settlements of Sri Lanka. https://doi.org/10.1016/j.foar.2018.04.002

Fajrina, et al. (2017) Pola Ruang Dalam Pada Rumah Tinggal Tradisional Jawa di Desa Brayut, Yogyakarta, Jurnal Mahasiswa Jurusan Arsitektur, 5(1), 1-7, Department of Architecture, Universitas Brawijaya, Malang.

Ghoreishi et al. (2021). An Analytical review on the theory of smart resilient city and its applicability. https://doi.org/10.22059/JFAUP.2021.329235.672671

Handinoto .(1998). Arsitektur Gaya Indo Eropa TH. 1920 an di Indonesia. Surabaya: Dimensi Arsitekturs, Universitas Kristen Petra.

Handinoto .(2010). Arsitektur dan Kota-kota di Jawa Pada Masa Kolonial, Penerbit Graha Ilmu. Yogyakarta.

Juan A. García-Esparza.(2019). Beyond the intangible/tangible binary: an analysis of historic built environments in Valencia, Spain. http://hdl.handle.net/20.500.12251/1615

Joohyun Lee, et all.(2020). Journal of Building Engineering : Benefits of solar photovoltaic systems for low-income families in social housing of Korea: Renewable energy applications as solutions to energy poverty. https://doi.org/10.1016/j.jobe.2019.101016

Idham, N. C. (2018). Javanese Vernacular Architecture and Environmental Synchronization Based On The Regional Diversity of Joglo and Limasan.<https://reader.elsevier.com/reader/sd/pii/S2095263518300384?token=28F3F1094B3160C994CD47B22D4A9EE397DA46CCBF77BC6A9FA84B9A9A9C3DE3FAD51E8C17C102248C30CC40F0471E85&originRegion=eu-west-1&originCreation=20221207015806> (Accessed on December 6, 2022)

Indartoro, L .(1988). Pengaruh Arsitektur Kolonial pada Bangunan Dalem di Yogyakarta, Unpublished Thesis, Fakultas Teknik Universitas Gadjah Mada, Yogyakarta.

Mahabella, et al. (2017) Spatial Configuration on Colonial-Style Dwelling in Kidul Dalem Malang, International Journal of Scientific & Engineering Research, 8(5), 1269-1274, Universitas Brawijaya, Malang.

Nugroho, F. A., & Putri, A. R. A. (2023). The Overview

of Culinary Tourism in Yogyakarta City from the Perspective of Experiential Value. International Journal on Recent Trends in Business and Tourism (IJRTBT), 7(1), 18-33. https://doi.org/10.31674/ijrtbt.2023.v07i01.002%20

Rohmah, K. R. (2020). Wujud Kebudayaan Jawa dalam Bentuk Rumah Limasan, Jurnal Mazharat, 26(2), 388-405, IAIN Ponorogo Jawa Timur, Ponorogo.

Tohari, et al.(2019). International Journal of Civil Engineering and Technology : Traces of Transcendental Space As Components to Preserve Yogyakarta Palace's Meaning, Vol 10(3), pp. 1461–1470.http://www.iaeme.com/ijmet/issues.asp?JType=IJCIET&VType=10&IType=3

Wibowo, et al. (1998). Arsitektur Tradisional Daerah Istimewa Yogyakarta, CV. Pialamas Permai, Jakarta.

Xiao Ling Jin, et all.(2022). International Journal of Information Management : The impact of cover image authenticity and aesthetics on users' product-knowing and content-reading willingness in social shopping community. https://doi.org/10.1016/j.ijinfomgt.2021.102428