

The contextual form of the campus center design in Bandung Institute of Technology area

Raden Asep Ahadiat Gandawijaya* 

Interior Design Study Program, Universitas Bina Nusantara
Jl. Pasirkaliki no. 25-27, Paskal Hyper Square, Kebun Jeruk, Bandung, Indonesia



| ARTICLE INFO | ABSTRACT |
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| <p><i>Article history:</i> Received July 08, 2020 Received in revised form August 30, 2020 Accepted November 02, 2020 Available online April 01, 2021</p> <p><i>Keywords:</i> Archetypes Campus center Contextual form Ordering principle</p> <p>*Corresponding author: Raden Asep Ahadiat Gandawijaya Interior Study Program, Universitas Bina Nusantara, Indonesia Email: r.gandawijaya@binus.ac.id ORCID: https://orcid.org/0000-0001-8419-3329</p> | <p><i>Contextual architecture is a concept used in creating building design and functions with due consideration for local characteristics to ensure sustainability with the surrounding or pre-existing conditions. The Bandung Institute of Technology (ITB) campus is divided into three zones which are heritage or traditional, transition, and modern. A building is, however, located between the heritage and transition zones which are known as the Campus Center and considered to have damaged the zoning division on the master plan for the area due to the presence of new modern building designs. This study was, therefore, conducted to determine the common thread existing between the Campus Center and the surrounding two zones, the heritage zone with the West Hall case, and the transition zone with the engineering laboratory V case. Descriptive, analytic, and interpretative methods, with contextual theory, archetypes, ordering principles were used and the results showed the three buildings have a common thread which includes the roofs, columns, hallways, and corridors but only the Campus Center has columns, hallways, and corridors. The findings of this study are expected to provide theoretical and pragmatic benefits for writers and readers. Theoretically, the object dissection knowledge with archetypes and order elements to obtain the contextual forms of the building was provided while the pragmatic aspect focuses on understanding the contextual form of modern buildings.</i></p> |

Introduction

The Bandung Institute of Technology is one of the campuses having a long history of building academic facilities in Indonesia with several renovations observed in its structures (Ashrawi 2013). The first master plan for the campus was designed by a Dutch architect, Henri Maclaine Pont (Savitri 2009) and some developments have been made based on a sense of identity and place (Hikmayuni 2012) to create harmony in the buildings within the campus area (Mahatmanto 2002). In 1970, Prof. Slamet Wirasonjaya and his team compiled the developments and renovations (Winarno ; Yuswadi Saliya 2018) as well as the

master plan and divided the whole campus into three zones which are the heritage or traditional, transition, and modern zones (Hudrita 2011).

The heritage or traditional zone covers the area starting from the front gate of the campus to the Civil Engineering and Physics area as well as the West and East Halls designed using Indisch architecture (Sitorus 2017). The transition zone has a twin engineering laboratory building in the Plaza Widya area consisting of technical laboratories V, VI, VII, VIII built using the same roof forms observed in the West and East Hall (Widiastuti 2015) but materials used reflect modern times (Pangat 1994) such as the synthetic material which is similar to shingles made in a

factory. Meanwhile, the modern zone consists of the Blue Engineering Laboratory building with its double helix stairs, the PAU building, and the ITB Central Library.

A modern building has, however, been erected between the heritage and transition zones known as the Campus Center building or CC and often considered damaging to the design of the previous master plan due to its visual inconsistency with the zoning context (Hudrita 2011).

This study was, therefore, conducted to dissect the design of the Campus Center visually with respect to 1 building in the heritage zone and another in the transition zone. The Campus Center has two buildings with the one located on the Westside reflecting the Eastside and vice versa and the same was observed with the West and East Hall in the heritage zone while there is an engineering laboratory building in the transition zone. Samples for this research were selected on one side with the focus placed on the buildings in the Westside. There is, however, no specific reason for the selection of this side for discussion but it is important to state that one side of the building represents the other.

This research showed the common thread between the Campus Center and regional master plan designed to develop the Bandung Institute of Technology area and also to determine the contextual form of the Campus Center when viewed from its placement between the heritage and transition zones.

The Campus Center is observed at first glance not to have any relationship with the preexisting zone concept with the materials used and forms displayed representing a modern zone. This study, therefore, dissected the building's contextual form based on contextual architectural theory to avoid viewing the structures only with the naked eyes without a concrete analysis.

Method

A descriptive qualitative method was used in the case studies with the data collected through direct observation and literary or reference studies on the research object which is the Campus Center building located between the traditional zone where West Hall was used as the object and the transition zone where Engineering Laboratory V was used. The data were analyzed through the observation of the physical architectural elements

in the main object after which a comparison sample was made to determine its contextual form.

Architectural elements are physically defined as the conditions of operation for architecture while space is formed by a boundary (Salura 2010) with an immediate separation observed between the inner and outer space and the relationship determined using several elements such as the limiting quality (Ching 1996) of floors, walls, ceilings, aesthetics, openings, lighting as well as the reference to the design principles such as the proportion, scale, balance, harmony, unity, variety, rhythm, and emphasis of spaces (Ching 2007). Moreover, archetype theory was used to understand structural patterns (Thiss-Evensen 1987), classify variations in architectural elements, and describe each variation to prove the existence of a common language of form.

The structure was analyzed comprehensively from a tectonic perspective (Frampton 2001) using four forming parameters which are the articulation of material talents, joint load expressions, elements, and the manufacturing process (Mangunwijaya 2009). The relationship between the structure and architecture is generally divided into exposed, hidden, appreciated, and unappreciated (Frick 1997). The exposed and appreciated structures include ornamentation and architecture, exposed and unappreciated involve an ornament, hidden and appreciated consists of the form's producers while hidden and unappreciated are the neglected structures.

Contextual architectural concepts are usually used to present the unity between a building and its surroundings and this is evident from the physical aspects such as the form, mass, pattern or rhythm, and ornament as well as the non-physical form such as the function and philosophy. However, this research only focuses on the physical aspect of the contextual form. Moreover, the keywords used in describing the context in the architecture for the studied area were the surrounding, part of the whole, respecting what is already there.

Contextual architecture involves attention and a combination of both the physical and non-physical elements to define the surrounding environment as a single space. This is in line with the findings of Christopher Alexander that every pattern defined needs to be formulated in an arrangement to form a relationship with a context (Alexander 1979, 253). The concept further includes planning and design with consideration

for the problem of visual continuity between new buildings and the nuances of the surrounding environment. It also shows the difficulties in creating harmony between buildings with different times and styles, in an adjacent location (Brolin 1980).

Result and discussion

The Bandung Institute of Technology area has an initial zoning pattern consisting of traditional, transitional, and modern zones before the construction of the Campus Center stands between the heritage and transition zones. For the purpose of this study, two additional buildings located in heritage and transition zones as shown in figure 1 were used as a comparison to determine the relationship between the Campus Center design and the context.

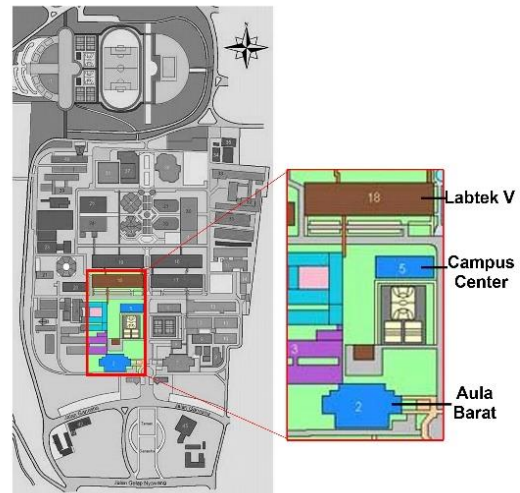


Figure 1. Position of campus center against engineering laboratory V and West hall in the ITB area map

Character

The building masses in the West Hall, Engineering Laboratory V, and Campus Center were found to have the same tendency to be elongated with the basic rectangular shape clearly visible in the Engineering Laboratory V and Campus Center while the West Hall transforms from a rectangular shape as shown in table 1. Moreover, the longer side of the building faces North-South while the shorter side faces the East-West direction.

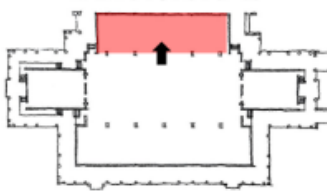
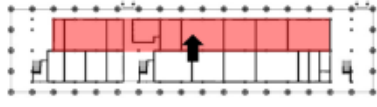
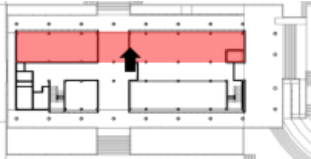
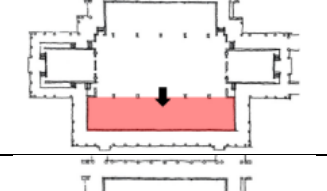
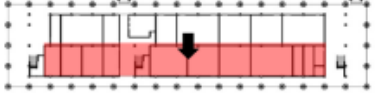
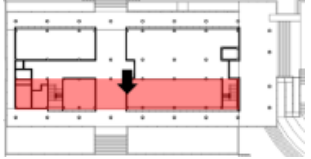
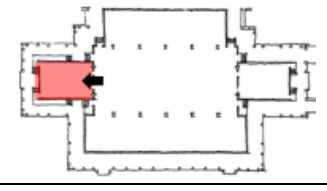
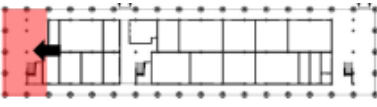
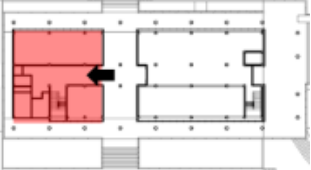
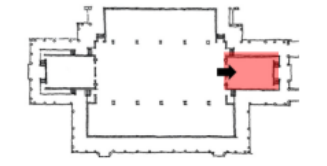
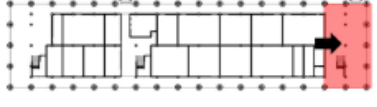
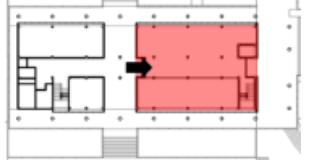
Table 1. Building mass and orientation

| Westhall | Engineering laboratory V building | Campus center |
|----------|-----------------------------------|---------------|
| | | |
| | | |
| | | |

The division of the inner space was also discovered to have some similarities with the three buildings observed to be responding to four

sides including the North, South, East, and West at once as presented in table 2.

Table 2. Division of space

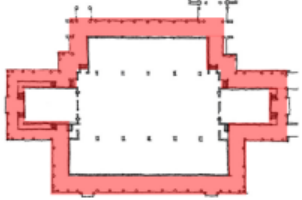
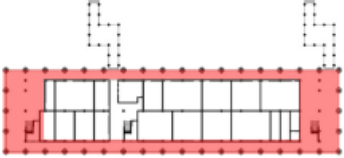
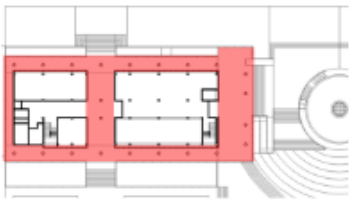
| Westhall | Engineering laboratory V building | Campus center |
|--|--|--|
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

The division of space responding to the North and South sides in the West Hall and Campus Center was observed as the user enters the building while the response of the Engineering Laboratory Building spaces to North and South was accessed from the hall or transition area. Moreover, the division of space responding to the West and East sides in the West Hall is experienced directly by the users as they enter the building due to the use of these sides as the access points. Meanwhile, the Engineering Laboratory V Building responds to the sides through the use of a larger lobby or transition area from the North and South and this means the West and East corridors were designed to accommodate more users. It also showed the main access is located on

the West and East sides. The Campus Center was, however, discovered to be responding to the West and East sides by dividing the masses into two.

There is a lobby area surrounding the inner space of the three buildings and which serves as the transition from the outside to inside as observed in the West Hall and Engineering laboratory V while the Campus Center was discovered to have changed the shape of the lobby area as shown in table 3. Its lobby area surrounds and divides the inner space into two parts and is found to be a typology concept of a traditional house used as a public terrace before entering the private area (Djono, Utomo, and Subiyantoro 2012).








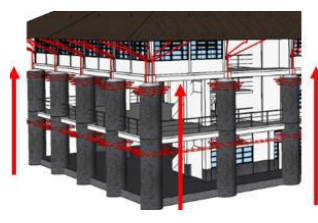

Table 3. Lobby area

| WestHall | Engineering laboratory V building | Campus center |
|---|---|--|
|  |  |  |

On the outside, there are rows of columns supporting the roof area in all the three buildings which are designed to be spherical to form the boundary of the building with the outer area and also to unite the inherent volumes of space into a single form or datum. These rows of columns form the facade and become the visual character of the building uniting the West Hall, the Engineering Laboratory V Building, and the Campus Center in one area as indicated in [table 4](#).

The difference was, however, observed from the column expression with the West Hall found to have the shortest with a dominant solid rock, the Engineering Laboratory V Building is taller than the West Hall with the expression of stone, solid, heavy, and large while the Campus Center is the highest with a lighter and thinner expression resembling a frame. Meanwhile, all the columns have a modular structure connected and arranged by regularly spaced grids.

Table 4. Rows of columns as facades

| Westhall | Engineering laboratory V building | Campus center |
|---|--|---|
|  |  |  |
|  |  |  |
|  |  |  |

Identification

The uptake of the Engineering Laboratory V Building and Campus Center was generally discussed using the ordering principle theory approach while the detailed language was expressed using the archetype as a divider for

floors, walls, and roofs as shown in [figure 2](#). The contextual form of the buildings was analyzed through a critical evaluation of the relationship between floors, walls, and roofs, as well as the construction structures as shown in [table 6](#).

Roof

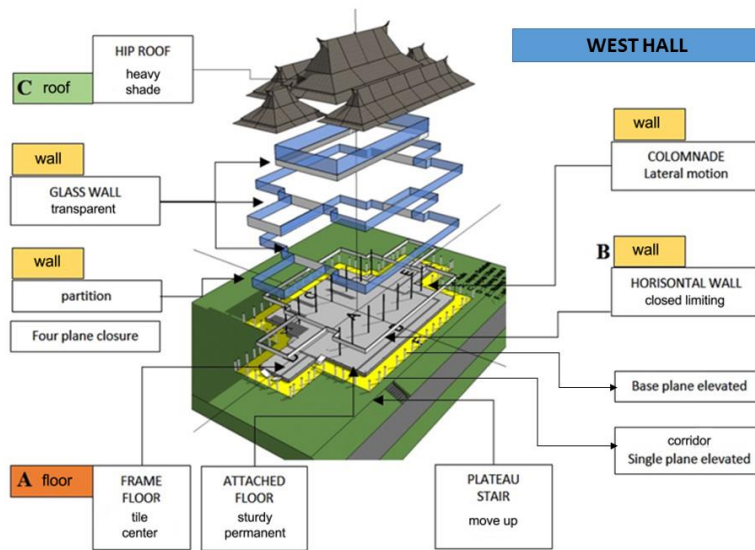
The main function of the roof is to serve as a barrier and protector of the inner space from the outer space above and around.

Wall

The main function of the wall is to limit space and support the roof. It also defines the boundaries and separates spaces from one another horizontally. The wall determines the space dimensions and their relationship with the surrounding.

Floor

The main expression of floor elements is the vertical relation between the space on its surface and underneath such as the tread. Floor elements have the following functions (1) directing, (2) limiting the space with its surroundings, and (3) supporting by providing a footrest and these serve as the theme for the floor elements.



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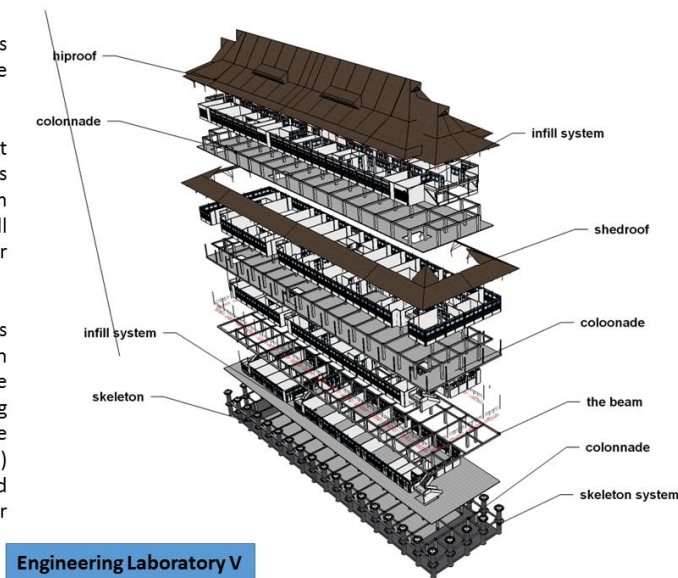


Figure 2. Dissection with archetype

The absorption of the Campus Center form as the study object in comparison with the West Hall and Engineering Laboratory V Building is indicated in table 5 and it was discovered that, first, its adoption was found to be in a position considered to be always dictated by a stronger or non-local civilization, a mixture of local and non-local forms in the architectural form of the Engineering Laboratory V and Campus Center buildings while the non-local forms were discovered to be dominant over local forms in West Hall (Helen I. Jessup 1975; H. I. Jessup 1988).

Second, a local civilization with more strength faces weak non-local forms and this leads to an adaptation of local and non-local forms as observed in the Engineering Laboratory V and Campus Center while the local form is preminent in West Hall compared to non-local forms. Third, in a situation both local and non-local civilizations are strong, there is the creation of a synergy between the local which is the West Hall, and non-local forms as observed in the Engineering Laboratory V and Campus Center buildings.

Table 5. Domination of form absorption

| Element/order | Westhall | Engineering laboratory V | Campus center |
|----------------------|---|--|--|
| Orientation and axis | Orientation to Tangkuban Parahu Mount | Synergy | Synergy |
| Building form | Additives | Subtractive/adaptation | Subtractive/adaptation |
| Mass form | The complex where the completion of each element is formed and local elements adopted | Absorption synergy can be seen in the pattern of repeated windows and doors, roofs, and columns | Adopt a frame for the vertical and horizontal walls with a wide glass opening |
| Rhythm | Repetition of columns and roofs | Adaptation | Adaptation The column is repetitive with the thin and high proportion surrounding the building |
| Space pattern | Enclosure and U-Shaped | The column is repeated with a higher and dominant proportion as well as the top and middle points | Adaptation |
| | Reworked rectangular model and four plane enclosure patterns | Adaptation | Reworked rectangular model and four plane enclosure patterns |
| Floor | Elevation | Reworked rectangular model and four plane enclosure patterns | Adoption |
| | Raised from the ground level of the road | Adaptation | The ground floor is below the road floor elevation |
| Lobby | Directing | Raised from the base of the road | Adaptation |
| | Surrounding the hallway and entrance area | Adaptation | It surrounds and leads to the foyer, entrance area, and central corridor |
| Wall | Infill wall | It surrounds the hall and leads to the entrance area and central corridor | Adoption |
| | Infill system where a noggin pattern is used in the module pattern of each wall filler | | The frame uses vertical and horizontal walls made of glass |
| Door | Door type | Adaptation | Adoption |
| | 2 leaf openings | Infill system where a noggin pattern is used in the module pattern of each wall filler | |
| Window | Window type | Adaptation | Adoption |
| | The pattern is repetitive | The pattern is repetitive | An opening pattern where the frame opens from the ground floor to the ceiling on the 3rd floor |
| Column structure | Column type | Adaptation | Adaptation |
| | The outer column is placed using exposed stone material and it supports the roof of the hallway | Columns with higher dimensions use stone material as absorption from the Hall building but the proportion is higher due to vertical subtraction. It supports the 3rd and 4th-floor buildings | The columns are reinforced concrete with small dimensions and the height supports the roof of the hallway |
| | Exposed wooden structures and form space | The exposed structure plane between the column and the wall has different dimensions | The exposed structure plane between the column and the wall has different dimensions |
| Roof | Roof type | Synergy | Adoption |
| | Additives with 3 repetitive roofs covering | 3 repetitive roof additives covering 1 building mass | Subtraction with reinforced concrete flat roof covering the lobby area while the Hyproof roof covers 2 building masses |

| Element/order | West hall | Engineering laboratory V | Campus center |
|---------------|--|--------------------------------------|---------------|
| | 5 masses of building and the hall's roof as a binder | and the roof of the hall as a binder | |

The absorption dominance of the Campus Center building form generally contains fewer covering elements in comparison with the Engineering Laboratory V building. This, therefore, means the Engineering Laboratory V is more dominant in adapting the floor details, walls, roofs, and construction structures of the West Hall.

The mass form of the three buildings was simplified and the West Hall was observed to be consisting of five building masses with different

spatial functions and each having a separate roof while the large roof covers and dominates the entire body of the building. Meanwhile, the Engineering Laboratory Building V has just 1 building mass with different functions of space combined under one roof which tends to be in the same ratio as the building body. The Campus Center also has 1 building mass with rooms performing different functions and joined under the roof but the body tends to dominate the roof.

Table 6. Comparison of construction technology

| Structure | West hall | Engineering laboratory V | Campus center |
|-----------------------|-----------|--|---|
| Form | Roof | Hyproof and shed roof log frame | Hyproof and shed roof steel truss |
| | Wall | Lamella arc truss, grid construction, lateral bolt truss construction with gaps, axial reinforcing curves | Grid construction, reinforced concrete beams, and columns, plastic hinge, pedestal, and field |
| | Floor | Continuous foundation, local footplate with stone foundation stairs | Strous pile foundation and reinforced concrete floor footplate, reinforced concrete stairs |
| Material and color | Roof | Wood, shingle roof covering | Steel, shingle roof covering |
| | Wall | Wall, stone, and wood frames | Brick, stone, reinforced concrete, aluminum frames |
| | Floor | Pavement and tiles and andesite stones or temples | Pavement and ceramic mating, reinforced concrete floor slabs with ceramic mates |
| Connection system | Roof | Wooden trusses with curtains as reinforcement | Steel truss frame |
| | Wall | 10 mm iron cage, and gapit iron ring | Plastic joints, pedestals, and field |
| | Floor | Red cement tile joints | Cement ceramic joints |
| Details and ornaments | Roof | 3-tiered roof with wooden truss bending and curtains as support, rooftop wood frame, and vents, shingle roof | 3-tiered roof bent steel trusses |
| | Wall | Foundation stone pair, plastered brick pair walls, and wooden frame sills | Plastered brick pair walls, sills, and aluminum frames |

| Structure | Westhall | Engineering laboratory V | Campus center |
|-----------|--|---|--|
| Floor | The use of pedestal from cement and foundation stone masonry, temple stone | Pairs of foundation stones and construction of gutters and iron knee braces on the roof | A column with granite brush and horizontal wall foundation stone arrangement |

Conclusion

The contextual form of the Campus Center was determined using the surrounding two zones and was discovered to have a building orientation with a direction in the axis of the Javanese architectural concept such as the upper direction as a symbol to represent the sacred as indicated with the Mount Tangkuban Perahu in the North and the downward profane or worldly direction in the South. Moreover, the building extends from the East to West as a natural context approach to minimize the ray of the sun on the East and West sides and maximize the openings on the North and South. The regularity of the buildings is divided based on the heritage, transition, and modern zones formed linearly to the north while the layout is balanced between the positions of the West and East buildings using a grid pattern.

The shape of the Campus Center building appears very contrasting compared to the West Hall and Engineering Laboratory V as observed from the repetition of columns and the pattern of the hallways surrounding the entire space. Meanwhile, the mass and orientation of the building are influenced by the movement of the sun and this makes the West and East to be shorter than the North and South sides. The hallway surrounding the inner space also serves as a transition area from the outside to the inside of the building and found to adheres to the concept of a traditional house typology which involves having a public terrace before entering a more private area. Moreover, the building's facade shows a row of columns supporting the roof area.

The contextual form of the Campus Center towards the West Hall in the heritage zone and the Engineering Laboratory V in the transition zone is reflected through the rectangular mass of the building with the longer sides oriented towards the North and South, the repetition of the column surrounding the hall area which surrounds the entire building, and the rows of the column in the hallway directly supporting the roof.

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