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THE STUDY OF THE HIGH-RISE BUILDINGS FACE

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ABSTRACT

One of the indicators that reflects the city's development is the rapid growth of high-rise buildings. The high price and limited available land coupled with the growth and increasingly diverse of human needs become trigger. This is affected advances in technology. various available materials as well sufficient economics factor, making high-rise buildings as one of the development options in major cities around the world. Several factors such as, technology, modernity, and economics dominate the image high-rise buildings. Is it possible to construct the unique high-rise buildings in order to be different from each other? The initial paper is an step examining the unique concepts that can be applied on high-rise buildings as the products of technology modernity. The study was through the conducted review of literature in terms of time development in order to seek the unique aspects to be applied on high-rise buildings.

Keywords: high-rise building, uniqueness, technology, modernity, locality

INTRODUCTION

High-Rise Buildings Phenomenon in the Context of Urban

Currently, the presence of high-rise buildings is a product of the needs, coupled with the rapid growth of

development relating urban to commercial and residential spaces. The big cities in the world are unable to avoid the urbanization immigrants who come from the surrounding areas or from the villages, resulted in the increasing needs of space. The highrise buildings become the landmark of the regions, cities, or even countries showcasing the presence of construction and material technologies, as well as the new concept i.e. environmentally friendly or saving buildings.

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The study was initiated by the following question, i.e., can we identify the image of high-rise buildings easily without having literal description about the location of the buildings? The high-rise buildings façade phenomenon looks similar (Figure 1) because the architecture of a number of cities lost its uniqueness. This phenomenon raises the question of whether the concept of locality in high-rise buildings can be presented. It seems that the presence of high-rise buildings in various cities in the world, is representing the aspects of heights, showing technological capability and latest materials, or functioning as the symbol of status. Following the previous statement, it can be questioned whether high-rise building façade only accommodate the face of technology, modernity, and economics capability. This paper is an initial study on building architectural façade by reviewing and formulating the unique concepts of locality that can be applied on high-rise building as the basis of thinking in advanced stages.



The Skyline of Jakarta



The Skyline of New York



The Skyline of Singapore



The Skyline of Hongkong Figure 1. The skylines of several big cities

LITERATURE REVIEW

The Development of the High-Rise Building Facade

The high-rise building era, began when Louis Henry Sullivan started his debut in his bold work around 1900. This was the reason whv he was considered the father a s of skyscrapers at the same time as the father of modernism. Louis Henry Sullivan, Henry Hobson Richardson and Frank Lloyd Wright are known as trinity in American architecture who created high-rise buildings. At the time, the birth of high-rise building, was meant to respond to new industrial era, in terms of technology, mobility, and political pressure creating the advent of International Style (Tallmadge, 1939).

a. High-rise Buildings before the Modern Era

Since the beginning of civilization, man has been trying to create a high building for the purpose as a sacred place which needs to be closer to heaven. As recorded, several Egyptian pyramids have a building that height of up to hundreds of meters, which are: Khufu Pyramid (built in 2620 - 2500 B.C with a height of 139 meters), Pharos Pyramid of Alexandria (reached 140 meters), and the Giza Pyramids (147 meters). The existence the

pyramid are not categorized as highrise buildings, and only classified as a monument. The Industrial Revolution was marked bγ the number discoveries of high-rise building that emphasizing the advanced in science and technology. For example, the invention of elevator by Otis (1852) and other new structure innovations encouraged the invention of multi-storey buildings (Schueller, 1977).

b. High-Rise Buildings in the Modern Era.

Modern architecture can be divided into early modern, medieval, and late modern. New modern architecture emerged in the 1860s in Europe with the first building: the Crystal Palace.

The building used rational forms: rigid boxy which looks massive and uses rarely ornaments to decorate the styles the streams (Figure 2). The or application of new materials can be seen in the buildings such as the use of steel structures, steel, glass, concrete. While in America, modern architecture appeared in the 1880s, when high-rise buildings were built using steel by structure (Schueller, 1977), as can be seen at The Crystal Palace (Figure 3). This lowrise building was categorized as early modern architecture.



Figure 2. The Crystal Palace, in Europe





Trinity Church, 1846 Latt

Latting Observatory 1853





World Building, 1890 Insurance

Building, 1894

Figure 3. The early high-rise buildings 1860-1890's in the Americas

Henry Sullivan (skyscraper creator) was an architect who combined technology and art framework of classical buildings (Schueller, 1977). Rectangular configuration is a reflection of the plan of Romanesque architectural form coupled with Queen Anne that used turrets peaked, chateausque roof and dormers.

The principle of the head-body-foot still applied properly. The character of "foot"

is displayed with a solid impression through the use of wall with a row of windows depicting renaissance style. While the upper floors between floors 2-7, using a row of Doric-style columns topped off with romanesque style window (Figure 4).

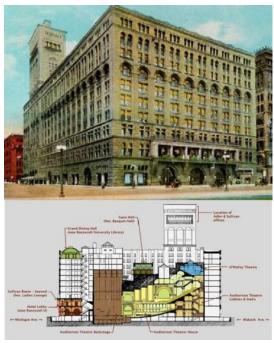


Figure 4. The Sullivan and Adler: Auditorium Building, Chicago, 1887- 1889

Between the period of 1880-1890 a kind of second industrial revolution represented in the form of rationalization and use of machinery in the large scale. The emergence of fabrication system in which the majority of building elements made in the factory, the use of machinery, steel casting technology enabling the development was only a relatively short time

During the early of modernization theories of aesthetic, especially in architecture which stated by Pugin, Ruskin, Morris, and others, developed more radically opposed to the classicism, emphasizing on functionalism and purism. Architectural style in the late nineteenth century and early twentieth century were asymmetrical, and cubical composition in all directions, which converged the form, windows, walls, roofs, and others as a composition of the building (Figure 5).



Singer Pullding



Park Row Building, 1899

Singer Building 1908

Metropolitan Life Insurance Company Tower, 1909



Woolworth Building, 1913



Bank of Manhattan Trust,



Chrysler Building, 1930



Empire State Building, 1931

Figure 5. The performace of the high-rise buildings, era of the 1900's

In 1919, Walter Gropius spreaded his ideas about Bauhaus architecture. He was the pioneer of International Style that has a major influence in architecture. Principally, Bauhaus

architecture is characterized by significant plan with activities and functions which have an interrelated space that emphasize more to the space functions and less ornaments. This era also produced several high buildings by exposing the stairs or elevators as well as a glass-walled. In architecture, Bauhaus influence is still continued to this day.

This era gave rise to the term of "Form Follows Function": a good building should be over in building not performance because the beauty will emerge through the truth of its meaning and function. The articulation of the bottom of the building is presented through the atrium design in the form of large space, mezzanine and Building's staircase. façade Art combined with Nouveau, Renaissance, and Romanesque styles in order to avoid monotonous facade. In about 1920 the usage of ornaments was merely as a symbol of status and function which were put in certain places. The expression of facade was strongly related to the various possible features of fabrication materials for example the use of curved shapes and skylight. Therefore, in 1920 and 1930 the created buildings mostly were highrise buildings or skyscrapers. This era was known as the spreading of International Style, that indicated by the use of geometric forms, plain-colored

walls (usually white), and flat roof, landscaped by a surrounding park. The main principles of the International Style are volumetric, regularity and unornamented. The International Style is still popular all over the world until 1950 (Figure 6).







Sears Tower, 1970, in 2009 become The Willis Tower

John Hancock Tower, Boston, 1968-1976, architect: I.M. Pei

Figure 6. The International Style

The later era was Post Modernism. This era tried to re-introduce the color and symbolism in architecture. This era was also referred to as neo-eclectic because it brought back the reference of ornaments and the use of non-orthogonal angle to form the surface area as a form of criticism of the modern style that refused ornaments. This era was also marked by the use of

the composition of façade, that refused monotonous forms as works of Kenzo Tange (Japan) and Paul Rudolf (United States) (Figure 7).



The Sony Canari (AT&T Building), New York City, 1984, by Philip Johnson, illustrating a "Postmodem"

Portland Municipal Services Building, 1982, Michael Graves, Emery Roth & Sons.



Wisma Dharmala Sakti, Jakarta, 1982-1985, Paul Rudolph



The Lippo Centre, Hongkong, 1987, by Paul Rudolph,



Kenzo

ice



Nakagin (Tokyo) Kisho

(Tokyo) Ki Kurokawa, 1945-1975

Figure 7. The Postmodern Style

Furthermore, there is also the Brutalism. The term comes from French: "concrete brut", which means "raw concrete". The Brutalism buildings are generally formed by hitting blockish, geometric, repetitive forms, and often repeated but without any ornaments (Figure 8).



Trellick Tower, London, 1966– 1972, designed by Ernő Goldfinger, is a Grade II* listed building.

Marcel Breuer, Hurbert Humprey Building, 1977



The Buffalo City Neo-Brutalist Ryugyong Hotel in Court Building in Pyongyang, North Korea Buffalo, NY.

Figure 8. The Brutalism Style

c. High-Rise Buildings in the Contemporary Era

Building envelope in contemporary era was used as a symbol of national elements in order to provide image as a powerful country. This was shown as an image of the tallest building or the most energy-efficient buildings (Figure 9).



Taipei 101



The Petronas Twin Towers Kuala Lumpur.



Tower 2 of the International Finance Centre in Hong Kong.



Torre agbar, Barcelon a, 1999-2005 by Jean



Burj Khalifa, Dubai, by Chicago's Skidmore, Owings & Merrill and developed by Dubai's Emaar Properties



Burj Al Arab Jumeirah Dubai Skidmore, Owings and Merrill of Chicago, with Adrian Smith as chief architect, and Bill Baker as chief structural engineer, 2004

Figure 9. The High-Rise Buildings Now

Trends in the 21st century focuses more on the development of "environmentally sounds" building envelope systems through technological progress. The issue that arises is the problem of transparency and complexity of the building (Figure 10 and 11)



The ability of the light to enter the building in an optimal but at the same time also expect the presence of the shadow so that the air conditioning did not work too heavy.



How to put a light to middle building and the basement. The building consider the slenderness dimensions and begin consider their inner-court entering the light to the building.

Figure 10. The consideration of natural light in the building design today



Figure 11. The design idea of Highrise at 21st era

Building envelope comes with new technology concepts give the to impression of a futuristic perspectives. It creating of high standards quality building to anticipate the rapid change of global environmental issues. It focuses on the comfort of the occupants, the ease of maintenance, and the new discourse of aesthetic value. Several techniques have been applied under continuous testing process. The building envelope employs the technique of active water wall which is thermally passive and thermic as well as applies flywheel accumulation, active green, photocell and ventilated wall combined by intelligent glass facade.

The Function Of The Building Envelope.

There are five basic functions of the

building envelope (Sukawi, 2010): (1) to add the structural support, (2) to control the humidity (moisture and humidity), (3) to regulate the temperature and, (4) to control the air pressure changes which affects the ventilation and the energy use in buildings, (5) to express the function.

The building envelope determines how much energy will be needed to maintain comfortable indoor environment from the outdoor conditions. Design considerations for the building envelope, i.e.: (1) calculation of the insulating ability of the air, (2) the system of soundproof, (3) the walls and the roof, (4) the window, the door and the skylight, (5) the local climate. Building envelope that does not articulate will affect properly, greatly the performance of the building. Basically, the building will affect the people, the environment and the energy. (Stephens, 2013). Stephens (2013) clarifies the role of the veil in detail in four groups: (1) the role of support; (2) the role of regulation (control); (3) the role of visual (finishing); (4) and the role of distribution. (See Table 1).

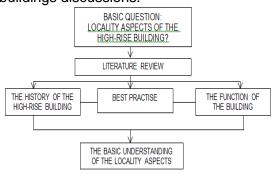
In the building envelope applications, there are two most important functions which are clearly shown, namely: to control the temperature and humidity (Stephens, 2013). Both will determine: (1) the air circulation; (2) the impact of

indoor environment; and (3) the decrease in exterior quality.

Norberg-Schulz, N. (1965) mentioned the importance role of the building envelope is as a physical control. Building envelope as a boundary, could be functioned as: filters, connectors, barriers and switches in the forms roofs, overhangs, doors, windows, walls. and subtractive or additive terraces. The dimensions of the physical control are ultimately described in terms of "elements" and "relations". The element is an "energy" of the existing and desired condition. While the become filters relations the that transform the existing energy into the desired energy.

METHODOLOGY

The study is based on theoretical review on the development of technology and building historically which was conducted by comparing the cases of architectural building. The experience of the city of Fremantle is considered and compared in order to gain an understanding of the locality that can be applied to the high-rise buildings discussions.



DISCUSSIONS

Berke's (1997) stated that architecture can be understood as a manifestation of daily life by the recipient. The local "inner beauty" can express regional characteristic naturally that contain behind the essence of local character.

1.1.Locality As A Basic Knowledge Of Architectural Aspects

mentioned Locality, as by Lewis Mumford (in Tzonis and Lefaivre, 1990) is as follows: 1) it related to history that completed by understanding the spirit of the age, but did not merely transferring it into the current context; 2) it related to a place that has a different subjective touch from one to another; 3) it related to each place which has social, political, and economical strengths and possess different soul; 4) it related to the utilization of sustainable technology which absorbs traditional values that passed over generations. Therefore, it synchronizes the spirit of the age; 5) it related to the needs of users that should be appropriate with the building function; 6) it related to values of regularity, cooperation, strength, sensitivity, as well as the community characteristic; 7) it has local cultural values, as well as universal values; 8) it related to the application of materials and local technologies. So, the locality has unique а piece architecture, a unified relation of the various relationships (Figure 12).

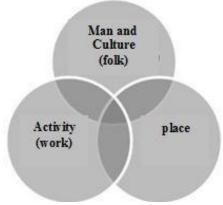


Figure 12. Locality as a distinctiveness and uniqueness aspect

Table 1. The Basic Function of the Building Envelope

SUPPORT	CONTROL	FINISH	DISTRIBUTION
 Lateral aspect: The Wind and the Earthquakes Gravity: the dead load, snow Rheological: The Temperature, the Humidity the Wear/ Abrasion the Noisy the Fire Animals 	 The heat The air The humidity The rain The noisy The fire The animals The access 	■ The color ■ The texture ■ The reflection ■ The Pattern	 The electricity The communication system The plumbing The air ventilation The gas The gutter
Regarding the transfer of endurance and physical strength from both inside and outside the building	Concerning the mass and energy flow	Regarding the interior and exterior surfaces that felt by humans	Concerning the protection and the building services

Source: Introduction to Building Enclosure, Dr. Brent Stephens, Ph.D., 2013

1.2. Locality Can Be Created And Presented.

In fact, the concept of uniqueness can be created and set for the high-rise buildings. Fremantle in this study was adopted as a model. As the city, Fremantle represents the existing character of the town which provides the identity of the city.

Agnieshka Kiera (2011) in her article: The Local Identity and Design Code as Tool of Urban Conservation, A Core Component of Sustainable Urban Development – The Case of Fremantle, Western Australia, argued that locality in urban context can be presented through a rule. This rule consists of two parts:

a. The Rule of Urban Identity(The Source Code)

The Rule of Urban Identity is derived from urban analysis on the existing city in the form of geometric numbers that provide identity and character of urban parts. Each area is given a certain number, certain code and certain explanation that covers: urban elements, city map (road part and form, public spaces, urban "grain"), streetscapes (urban interiors), all the way to architectural detail part (scale, facades). It is also completed by specific feature city that needs to be protected, rehabilitated or preserved. These rules provide inputs on the

detail of the city such as material and color. Each building to be constructed in a certain area should take these rules into account so that locality aspect of each region can be always protected (figure 13).

inland areas		recommended		accepted
area	zone	height	height deformation	minimum height
area 001 _ :	zone 1a - High St.	15.5 m	vibrations +/- 0.5 m	14.5 m
	zone 1b	12.5 m	vibrations +/- 1.0 m	9.0 m
area 002	zone 2	12.0 m	vibrations +/- 1,0 m	10.0 m
area 003	zone 3a	14.0 m	vibrations +/- 1.0 m	10.0 m
	zone 3b	17.5 m measured at Cantonment St.	vibrations +/- 1.0 m	10.0 m
area 004	zone 4a - High St.	15.5 m	vibrations +/- 1.0 m	14.5 m
	zone 4b	10.5 m	vibrations +/- 1.0 m	no limits
	zone 5a	walt: 6.3 m; gabled roof: 9.0 m	vibrations +/- 0.5 m	5.8 m
	zone 5b	outside the study area		
area 006	zone 6	outside the study area		
waterfro	nt. riverfront areas	recommended		accepted
area	zone	height	height deformation	minimum height
area 007	zone 7	walt 8.0 m., gabled roof: 10.0 m	vibrations +/- 0.5 m	5.4 m
area 008	zone 8+9	8.5 m	vibrations +/- 1.0 m	7.4 m
area 009		for special buildings: 12.0 m	vibrations +/- 0.5 m.	11.5 m
area 010	zone 10a	9.0 m	vibrations +/- 1.0 m	7.2 m
	zone 10b	west side of Marine Terrace: 10.0 m, gabled roof: 12.5 m	vibrations +/- 1.0 m	7.2 m
area 011	zone 11a	9.0 m	vibrations +/- 1.0 m	7.2 m
	zone 11b	west side of Marine Terrace: 10.0 m, gabled roof: 12.5 m	vibrations +/- 1.0 m	7.2 m
area 012	zone 12	north bay shore of Fishing Boat Harbour.	vibrations +/- 1.0 m	

Figure 13. Rule of Urban Identity that gives
Locality Touch in Fremantle
(Source: Dr Jacek Dominiczak and Monika
Zawadzka – extracts from the Local Identity
& Design Code for Central Fremantle, 2008,
selected by Agnieshka Kiera)

b. Design Code

Design code contains more specific rules on building height and proportion of city parts in order to gain the features of power and the uniqueness of each place (figure 14).

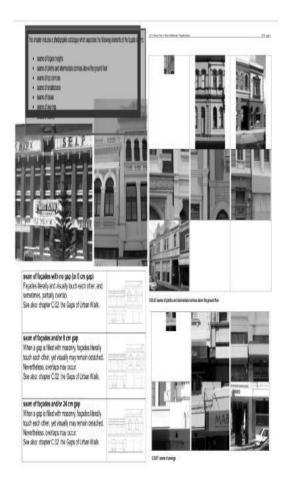


Figure 14. Detail Rule of Urban Design that gives locality touch in Fremantle (Source: Dr Jacek Dominiczak and Monika Zawadzka – extracts from the Local Identity & Design Code for Central Fremantle, 2008, selected by Agnieshka Kiera)

Apparently, locality aspect in relation to place is possible to be presented through some rules. The power of place should be explored from the environmental and physical, as well as social-cultural contexts.

1.3. The Power Of Place In The Context Of Physical Aspect

The power of place in architecture is constructed by taking social, political, cultural, economic and environmental factors into account (Burden, 2001; Oxford Dictionary of English). A place can have a power if the placement of the building, site and its position, natural environment and inhabitants are well integrated and mutually benefited (Burden, 2001). A locality which based on the power of a place, will have a "power" if the architecture "fit in" with the urban plan. It should take locality and space experiences consideration as a totality, as Burden (2001) stated that All architecture must fit respond to, and mediate its into, surroundings.



Figure 15. If it is viewed from the context of different location: left is in the center of the city, right is in the context of sea, but both apartments are similar.

Based on Figure 15, it can be concluded that the presence of a location context tends to consider more on market, economics, and demand aspects which are powerful so that the locality aspect does not have "a chance" to be presented.

1.4. The Concept of Sustainability

There are basic principles that should be applied in sustainable design (Hui, 2002; Fischer, 1992). They are: 1) Understanding Place: sustainable design requires architects to understand a place, to be sensitive toward place, to build without damaging, to understand design orientation, to preserve naturalness; 2) Connecting with Nature: the correlation between a place and its characteristics although the natural building is located in an urban context; Understanding the Natural Processes: understand the natural process that will happen, what the life cycle of environment and human beings is; 4) Understanding Environmental Impact: awareness of every impact of developmental the stages conducting an evaluation of buildings, materials, during construction process; 5) Embracing Co- creative Design Processes: listening to every input from various parties: collaborating with consultants, experts from various scientific disciplines, local community, and prospective users; 6) Understanding People: good sustainable design should be able to accommodate culture, race, ethnicity, religion and various human interests. The attitude of empathy should also be

developed toward a powerless community (such as: community with disabilities).

CONCLUSION

high-rise buildings The uniqueness of should be understood in the context of physical (form, material, technology) and aspects non-physical (functions, philosophy and cultural values). The uniqueness of physical aspects can be created by: 1) applying local ornaments; the form of local building mass; the pattern or rhythm of the openings; integrated specific basic forms; 2) searching new forms that relatively equal to visual effects depicting the context; 3) abstracting the local original forms. The aspects of technology, modernity locality can be considered as a united concept which can be supported each other by providing a unique high-rise building appropriate to the context of the place.

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