

# Development of Betawi Architecture for Green and Low-Energy Building of Tropical Sub-urban Business Centre in Greater Jakarta

Pita Asih Bekti Cahyanti and Adi Utomo Hatmoko

Department of Architecture and Planning, Faculty of Engineering UGM Yogyakarta Indonesia

Email: pita.asih.b@mail.ugm.ac.id, adiutomohatmoko@ugm.ac.id

Ali Rizak

PT Airmas Asri, Jakarta Indonesia

Email: rizak@airmasasri.com

Cahyono Agus

Faculty of Forestry UGM Yogyakarta Indonesia

Email: cahyonoagus@gadjahmada.edu

Kemas Ridwan Kurniawan

Department of Architecture, Faculty of Engineering Universitas Indonesia Depok Indonesia

Email: kemas.ridwan@gmail.com

**Abstract**—Jabodetabek or Greater Jakarta is an official and administrative definition of the urban area or megacity surrounding the Indonesia capital city, Jakarta. The population of Jabodetabek, with an area of 6,392 km<sup>2</sup>, was over 30.0 million by January 2014 or about 11.26% of national population, making it the most populous region in Indonesia. The center of Jakarta is the center of government, culture, education, economy, finance, manufacture and commerce while the sub-urban area became the center of the settlement. It's causes jam, high cost, wasteful, inefficient, pollution, longer time, uncomfortable, high life stress. Restructuring the shifting of the center of business economic activities to the sub-urban areas closed to the residential area is expected to increase amenities, productivity and efficiency. The local special characters of Betawi culture that had been marginalized in Jakarta can be revived in the development of new office centers, shopping and education in sub-urban areas. Wider spatial arrangement and optimal tropical climate can realize harmony of nature, humanity, social, culture, monetary, psychological, spiritual, environment and life for sustainable development.

**Index Terms**—Betawi, business center, greater Jakarta, local unique architecture, urban areas

## I. INTRODUCTION

The United Nations first-ever report on The State of Asian Cities 2010/11 that with 42% of its population in cities in 2010, Asia is urbanizing rapidly; its cities are highly productive and generate an estimated 80% of the region's GDP [1]. Dynamic cities are engines of local and

national economic growth, and Asian cities are especially productive: just over 40% of the region's population living in cities and towns contributes over 80% of its GDP [2]. Mega-cities, mega urban regions and urban corridors are a manifestation of the restructuring of urban territorial space that comes with globalization.

'Jabotabek' (Jakarta, Bogor, Tangerang and Bekasi), Bangkok Metropolitan Region and Manila Extended Metropolitan Regions (EMR) in South-East Asia are important mega urban regions, while Singapore-Johore-Riau 'growth triangle' is an emerging EMR [2]. Mega-cities at the core of mega urban regions are often beset with high real estate prices, traffic congestion and poor environmental quality. These 'negative externalities' drive firms and households away from core city locations to the periphery for cheaper land and better environmental quality'' [2]. Environmental problems vary significantly across cities depending on geographic location, climate, urban form, population density, and respective degrees of economic development. [Some of the salient environmental problems of Asian cities are: (i) Air quality, (ii) Water supply, (iii) Sanitation and wastewater management, (iv) Solid waste management, (v) Urban biospheres, (vi) The challenge of climate change, (vii) The causes of climate change and the challenge of mitigation [2].

Given its large population and relatively low adaptive capacity, Asia is arguably the most vulnerable region to climate change [3], which is bound to have significant impacts on the human, social, economic and physical environments in its cities. Douglas (1989) mentioned : (i) Increase in natural disasters, (ii) Rising sea levels, (iii)

Urban poor and climate change, (iv) The challenge of 'eco-refugees', (v) Towards improved environmental planning and management in Asian cities.

## II. MATERIALS AND METHODS

This research includes the type of literature study, historical study and thematic study. The library research conducted by searching data from literature materials both in the primary and secondary sources. Historical study method is used to collect data about Betawi architecture and dynamic of Jabodetabek. The thematic study method is used to describe data about current and future architectural issues and concepts that become an analytical tool to see the conception of betawian architectural design for Jabodetabek business center. The data analysis was conducted by comparative, analytical, and synthesis method.

## III. RESULTS AND DISCUSSIONS

### A. Sustainable Urban Development

To achieve sustainable urban development in the Asia-Pacific region, [2] reported three areas of action to which governments and communities must give priority: (i) Better urban planning and management of development, (ii) Improvements to environmental management, (iii) Better environmental governance and compliance. While the world population became predominantly urban in 2008, this 'tipping point' is not expected to occur in Asia until 2026. This means that during 2010–2020 two-thirds of the demographic expansion in the world's cities will take place in Asia, and in 2020, 2.2 billion of the 4.2 billion global urban populations will be in Asia [2].

Asia has seen rapid urbanization but has also witnessed 'the urbanization of poverty' and rising inequality. This is manifested in an inability to pay for basic services such as water supply, sanitation, waste collection, health, energy and transportation (reviewed in the Report), which – along with education – are fundamental requirements for a sustainable existence [2]. At the same time as they promote economic development, Asian cities must resist the temptation to do so entirely at the expense of the natural resource base. Thus, a focus on meeting human needs and improving well-being with the lowest possible ecological cost is more relevant to Asia-Pacific than to other regions [2]. To address the existing environmental problems, better urban environmental planning and management will be needed.

### B. Development Jakarta Greater

In the late 1970s the Government of Indonesia initiated a series of planning studies focusing on the environmental deterioration of the Jakarta metropolitan region [2]. Jabodetabek or Greater Jakarta is an official and administrative definition of the urban area or megacity surrounding the Indonesia capital city, Jakarta. The name of the region is taken from each city's name: Jabo(de)tabek from Jakarta, Bogor, Depok, Tangerang and Bekasi [4].

The central feature of the resulting spatial development plans has been to guide urban-industrial development out of DKI Jakarta toward a select number of growth centre and inter-urban corridors. Although the plans have served to focus public attention on the cumulative impacts of land use change on the environment in the region, they have not been accompanied by sufficient attention to the institutional obstacles preventing effective translation of the plans into action.

The population of Jabodetabek, with an area of 6,392 km<sup>2</sup>, was over 28.0 million according to the Indonesian Census 2010, and by January 2014 was officially estimated to have increased to over 30.0 million making it the most populous region in Indonesia, as well as the second most populous urban area in the world after Tokyo. The population share of Jabodetabek to national population was increased from 6.1% in 1961 to 11.26% in 2010. Nowadays, about 20% of Indonesia's urban population is concentrated in the Jabodetabek area [4].

Nowadays, the role of Jabodetabek in the national economy is still dominant although the decentralization policy has been implemented since Reformasi in 1998 [4]. The region accounts for 25.52% of total national gross domestic product and 42.8% to the total GDP of Java Island in 2010. The development of large scale residential areas and industrial parks in the Jabodetabek has been induced by infrastructure development, especially toll roads and railways.

### C. Betawi Cultural Local Unique Wisdom

Betawi architecture was originally architecture that used by Native people who occupied the area namely colonial Batavia (Jakarta today) and its surrounding [5]. The areas where Betawi Community live, are divided into three [6]: *Betawi Tengah* or *Betawi Kota* (Betawi people who lived in the centre of Batavia), *Betawi Pinggir* (Betawi people who lived on the border area of Batavia), and *Betawi Udik* or *Betawi Ora* (Betawi people who lived faraway or out of the city of Batavia or Jakarta).

Moreover, based on its location too, the architecture of traditional Betawi houses is categorized into two: *Rumah Betawi pesisir* (coastal Betawi house) and *Rumah Betawi daerah dataran dalam* (inland Betawi house) [7]. Coastal Betawi house can be represented by traditional Betawi stage house that located along Jakarta's coastal area. However, presently, this kind of Betawi house is very rare. Meanwhile, for inland Betawi houses are consisted of three kind of houses based on its roof styles [8]. They referred to as: 1) *Rumah Gudang* (Gudang house) with rectangular shape to the rear and its long gable or shield roof, 2) *Rumah Bapang* or *Rumah Kebaya*, with its basic square form. Its main characteristics are terrace extension, roof that looks like horse-saddle or shield, and there is in the front side small roof that functions as rain water or sun light shield. 3) *Rumah Joglo*. The different between *Rumah Joglo Betawi* and Joglo House in Java is from its roof construction. If Javanese joglo used 'soko guru' system (four main wooden pillars to support roof), *Rumah Joglo Betawi* applied simple 'kuda-kuda' (horses system) construction for its roof.

TABLE I. DISTRIBUTION OF AREA, POPULATION AND THEIR DENSITY IN JABODETABEK REGION

Administrative division	Province	Area (km <sup>2</sup> )	Population (2010 census)	Population (2015 estimate)	Density/km <sup>2</sup> (2015)
Bekasi City	West Java	210	2,378,211	2,714,825	12,928
Bekasi Regency	West Java	1,270	2,629,551	3,246,013	2,556
Bogor City	West Java	109	952,406	1,047,922	9,614
Bogor Regency	West Java	2,664	4,779,578	5,459,668	2,049
Depok City	West Java	200	1,751,696	2,106,102	10,530
<b>Jabodetabek</b>		<b>6,392</b>	<b>28,019,545</b>	<b>31,689,592</b>	<b>4,957.7</b>
Jakarta	Jakarta	664	9,588,198	10,154,134	15,292
South Tangerang City	Banten	151	1,303,569	1,543,209	10,220
Tangerang City	Banten	164	1,797,715	2,047,125	12,482
Tangerang Regency	Banten	960	2,838,621	3,370,594	3,511

Sources: 2010 decennial census, 2015 BPS Banten, 2015 BPS West Java [4]

Gate in Betawi architecture is not always being used for houses. It only functions as entrance structure into certain important areas such as mosques and cemeteries. Other philosophy found in the Rumah Kebaya is the presence of the fence around the terrace that means self restraining of negative things, especially in religious sense. It is necessary to filter external influences of those coming from areas outside Betawi kampung based on their religious belief. The negative cultural aspects should be refused, while the positive cultural aspects should be followed and upheld.

Other special and important characteristics is the presence of gazebo in a garden with its each side opened to surrounding environment for free sight into the surrounding garden and for fresh air [9]. Betawi ornament represents decoration to beautify certain parts of a building or an object. Architectural ornament may be made of carved stones, woods or precious metals. Additionally, it may also be made of concrete plastering or formed clay. Some ornaments in Betawi traditional house are: fascia board, lattice ornament, jasmine ornament, tropical magnolia or champak, sun flowers. Balustrade is a fence that serves as divider of the terrace and yard and made of carved wood of human figure with moral and ethic message that one should goes through the front yard of a house when he or she comes as a guest because coming into a house from back or sides is considered as unethical [9]. The rich culture of Betawi people supports the creation of characteristic Betawi architectural ornaments that also contain the living philosophy of Betawi people.

#### D. Jabodetabek Urban Business Center

Jabodetabek has developed from the small and separated city regions into the largest megacity in Indonesia. However, lack of planning capacity to deal with growing complexity in managing this area should be seriously remarked. The dynamics of Jabodetabek starting from the early city development toward the future

megacity development [10]. It is divided into three sections comprising planning and development history; recent status of social-economic and physical-environmental situation; and future challenges that should be anticipated to achieve sustainable development. Obviously, planning and development strategy need to be transformed into adaptive, inclusive and integrated approaches within a continue incremental process to reach the development vision.

The center of Jakarta is the center of government, culture, education, economy, finance, manufacture and commerce while the sub-urban area became the center of the settlement. It's causes jam, high cost, wasteful, inefficient, pollution, longer time, uncomforted, high life stress. Restructuring the shifting of the center of business economic activities to the sub-urban areas closed to the residential area is expected to increase amenities, productivity and efficiency. BSD City settle city is a suburban area situated in the outskirts and it is expected that the city could be residential development center. However, it will also be developed as a city with various facilities, including offices, shopping malls, and other retail facilities. In a developmental science, it is difficult for the offices in a sub-urban area to get high selling value because the area is developed for residential area. The designing concept in urban area usually uses glasses as dominant element, while it used more casual designing concept in suburban area that both designing concepts have their own special characters.

The developmental site situated in the suburban area as BSD City should be able to maximize the potential of the area with its good master plan and good access to public space. The pedestrian area in the developmental site is a potential that has very significant impact on building design that maximizes the public areas such as retail area and other activity facilities. All of the facilities enable people to interact during the breaks in their working days,

lectures and businesses. It is necessary for the design of building exterior and interior to adopt local unique cultural characters that keep the elegant sides of special arrangement with its special characters.

#### E. *Betawian Green and Low-Energy Building for Tropical Urban Business Center*

The local special characters of Betawi culture that had been marginalized in Jakarta can be revived in the development of new office centers, shopping and education in sub-urban areas. Wider spatial arrangement and optimal tropical climate can realize harmony of nature, humanity, social, culture, monetary, psychological, spiritual, environment and life for sustainable development. In-situ "Betawi Town" as a part of suburban ethnic clusters or enclaves of residential areas and business districts in large Greater Jakarta metropolitan areas could be development in Jabodetabek. Previously, there were two areas in Jakarta that had been dedicated by the Government to preserve Betawi culture, they are Condet (in 1974) and Setu Babakan (in 2000). These in-situ preservation are to preserve and re-realize the value of social values of Betawi culture in their place of origin. However, Condet area (famous for its 'salak' fruit plantation) failed to be conserved as the Heritage of Betawi traditional settlement because it could not sustain in facing modern pressures and population changes. Therefore, in order to replace Condet, the Government of Jakarta chose Setu Babakan (the area surrounding a lake) in the southern edge of Jakarta as the Heritage Conservation area for Betawi Culture. By learning from Condet and Setu Babakan, the future application of Betawi culture in the development of urban and sub-urban areas will be able to reestablish the harmony of nature, humanity, spiritual, local wisdom, so as to create a more dignified and sustainable environment and life. Empowering the ABCG (academic, business, community, government) networking has a good prospect for sustainable environment and life.

Indonesia which is located in the tropics must sweep empowering the potential of natural and human resources optimally. Tropical ecosystem has a high net primary production that more supported by the rapid organic-cycling than their low fertility weathered acid soil, due to the high temperature, rainfall, moisture and light intensity along a year [11, 12, 13, 14]. New paradigm from extraction to empowerment of natural resource will give new challenge to shift from red- & green economic to blue economic concept that should be more smart, global, focus, and futuristic for sustainable development.

The "green" buildings can achieve greater productivity than buildings that are not accredited as "green" [15]. This relationship between building design and productivity is claimed to be achieved through compliance with internal environmental quality (IEQ) criteria of Green rating tools. The implementation of green building principles for passive cooling through vertical garden and vegetation influences the quality of surrounding air. However, excessive green area resulted in an expensive maintenance cost of a building and it is

necessary to reconsider the balance of the cost and the benefit.

Implementation of Integrated Bio-cycle System (IBS) as a closed-to-nature ecosystem on landscape ecological management to manage land resource (soil, mineral, water, air, microclimate), biological resources (flora, fauna, human) and their interaction could more high added value in environment, economic, socio-culture and health. The bio-economic chain should be managed by 9R (reuse, reduce, recycle, refill, replace, repair, replant, rebuild, reward). The system has multifunction and multi-product, to produce "gold of life", that will meet with the expected basic need for daily-, monthly-, yearly- and decade's income at short-, medium- and long- term periods for small, medium, and big stakeholder [9, 11]. The concept that "the Porosity" maximizes public space will maximize public area to improve the interaction and the moving area of the users of the office. The concept that "the vertical green" maximizes green area will add more green area that will in turn help reduce the consumption of energy of the building. However, the mass of the building is too complicated and the vegetation is excessive and hence very expensive in its maintenance cost. The tropic elite office building may be developed using open space and glass cover for natural illumination and air naturally flow. The addition of vertical garden to the façade will accentuate dignity and comfortable environment and life. The tropic green energy should be applied in the application of shading fins for the exterior of the building that faces westward and eastward.

#### IV. CONCLUSIONS

The center of Jakarta is the center of government, culture, education, economy, finance, manufacture and commerce while the sub-urban area became the center of the settlement. It's causes jam, high cost, wasteful, inefficient, pollution, longer time, uncomforted, high life stress. Restructuring the shifting of the center of business economic activities to the sub-urban areas closed to the residential area is expected to increase amenities, productivity and efficiency. The local special characters of Betawi culture that had been marginalized in Jakarta can be revived in the development of new office centers, shopping and education in sub-urban areas. By learning from Condet and Setu Babakan, future application for making sustainable settlement for Betawi people can be realized. It is hoped that wider spatial arrangement and optimal tropical climate can realize harmony of nature, humanity, social, culture, monetary, psychological, spiritual, environment and life for sustainable development.

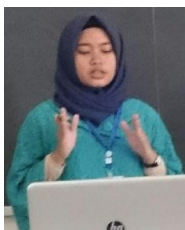
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### Pita Asih Bakti Cahyanti

Pita born in Yogyakarta, August 26, 1997. She is an under graduated student at Department of Architecture and Planning, Faculty of Engineering Universitas Gadjah Mada Yogyakarta Indonesia. She presented her paper at 2017 8th International Conference on Environmental Engineering and Applications (ICEEA 2017) 18–20 July 2017 at Faculty of Architecture, SAPIENZA University of Rome,

Italy. This paper was published in IOP Conf. Ser.: Earth Environ. Sci. 83 012028



### Ir. Adi Utomo Hatmoko, M.Arch.

He is a lecturer at Department of Architecture and Planning, Faculty of Engineering Universitas Gadjah Mada Yogyakarta Indonesia. He got Master degree from Architecture and Urban Design, School of Architecture, Georgia Institute of Technology, Atlanta, USA, United States, 1996. His Research Interest are healthcare architecture, hospital architecture, aesthetic architecture.



### Ir. Ali Rizak

Ali Rizak graduated from Parahyangan Catholic University. He is a Director at Consultant office of PT. Airmas Asri Jakarta Indonesia. This company got TOP TEN 2006, 2007 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018 ARCHITECTS – INDONESIA by Building Construction Information (BCI) Asia Awards.



### Prof. Dr. Cahyono Agus DK

Cahyono born in Yogyakarta, March 10, 1965. He is a Professor at Universitas Gadjah Mada Yogyakarta Indonesia. The Doctorate degree was obtained from Tokyo University of Agriculture & Technology, Tokyo, Japan in 2003. He was head of UGM University Farm 2008–2015. He currently serves as Chairman of Tamansiswa alumni Board (PP PKBTS) 2016–202, a member of Majelis Luhur Persatuan Tamansiswa (MLPTS) 2016–2021, and member of Education Board DIY. He actively as a reviewer in the field of research, community development, scientific publications, institutional development in Higher Education, Indonesia. He published many scientific works in international seminars and journals, and have several awards and copyrights from various agencies.



### Prof. Kemas Ridwan Kurniawan, M.Sc., Ph.D

Kurniawan is a Professor of Architecture from Universitas Indonesia. He obtained his Master (2000) and Doctorate's Degree (2005) from the Bartlett School of Architecture University College London. His research interest is about socio-cultural history of Indonesian architecture and urbanism, in relation to the context of coloniality and postcoloniality, traditionality, modernity, and heritage. He wrote several books and articles for International and National Journals, as well as presenting papers for International and National Seminars, and giving Public Lectures in Indonesia and overseas. He was former Head of Architecture Departement Universitas Indonesia (2007 – 2013) and also former Head of APTARI (Association of Architectural Higher-Education in Indonesia, 2010 – 2013). Presently, He is Head of Heritage Conservation Expert Team in West Bangka. He is also a Building Expert Team for DKI Jakarta, Assesor for National Accreditation Board, and Senate member of Faculty of Engineering UI.