

IOP Conference Series

Materials Science and Engineering

2nd International Conference
on Robotics and Mechantronics

517

VOLUME 517 – 2019

5–11 November 2018
Singapore

EDITOR
Meng Joe Goh

The open access journal for conference proceedings
iopscience.org/jcs

IOP Publishing

PAPER • OPEN ACCESS

Preface


To cite this article: 2020 *IOP Conf. Ser.: Mater. Sci. Eng.* **852** 011001

View the [article online](#) for updates and enhancements.

239th ECS Meeting

with the 18th International Meeting on Chemical Sensors (IMCS)

ABSTRACT DEADLINE: DECEMBER 4, 2020



May 30-June 3, 2021

SUBMIT NOW →

2nd Tarumanagara International Conference on the Applications of Technology and Engineering 2019

Preface

On behalf of the organizing committee of 2nd Tarumanagara International Conference on the Applications of Technology and Engineering (TICATE) 2019, I would like to welcome all delegates to Jakarta, Indonesia with great pleasure. Being held from November 21 to 22, 2019 at Campus I- Jl. Letjen. S. Parman No. 1, Jakarta, the international conference is organized by Universitas Tarumanagara (UNTAR) and technically sponsored by IOP Publisher.

TICATE 2019 has attracted many academicians, scientists, engineers, postgraduates and other professionals from many countries. This conference accepted 215 papers from 7 different countries, those are Australia, Taiwan, India, Malaysia, Japan, Peru and Indonesia. The aim of the conference is to promote exchange of ideas among engineers, researchers, and scientists active in the related areas of technology and engineering.

Our special thank goes to our Rector, Prof. Dr. Agustinus Purna Irawan, who has initiate this international conference, to our Plenary Speakers, Dr.-Ing. Joewono Prasetyo from Universiti Tun Hussein Onn, Malaysia, Prof. Dr. Tjokorda Gde Tirta Nindhia from Udayana University, Indonesia, Prof. Dr. Srikantappa A.S. from Cauvery Institute of Technology, India, and Prof. Dr. Mohd. Zulkifli Abdullah from Universiti Sains Malaysia, Malaysia, and Prof. Yasuyuku Nemoto, Ph.D. from Ashikaga University, Japan.

Our special thank also goes to Tarzan Photo and PT. Astaguna Wisesa as our patrons. Also to all individuals and organizations such as the members of international editorial board, the conference organizers, the reviewers and the authors, for their contribution in making TICATE 2019 as a successful international conference and a memorable gathering event. I am also grateful for the support of publication service of IOP Publisher. We hope that the conference could present you wonderful memories to bring home in addition to new insights and friendship congregated during the event.

We truly value your participation and support for the conference. We hope that you will enjoy TICATE 2019 and culture and tradition in Jakarta.

Dr. Hugeng, S.T., M.T. (SMIEEE)



2nd TICATE 2019
Conference Organisation

INITIATION & ORGANIZING INSTITUTION
Universitas Tarumanagara, Jakarta

Supporting Institution
IOP Publisher, Tarzan Photo, PT. Astaguna Wisesa

Honorary Chair

Prof. Dr. Agustinus Purna Irawan
R. M. Gatot Soemartono, Ph.D.

Chairman

Dr. Hugeng, S.T., M.T. (SMIEEE)

Co-chairperson

Dr. Fransisca Iriani Roesmala Dewi

Secretary

Bagus Mulyawan, M.M.

Program & Sponsorship

Mei Ie, M.M.

Herlina Budiono, M.M.

Parallel & Scientific Session

Dr. Hetty Karunia Tunjung Sari

Sinta Paramita, M.A.

Treasurer

Wulan Purnama Sari, M.Si.

Keynote Speakers

Prof. Dr. Tjokorda Gde Tirta Nindhia, Universitas Udayana, Indonesia

Dr.-Ing. Joewono Prasetyo, Universiti Tun Hussein Onn, Malaysia

Prof. Dr. Srikantappa A.S., Cauvery Institute of Technology, India

Prof. Dr. Mohd. Zulkifli Abdullah, Universiti Sains Malaysia, Malaysia

Prof. Yasuyuku Nemoto, Ph.D., Ashikaga University, Japan

Editorial Board / Reviewers:

Prof. Dr. rer. nat. Alexander Ferrein, University of Applied Sciences Aachen, Germany

Dr.-Ing. A. Ruggeri Toni Liang, Karlsruhe Institute of Technology, Germany

Dr. -Ing Stephan Herzog, TU Kaiserslautern, Germany

Dr. Thomas Marconi, Inside Secure, France

Prof. Yifan Chen, Ph.D., University of Waikato, New Zealand

Dr. Soh Sie Teng, Curtin University, Australia

Dr. Channing Chuang, Kun Shan University, Taiwan

Prof. Mohd Zulkifli bin Abdullah, Universiti Sains Malaysia, Malaysia

Prof. Zaidi Mohd. Ripin, Universiti Sains Malaysia, Malaysia

Dr. -Ing. Joewono Prasetyo, Universiti Tun Hussein Onn, Malaysia

Dr. Filbert H. Juwono, Curtin University, Sarawak Malaysia

Prof. Dr. Tresna P. Soemardi, Universitas Indonesia, Indonesia

Dr. -Ing. Eko Adhi Setiawan, Universitas Indonesia, Indonesia

Prof. Dr. Jamasri, Universitas Gadjah Mada, Indonesia

Dr. Bambang Kismono Hadi, Bandung Institute of Technology, Indonesia

Prof. Eko Sedyono, Universitas Kristen Satya Wacana, Indonesia

Prof. Tjokorda Gde Tirta Nindhia, Universitas Udayana, Indonesia

Dr. Rianti Ariobimo, Universitas Trisakti, Indonesia

Dr. Richard Napitupulu, Universitas HKBP Nommensen, Indonesia

Prof. Dr. Dyah Erny Herwindiati, Universitas Tarumanagara, Indonesia

Prof. Dr. Leksmono Suryo Putranto, Universitas Tarumanagara, Indonesia

Harto Tanujaya, Ph.D., Universitas Tarumanagara, Indonesia

Jap Tji Beng, Ph.D., Universitas Tarumanagara, Indonesia

Lina, Ph.D., Universitas Tarumanagara, Indonesia

Dr. Steven Darmawan, Universitas Tarumanagara, Indonesia





This site uses cookies. By continuing to use this site you agree to our use of cookies. To find out more, see our Privacy and Cookies policy.



Table of contents

Volume 852

2020

◀ Previous issue Next issue ▶

The 2nd Tarumanagara International Conference on the Applications of Technology and Engineering (TICATE) 2019 21-22 November 2019, Jakarta, Indonesia

Accepted papers received: 21 April 2020

Published online: 20 July 2020

Open all abstracts

Preface

OPEN ACCESS 011001

Preface

+ Open abstract View article PDF

OPEN ACCESS 011002

Peer review statement

+ Open abstract View article PDF

Part 1

OPEN ACCESS 012001

Cipali Toll Road Safety Audit

Niluh Putu Shinta Eka Setyarini, Leksmono Suryo Putranto and Najid

+ Open abstract View article PDF

OPEN ACCESS 012002

Factors affecting residential choice in Greater Jakarta

L S Putranto and P Louis

+ Open abstract View article PDF

OPEN ACCESS 012003

Mechanical properties of powder concrete with a geopolymer bond

W Kushartomo and Sofianto

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012004

Whitmore Section and Block Shear Failure Analysis on a Bolted Gusset Plate using Finite Element Method

Yoses Riadi and Leo S Tedianto

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012005

Traffic Management and Engineering Analysis of the Manahan Flyover Area by using Traffic Micro-Simulation VISSIM

Budi Yulianto

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012006

The compressive strength behavior of mahogany wood connections with bolt-ring connectors

Wiryanto Dewobroto, Ika Bali and Lodia Semaya Amnifu

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012007

Maintenance Building Strategies in a private University in Jakarta

F Triwijayanty and W I Sakti

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012008

Application of life cycle cost in the construction of soil retaining wall replacing soldier pile with diaphragm wall (case studi of Pejaten Apartment Projects)

L Monalisa and C A Makarim

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012009

Whole Effluent Toxicity (WET) Test On Microalgae Reactor and Acute Toxicity on *Daphnia* sp.

Ika Bayu Kartikasari, A Yulianto and A Asmarany

[+ Open abstract](#)



[View article](#)



[PDF](#)

OPEN ACCESS

012010

Control of Quality Concrete Base on Curing Methods

Anisah and Prihantono

[+ Open abstract](#)



[View article](#)



[PDF](#)

Development of wood carving furniture technology in Jepara

Eddy Supriyatna Marizar, Maitri Widya Mutiara and Agustinus Purna Irawan

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012147

Cardiac Arrhythmia classification using deep learning

Alexander R. J. Silalahi and Tumpal Pandiangan

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012148

Designing and Building Secure Electronic Medical Record Application by Applying AES-256 and RSA Digital Signature

Galih Wening Werdi Mukti and Hermawan Setiawan

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012149

Medical Diagnosis System in Healthcare Industry: A Fuzzy Approach

N Sevani, A Setiawan, F Saputra, R. K. Sali and O Sunardi

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012150

Climate Responsive Architecture in Jakarta's Apartments

C Tjie, F Lianto and N W Priyomarsono

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012151

Natural Lighting Analysis in Plaza Senayan, Jakarta, Indonesia

Silvia Gunawan, Naniek Widayati Priyomarsono and Rudy Trisno

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012152

Emergency Shelter Design For Disaster Preparation

Abdel Mounaim, Naniek Widayati Priyomarsono and Rudy Trisno

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012153

Potential of processed timber for preserving the Chinese traditional buildings

J Rilatupa, R Trisno and F Lianto

[+ Open abstract](#) [View article](#) [PDF](#)

OPEN ACCESS

012154

OPEN ACCESS

012178

Cloud computing model in higher education

Bagus Mulyawan, Raymond Kosala, Benny Ranti and Suhono Harso Supangkat

[+ Open abstract](#)[View article](#)[PDF](#)

JOURNAL LINKS

[Journal home](#)

[Information for organizers](#)

[Information for authors](#)

[Search for published proceedings](#)

[Contact us](#)

[Reprint services from Curran Associates](#)

PAPER • OPEN ACCESS

Climate Responsive Architecture in Jakarta's Apartments

To cite this article: C Tjie *et al* 2020 *IOP Conf. Ser.: Mater. Sci. Eng.* **852** 012150

View the [article online](#) for updates and enhancements.

Climate Responsive Architecture in Jakarta's Apartments

C Tjie^{1*}, F Lianto^{1#}, and N W Priyomarsono¹

¹ Department of Architecture, Tarumanagara University, Jakarta, Indonesia

*Email: christine_tjie@yahoo.com

#Corresponding Author: fermantol@ft.untar.ac.id

Abstract. Almost every day, apartment buildings in Jakarta have to face a long hour exposure of solar heating which caused temperature gain inside the building. It creates a high room temperature and requires an air-conditioning system to reduce room temperature. This problem arises from the ineffective function of architecture design elements used. The method used in this research is literature study and analyze it with the case study of three apartments located in Jakarta. The principal design of climate-responsive architecture in Jakarta (tropical humid climate city) is a passive cooling strategy which used to prevent/avoid solar heat exposure and to release heat inside the building. There are two categories of design elements function used: 1) as building envelope/façade (such as shadings, ventilation, roof, and building materials) and 2) as building placement (such as building thickness and orientation, ventilations, building landscape, etc.). Three apartments located in Jakarta were analyzed with the findings, and the design elements used were found ineffective as climate filter in Jakarta (the three apartments still rely on air-conditioned systems-active cooling approach to reduce the transmitted solar heat and cooling rooms). The result of this study is a solution/recommendation for designing architecture elements that functioned as climate filter and have better respond to Jakarta's climate.

1. Introduction

The research started with a phenomenon found in the architecture of Jakarta's apartments, the design styles are so modern using glasses as building envelope/façade makes us wonder, are they suitable for Jakarta's climate? Are they inspired by international/global modern architecture? Why the used of Air-conditioned is a must to create a comfortable interior in apartments? These questions lead to one research question on how to design a residence that suitable to Jakarta's climate with minimal use of air-conditioner? The focus of research is to understand Jakarta's tropical humid climate, its problems to buildings, especially apartments, and the potential of using architecture design elements as climate filter.

2. Material and Method

2.1 Method of Study

The method used in this research is a literature study concerning climate-responsive architecture theory, a passive cooling strategy that suitable for the humid tropical climate in Jakarta, and the effective design elements used in achieving it. The findings in the literature study will be used to analyze the case study of three apartments located in Jakarta. The interpreted result will answer the question of whether architecture apartments in Jakarta are designed with climate consideration, and if not, what kind of solution/recommendation for creating a climate-responsive apartment in Jakarta with optimal climate filter, and energy usage (especially in aircon usage).



2.2 Theoretical Review

The literature study started with understanding what architect and architecture mean to the world. Architect derives from Greek etymology, *arkhitekton*. *Arkhi* means chief and *tekton* means builder [1]. Architecture has to characterize its esthetic (*Venustas*), strength (*Firmitas*), and function (*Utilitas*) [2], architecture is the coordination and balance of three. Now the definition of architecture evolves as of a holistic design thinking process of an architect that consider all esthetic, strength, function, and sustainability of architecture for human and its environment. The proper structuring and balancing of buildings in architecture, structure, and interior can provide the best benefits for users [3].

With a holistic meaning of design architecture, the study goes further to finding what climate-responsive architecture is. A climate-responsive architecture is a design practice that focuses on designing buildings that function effectively with its environment (microclimate) [4]; Architecture has to represent its climate, the condition of atmosphere will influence the design, materials, and construction methods used [5]; and architecture connecting place, environment, and human life. There is three principal of climate adaptation/responsive architecture are passive design, active design, and the combination of both [6].

Jakarta's climate is a humid tropical climate with its characteristic such as an everyday average 10-12 hours sun hours [7]; average temperature 28°C, deviation 7°; average humidity 70%; average wind speed 1meter/second; and average precipitation 3000mm/year). With this kind of climate statistic, everyday Jakarta's people and its building (include apartments) have to face a hot temperature and be adapted with it.

A passive design strategy means a design that regards climate. Designing building envelopes/façade as building climate filter is an approach of passive design strategy [6]. Passive design charts are straightforward to use for architects in designing apartment because direct results can be adjusted using the graph without difficult calculations [8]. The effort to control interior thermal comfort without consuming too much energy (fuels); to arranged building orientation, layout, façade that control heat, wind flow, humidity; the use of selected materials that insulate building from heat/sun exposure; to maximize the use of sunlight for natural lighting; to maximize the opening for passive cooling; the use of shadings to control sun heating [9]. There are two passive design strategies: passive cooling and passive heating design. A passive cooling design approach suitable for humid tropical climate. The policy is to release heat in the building with opening quickly, and natural ventilation [5] with the most effective design elements functioned as ventilation and sun-shadings [10]. The heat avoidance strategy is sun-shadings and the design arrangement of opening and cross ventilation [9]. The design of flats should follow to natural ventilation requirements for comfort, occupant health, and energy savings [8].

The architecture design elements responsive to passive cooling designs are: 1) building mass thickness, and orientation to the sun (source of heat and radiation); 2) roof design; 3) opening/ventilation-ratio between transparent wall and massif wall; 4) building materials; 5) green and vegetation; 6) building shade designs [5] [9] [10] [11].

- 1) Building mass thickness, and orientation to the sun (source of heat and radiation). Optimization of building envelope/façade design can reduce the usage of air-conditioner [12]. The building mass thickness means the shorter side of the building. In a humid tropical climate, the slimmer building mass means the faster movement of air flowing in-out, releasing heat inside the building [5]. The building and opening/ventilation not facing direct East-West sun orientation are more effective in tropical climate [13].
- 2) Roof design. The roof is the first defender/filter from sun's heat and radiation. Architecture that pays attention to its roof design and a non-transferable heat-materials will give a significant impact to heat release-passive cooling strategy.

- 3) Opening/ventilation-ratio between the transparent wall and the massif wall. The right design of opening/ventilation ratio and its position will filter and release heat in-out the building. Two tables of natural cross-ventilation, room depth to ceiling height ratio, and one illustration of a window to wall ratio (WWR) required to design a climate-responsive building/apartment [11, pp. 41-43]. Window to wall ratio (WWR) is a guideline of façade transparent wall and massif wall ratio [11, pp. 20-21]. A maximum of 30% façade opening is required in tropical humid climate building/apartment in Jakarta [11, pp. 26-28].
- 4) Building materials. As building materials develop extensively, it is essential for architects to have knowledge of materials used for the building design. The right materials can filter heat from entering the building and help release the heat from inside the building.
- 5) Green and vegetation. Creating a micro-climate is essential, positioning and choosing vegetations can create a good filter of climate and reducing heat from the building site.
- 6) Building shades. External shading devices are important design elements to avoid and reduce heat from entering the building. To design the effective sun-shading/external shading devices, architects must understand the orientation and the ratio of sun-shading.

The theoretical review on how to design a climate-responsive architecture in Jakarta's apartments above is a passive cooling design where the main issue is to avoid heat and releasing heat as fast as possible so the room temperature can be cold and minimal use of air-conditioning. The figure summary is shown below (Figure 1).

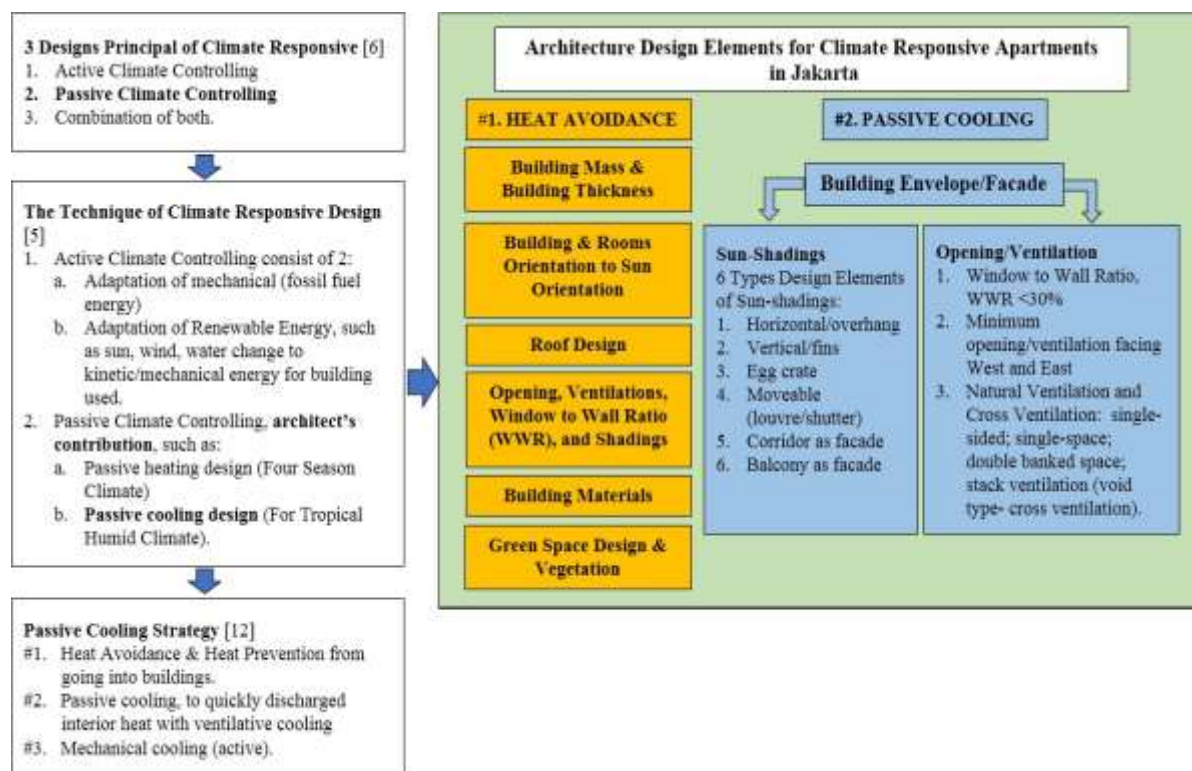


Figure 1. Summary/Schematic Theories of Climate Responsive Architecture Jakarta's Apartments.

2.3 Case Study

The study conducted at three apartments (Figure 2,3,4 and Table 1): Regatta Pantai Mutiara-London Tower (North Jakarta); Thamrin Executives Residence (Central Jakarta); and La Maison Barito (South Jakarta).



Figure 2. Regatta Apartment London Tower.




Figure 3. Thamrin Executives Residence Apartment.



Figure 4. La Maison Barito Apartment.

Table 1. Analyses on Case Study of Three Apartments with Climate Responsive-Passive Cooling Design Strategy-Elements/Parameter.

Jakarta's Climate Responsive Design elements/Parameter		Regatta Menara London 2017	Thamrin Executives Residence 2012	La Maison Barito 2017
Building Mass & Thickness		<ul style="list-style-type: none"> • Tower • High-rise-24 floors • High-end • Family • 2-3 bedrooms unit-type • Double-loaded corridor 	<ul style="list-style-type: none"> • Slab- L shape • High-rise-35 floors • Medium to High-end • CBD Area • Studio, 1-2 bedrooms • Double loaded corridor 	<ul style="list-style-type: none"> • Tower • High-rise-24 floors • High-end • Family • 2-3 bedrooms unit type • Double loaded corridor 
Building and Units Orientation		<ul style="list-style-type: none"> • North East • South West 	<ul style="list-style-type: none"> • North, South, East, and West 	<ul style="list-style-type: none"> • East • West
Roof Design		<ul style="list-style-type: none"> • No design- standard RC deck-utility area 	<ul style="list-style-type: none"> • No design- standard RC deck- utility area 	<ul style="list-style-type: none"> • No design- standard RC deck-utility area
Materials for Building Envelopes/Facade		<ul style="list-style-type: none"> • 85% reflective glass + opaque • 15% solid wall as facade 	<ul style="list-style-type: none"> • 80% solid wall as facade • 20% windows and balcony 	<ul style="list-style-type: none"> • 90% reflective glass+ opaque • 10% solid wall as facade
Green Space Design & Vegetation		<ul style="list-style-type: none"> • At ground level-minimal. No impact on micro climate 	<ul style="list-style-type: none"> • At Podium level-minimal. No impact on micro climate 	<ul style="list-style-type: none"> • At ground level. No impact on micro climate
Shadings	External Sun-shading	<ul style="list-style-type: none"> • Not designed 	<ul style="list-style-type: none"> • Designed, less than ratio required 	<ul style="list-style-type: none"> • Not designed
	Balcony	<ul style="list-style-type: none"> • Designed 	<ul style="list-style-type: none"> • Designed 	<ul style="list-style-type: none"> • Not designed
	Corridor as Facade	<ul style="list-style-type: none"> • Not designed 	<ul style="list-style-type: none"> • Not designed 	<ul style="list-style-type: none"> • Not designed
Opening/Ventilation	Window to Wall Ratio-WWR	<ul style="list-style-type: none"> • Designed. 85% WWR 	<ul style="list-style-type: none"> • Designed. 30% WWR 	<ul style="list-style-type: none"> • Designed. 90% WWR
	Natural ventilation (1 room)	<ul style="list-style-type: none"> • Designed 	<ul style="list-style-type: none"> • Designed 	<ul style="list-style-type: none"> • Designed
	Cross Ventilation in 1 room	<ul style="list-style-type: none"> • Designed for corner units 	<ul style="list-style-type: none"> • Designed for corner units 	<ul style="list-style-type: none"> • Designed for corner units
	Cross Ventilation- 2 rooms connected	<ul style="list-style-type: none"> • Not designed 	<ul style="list-style-type: none"> • Not designed 	<ul style="list-style-type: none"> • Not designed
	Stack Ventilation	<ul style="list-style-type: none"> • Not designed 	<ul style="list-style-type: none"> • Not designed 	<ul style="list-style-type: none"> • Not designed
Air-conditioned (AC) in unit apartments		<ul style="list-style-type: none"> • Designed (VRV system) 	<ul style="list-style-type: none"> • Designed (Split system) 	<ul style="list-style-type: none"> • Designed (VRV system)

3. Results and Discussion

The result of analyses on three apartments with climate responsive-passive cooling design strategy-elements/parameter are as follow:

1. Building mass thickness, and orientation to the sun (source of heat and radiation). Regatta and La Maison Barito were designed with massif, and thick building mass resulted of slower heat release. Thamrin Executives Residence's building thickness is less than 17 meters, it is slim and have opening on both corridor end (although the distance is more than 15 meters-not an optimal distance according to room to ceiling height ratio of cross ventilation) which can release heat better, especially in the higher level where the wind blows stronger. On building and rooms orientation, the three apartments were not following 'avoid East-West orientation design parameter.' They follow site orientation with maximum numbers of units and maximum view. As a result, some apartment units have to face heat and use aircon to reduce room temperature. The three-case study was showing the un-effective passive cooling design in building mass thickness, and orientation to the sun.
2. Roof design. The three case study did not have any special design and materials for their roof and functioned as a utility area. So the roof is not designed as the first defender/filter from sun's heat/radiation and does not implement a passive cooling design strategy.
3. Opening/ventilation-ratio between the transparent wall and the massif wall. The natural ventilation and cross ventilation in the three apartments are not functioned effectively due to poor positioning of ventilation/windows, the room to ceiling height ratio is not effective, and the window to wall ratio for Regatta apartment is 85%, Thamrin Executives Residence is 30%, and La Maison Barito apartment is 90%. The higher WWR means the internal building receives more heat. The analyses show that only Thamrin Executives Residence have better WWR, so they only rely on split system aircon to adjust room temperature. The right design of opening/ventilation ratio and its position will filter and release heat in-out the building.
4. Building materials. Regatta and La Maison Barito apartment were designed using wall-cladding system with reflective glasses while facing East-West orientation, resulted in 'glasshouse effect' and have to use the VRV aircon system to achieve desired room temperature. The passive cooling design on building façade materials of these two apartments are not applicable. Thamrin Executive Residence was designed with better WWR (30%) and using pre-cast massif wall, and glass/transparent window ventilation have better heat filtering. The right materials can filter heat from entering the building and help release the heat from inside the building.
5. Green and vegetation. The three apartments were not designed with effective and optimal green and vegetation, resulted in no significant filter of climate and reducing heat from the building site.
6. Building shades. La Maison Barito was not designed with any external shading; the 90% WWR have to face 10-12 hours transmitted heat from the sun every day. Regatta apartment was not designed with sun-shading devices, but have a balcony as another shading design elements which reducing heat from entering units. Thamrin Residence Executives apartment has ineffective 20cm depth horizontal overhang and good sizes of balconies which reduce the heat from entering units.

4. Conclusion

Based on the analysis, the study of the climate-responsive architecture of Jakarta's apartments can be concluded as follow:

1. Architecture apartments in Jakarta were not designed to follow climate-responsive architecture-passive cooling design strategy, resulted in high usage on aircon to reduce and achieve desirable room temperature.
2. The climate-responsive architecture of Jakarta's apartment is a passive cooling design strategy. Passive cooling design strategy basically is a design strategy to prevent/avoid transmitted heat from

sun to building and fast-release heat from building with design elements such as 1) building mass thickness, and orientation to the sun (source of heat and radiation); 2) roof design; 3) opening/ventilation-ratio between transparent wall and massif wall; 4) building materials; 5) green and vegetation; 6) building shade designs.

3. The case study on three apartments in Jakarta resulted in proofing were not designed with the climate-responsive architecture-passive cooling design strategy. Apartments in Jakarta still using active controlling approach to control room temperature and heat from the climate.
4. Suggestion and solution to the case study of three apartments in Jakarta are:
 - a) Building mass thickness, and orientation to the sun (source of heat and radiation).
 - b) Roof design. Using material heat insulation for the roof or designing a roof garden.
 - c) Applying better calculation on creating opening/ventilation-ratio between the transparent wall and the massif wall.
 - d) Building materials. To equip apartments with building materials functioned as climate filter.
 - e) Green and Vegetation. To implement a significant measure of green and vegetation in apartments, creating cooling micro-climate.
 - f) Building shade/External Shading Devices. The three apartments can adopt the use of sun-shading devices, especially the horizontal shading, to reduce the heat entering the building.

References

- [1] D. Harper, 2000. [Online]. Available: <http://www.etymonline.com/>.
- [2] I. D. Rowland and T. N. Howe, *Vitruvius-Ten Books on Architecture*, New York: Cambridge University Press, 1999.
- [3] S. W. Teh, F. Lianto and R. Trisno, "The Impact of Column and Beam Construction System to Interior Design Layout According to Fengshui," *International Journal of Civil Engineering and Technology*, vol. 9, no. 13, pp. 1822-1828, 2018.
- [4] A. Malekafzali, "https://www.sageglass.com/eu/article/future-architecture-climate-responsive-design," 20 December 2017. [Online].
- [5] T. H. Karyono, *Arsitektur Tropis: Bentuk, Teknologi, Kenyamanan, & Penggunaan Energi*, Jakarta: Penerbit Erlangga, 2016.
- [6] T. Dahl, *Climate and Architecture*, London: Taylor & Francis Ltd, 2009.
- [7] M. S. S. Purnama and D. Sutanto, "Dynamic Facade module prototype development for solar radiation in high rise building," in *IOP Conf. Ser.: Earth Environ. Sci. Volume 126*, 2018.
- [8] B. Chandra, R. Trisno, S. Gunanta, N. W. Priyomarsono, B. M. Susetyarto and F. Lianto, "The Application of Passive Design Chart on the Analysis of Natural Ventilation of Low and Middle Income Flats Case Study Sky View Apartment and 'Rusunawa' Manis Jaya, Tangerang," *Journal of Physics: Conference Series*, vol. 1179, no. 1, pp. 1-9, 2019.
- [9] T. M. Boake, *Presentation slide*, Ontario: Waterloo Architecture, 2011.
- [10] H. Rosenlund, "Climatic Design of Buildings using Passive Techniques," *Building Issues*] *Volume 10 Number 1*, pp. 3-26, 2000.
- [11] I. F. C.-. W. B. Group, *User Guide for Homes Version 2.0-corresponds to EDGE software version*] *2.0.0*, Edge-IFC, 2016.
- [12] N. Lechner, *Heating, Cooling, Lighting -4th edition*, Canada: John Wiley & Son, Inc., 2015.
- [13] G. Francesco, "Search for the optimal window-to-wall ratio in office buildings in different] European climates and the implications on total energy saving potential," *Journal Solar Energy* 132, pp. 467-492, 2016.

**SJR**

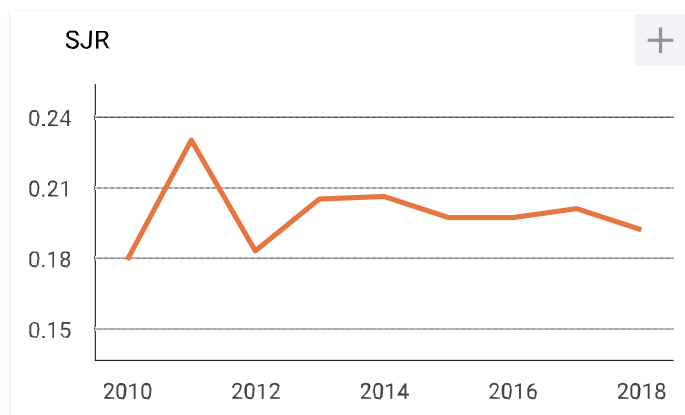
Scimago Journal & Country Rank

Enter Journal Title, ISSN or Publisher Name

[Home](#)[Journal Rankings](#)[Country Rankings](#)[Viz Tools](#)[Help](#)[About Us](#)

IOP Conference Series: Materials Science and Engineering

Country	United Kingdom - SJR Ranking of United Kingdom	24
Subject Area and Category	Engineering Engineering (miscellaneous) Materials Science Materials Science (miscellaneous)	
Publisher		
Publication type	Conferences and Proceedings	
ISSN	17578981, 1757899X	H Index
Coverage	2009-ongoing	
Scope	The open access IOP Conference Series provides a fast, versatile and cost-effective proceedings publication service for your conference. Key publishing subject areas include: physics, materials science, environmental science, bioscience, engineering, computational science and mathematics.	
	Homepage How to publish in this journal Contact Join the conversation about this journal	



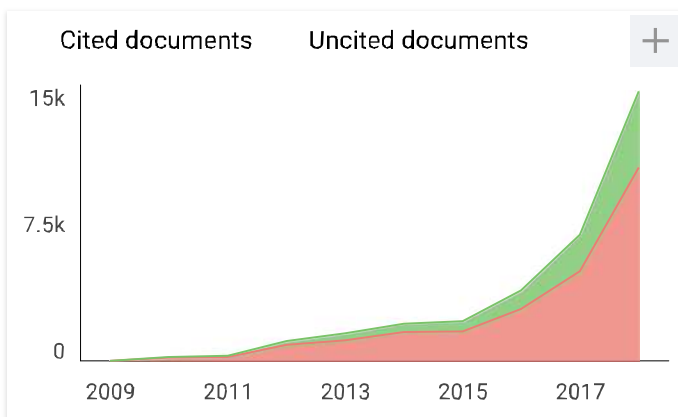
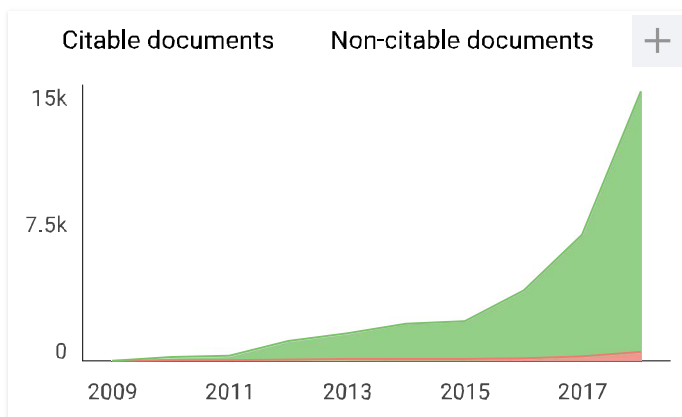
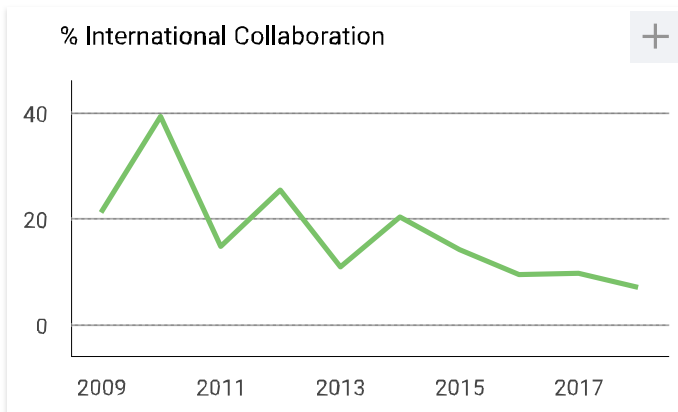
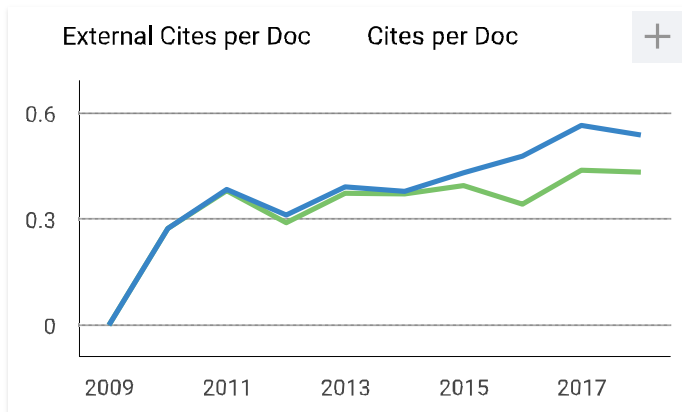
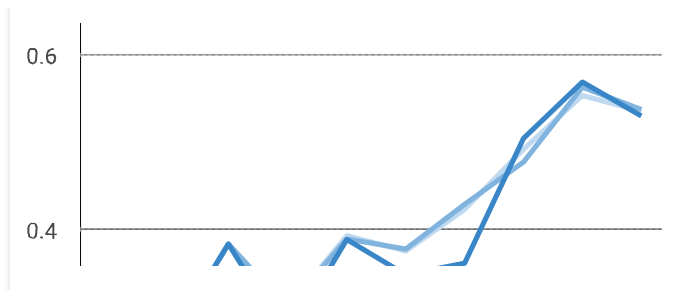
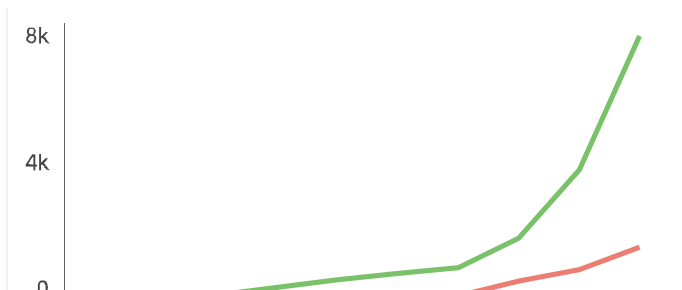
Citations per document



Total Cites

Self-Cites





**IOP Conference Series:
Materials Science and...**

Not yet assigned
quartile

SJR 2018
0.19

powered by scimagojr.com

← Show this widget in
your own website

Just copy the code below
and paste within your html
code:

```
<a href="https://www.scimaç"
```

K

Kassim 1 month ago

Hello

I want know that is Elsevier a publisher of this journal?

reply



Source details

IOP Conference Series: Materials Science and Engineering

Scopus coverage years: from 2009 to 2019

ISSN: 1757-8981 E-ISSN: 1757-899X

Subject area: [Engineering: General Engineering](#) [Materials Science: General Materials Science](#)[View all documents >](#)[Set document alert](#)[📁 Save to source list](#) [Journal Homepage](#)

CiteScore 2018

0.53

Add CiteScore t

SJR 2018

0.192

SNIP 2018

0.531[CiteScore](#)[CiteScore rank & trend](#)[CiteScore presets](#)[Scopus content coverage](#)CiteScore [2018](#) [v](#)Calculated using data from **30 April, 2019**

CiteScore rank ⓘ

$$0.53 = \frac{\text{Citation Count 2018}}{\text{Documents 2015 - 2017}^*} = \frac{7,820 \text{ Citations} >}{14,668 \text{ Documents} >}$$

*CiteScore includes all available document types

[View CiteScore methodology >](#)[CiteScore FAQ >](#)

Category

Rank

Engineering

General Engineering

#171/275

Materials Science

General Materials Science

#305/438

CiteScoreTracker 2019 ⓘ

Last updated on **08 December, 2019**

Updated monthly

$$0.43 = \frac{\text{Citation Count 2019}}{\text{Documents 2016 - 2018}} = \frac{12,277 \text{ Citations to date} >}{28,226 \text{ Documents to date} >}$$

[View CiteScore trends >](#)

Metrics displaying this icon are compiled according to Snowball Metrics [↗](#), a collaboration between industry and academia.

About Scopus

[What is Scopus](#)[Content coverage](#)[Scopus blog](#)[Scopus API](#)[Privacy matters](#)

Language

[日本語に切り替える](#)[切换到简体中文](#)[切换到繁體中文](#)[Русский язык](#)

Customer Service

[Help](#)[Contact us](#)

