

**LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : PROSIDING**

Judul Jurnal Ilmiah (Artikel) : Product Development Using Bio-mimicry Design Spiral Approach of Swimming Aid
 Jumlah Penulis : 5 orang
 Status Pengusul : Penulis Pertama
 Identitas Makalah : a. Judul Prosiding : 3rd International Conference on Energy, Environmental and Information System
 b. Nomor ISSN :
 c. Tahun Terbit, Tempat : 14-15 Agustus 2018, Semarang
 d. Penerbit/Organizer : Web of conference/ Undip
 e. DOI artikel (jika ada) : 10.1051/e3sconf/20187308007
 f. Alamat web : <https://www.e3s-conferences.org/>
 g. Terindeks di Scopus/Scimagojr/SJR = scopus

Kategori Publikasi : Prosiding Forum Ilmiah Internasional
 Prosiding Forum Ilmiah Nasional

(beri \checkmark pada kategori yang tepat)

Hasil Penilaian Peer Review :

Komponen Yang Dinilai	Nilai Maksimal Prosiding		Nilai Yang Diperoleh
	Reviewer 1	Reviewer2	
a. Kelengkapan unsur isi prosiding(10%)	2,5	2,8	2,65
b. Ruang lingkup dan kedalaman pembahasan (30%)	8	8,2	8,1
c. Kecukupan dan kemutakhiran data/informasi dan metodologi	8	8,3	8,15
d. Kelengkapan unsur dan kualitas penerbit (30%)	8,5	8,5	8,5
Total = (100%)	27	27,8	27,4
Nilai Pengusul = (60%)* 27,4 = 16,44			

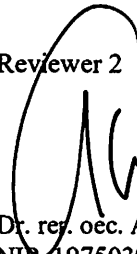
Semarang, 12 Agustus 2019

Reviewer 1



Dr. Ir. Heru Prastawa, DEA
 NIP. 196003151987031001
 Unit Kerja : Dept T. Industri FT Undip
 Bidang Ilmu: Teknik Industri
 Jabatan Fungsional: Lektor Kepala

Reviewer 2



Dr. rer. oec. Arfan Bakhtiar, ST, MT.
 NIP. 19750306 200012 1 001
 Unit Kerja : Dept T. Industri FT Undip
 Bidang Ilmu: Teknik Industri
 Jabatan Fungsional: Lektor Kepala

**LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : PROSIDING**

Judul Jurnal Ilmiah (Artikel) : Product Development Using Bio-mimicry Design Spiral Approach of Swimming Aid
 Jumlah Penulis : 5 orang
 Status Pengusul : Penulis Pertama
 Identitas Makalah : a. Judul Prosiding : 3rd International Conference on Energy, Environmental and Information System
 b. Nomor ISSN :
 c. Tahun Terbit, Tempat : 14-15 Agustus 2018, Semarang
 d. Penerbit/Organizer : WEB of conference/UNDIP
 e. DOI artikel (jika ada) : 10.1051/e3sconf/20187308007
 f. Alamat web : <https://www.e3s-conferences.org/>
 g. Terindeks di Scopus/Scimagojr/SJR = -
 Kategori Publikasi : Prosiding Forum Ilmiah Internasional
 Prosiding Forum Ilmiah Nasional

(beri \checkmark pada kategori yang tepat)

Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal Prosiding		Nilai Akbir Yang Diperoleh
	Internasional	Nasional	
a. Kelengkapan unsur isi prosiding (10%)	3		2,5
b. Ruang lingkup dan kedalaman pembahasan (30%)	9		8
c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%)	9		8
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	9		8,5
Total = (100%)	30		27
Nilai Pengusul = (60%)* 27 = 16,2			

Catatan penilaian oleh reviewer :	
1.	<u>Kesesuaian dan kelengkapan unsur isi prosiding</u> : Unsur isi artikel baik, sesuai dengan sistematika makalah yaitu introduction, methodology, results, discussion, and conclusion. Makalah cukup jelas dengan struktur penulisan yang baik
2.	<u>Ruang lingkup dan kedalaman pembahasan</u> : Ruang lingkup artikel baik dengan pembahasan yang cukup jelas dikaitkan dengan metode atau tahapan perancangan produk, sayangnya penjelasan belum sampai pada tahap pengujian produk
3.	<u>Kecukupan dan kemutakhiran data/informasi dan metodologi</u> : Biomimicry merupakan metode perancangan produk yang jarang diteliti sehingga penelitian ini memberi kontribusi pada penjelasan teknis pelaksanaan perancangan produk dengan biomimicry, metode mutakhir
4.	<u>Kelengkapan unsur dan kualitas terbitan</u> : Diterbitkan oleh web of conference dalam prosiding IES yang terindex scopus

Semarang, Agustus 2019
Reviewer I



Dr. Ir. Heru Prastawa, DEA.
 NIP. 196003151987031001
 Unit Kerja : Dept T. Industri FT Undip
 Bidang Ilmu: Teknik Industri
 Jabatan Fungsional: Lektor Kepala

**LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : PROSIDING**

Judul Jurnal Ilmiah (Artikel) : Product Development Using Bio-mimicry Design Spiral Approach of Swimming Aid
 Jumlah Penulis : 5 orang
 Status Pengusul : Penulis Pertama
 Identitas Makalah : a. Judul Prosiding : 3rd International Conference on Energy, Environmental and Information System
 b. Nomor ISSN :
 c. Tahun Terbit, Tempat : 14-15 Agustus 2018, Semarang
 d. Penerbit/Organizer : Web of conference/Undip
 e. DOI artikel (jika ada) : 10.1051/e3sconf/20187308007
 f. Alamat web : https://www.e3s-conferences.org/
 g. Terindeks di Scopus/Scimagojr/SJR = scopus
 Kategori Publikasi : Prosiding Forum Ilmiah Internasional
 Prosiding Forum Ilmiah Nasional

(beri pada kategori yang tepat)

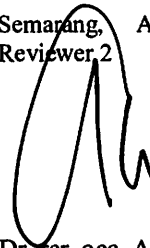
Hasil Penilaian Peer Review :

Komponen Yang Dinilai	Nilai Maksimal Prosiding		Nilai Akbir Yang Diperoleh
	Internasional	Nasional	
a. Kelengkapan unsur isi prosiding (10%)	3		2,8
b. Ruang lingkup dan kedalaman pembahasan (30%)	9		8,2
c. Kecukupan dan kemutakhiran data/informasi dan metodologi (30%)	9		8,3
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	9		8,5
Total = (100%)	30		27,8
Nilai Pengusul = (60%)* =			

Catatan penilaian oleh reviewer :

- Kesesuaian dan kelengkapan unsur isi prosiding: Unsur isi artikel baik dan sesuai dengan sistematika makalah yaitu introduction, methodology, results, discusion, and conclusion.
- Ruang lingkup dan kedalaman pembahasan: Ruang lingkup artikel baik dengan pembahasan yang cukup jelas dikaitkan dengan metode dan teknik perancangan yang digunakan
- Kecukupan dan kemutakhiran data/informasi dan metodologi: Tidak banyak data yang disajikan karena lebih focus pada metode biomimicry sebagai metode yang jarang diteliti sampai level teknikal
- Kelengkapan unsur dan kualitas terbitan: Artikel diterbitkan oleh IES dari penerbit web of conference terindex scopus

Semarang, Agustus 2019
 Reviewer 2



Dr. Ter. oec. Arfan Bakhtiar, ST, MT
 NIP. 19750306 200012 1 001
 Unit Kerja : Dept T. Industri FT Undip
 Bidang Ilmu: Teknik Industri
 Jabatan Fungsional: Lektor Kepala



3rd INTERNATIONAL CONFERENCE ON ENERGY, ENVIRONMENT AND INFORMATION SYSTEM 2018 (ICENIS 2018)

Tuesday - Wednesday, August 14th - 15th, 2018

Theme:
 “Strengthening Planning and Implementation on Energy, Environmental and Information System Toward Low Carbon Society”

Keynote Speakers



Prof. Dr. Takayuki Shimaoka
Kyushu University, Japan



Prof. Dr. Nasrudin
University of Malaya, Malaysia



Prof. Ho Ching Siong
Universiti Teknologi Malaysia, Malaysia



Dr. Junichi Fujino
IGES - Japan



Dr. Kanawut Inkaew
Rajamangala University of Technology Phra Nakhon, Thailand



Dr.-Ing. Sudarno
School of Postgraduate Studies Diponegoro University, Indonesia

A Call for Participant

After Successful in the previous event with 200 selected paper, we invite for 3rd ICENIS 2018 on August 14th - 15th, 2018 at Santika Premier Hotel Semarang, with the theme “Strengthening Planning and Implementation on Energy, Environmental and Information System Toward Low Carbon Society”

Topics of Conference

- Energy
 - Energy Management and Policy
 - Energy Planning and Education
 - Energy Conservation and Efficiency
 - Energy Conversion Technology
 - Renewable Energy
 - Nonrenewable Energy / Fossil Energy
- Environments
 - Environmental Conservation
 - Environmental Policy, Planning and Education
 - Environmental Technology
 - Environmental Health and Toxicology
 - Environmental Epidemiology
 - Pollution Control
 - Waste Management
 - Green Infrastructure and Resilience
- Information System
 - Business Intelligence
 - Supply Chain Information Systems
 - Industrial Information Systems
 - Decision Support Systems
 - Smart Information Systems
 - Health, Safety and Environment Information Systems
- Societal Change, Culture and Low Carbon Development
 - Infrastructure Development and Low Carbon Society
 - Economic Perspective in Low Carbon Society
 - Government and International Relation
 - Public Policy
 - Labour and Formal- Informal Worker
 - Health and Gender
 - Media
 - Culture and Development

Publication

All accepted papers will be published in **Scopus - indexed** E3S Web of Conferences Series.

Important Dates

Abstract Submission : before July 05th, 2018
 Full Paper Submission : before July 15th, 2018
 Early Registration Payment : before July 10th, 2018

Registration Fee

Before July 10 th , 2018	
Indonesian Presenter	IDR 2.500.000,00/paper
International Presenter	USD 250/paper
Student Presenter	IDR 2.000.000,00/paper
Indonesian Participant	IDR 1.000.000,00
International Participant	USD 150

After July 10 th , 2018	
Indonesian Presenter	IDR 2.750.000,00/paper
International Presenter	USD 300/paper
Student Presenter	IDR 2.500.000,00/paper
Indonesian Participant	IDR 1.250.000,00
International Participant	USD 200

Venue / Place

Santika Premiere Hotel – Semarang
 Pandanaran Street, Number 116-120, Semarang,
 Central Java - Indonesia

Phone / Fax: +62 24 8413115 / +62 24 8413113

More Information

Conference Website:

www.icenis.org

e-mail:

icenis2018@live.undip.ac.id

Secretariat:

School of Postgraduate Studies Diponegoro University
 Phone & Fax. : +62248449608

Contact Person:

Dr. Budi Warsito, S.Si., M.Si. : 0812 2691 363
 Fauziyah Mastuti : +62248449608
 Rahayu : 0878 3091 7461
 Eko Pujiyanto : 0813 9085 6514

SCHOOL OF POSTGRADUATE STUDIES DIPONEGORO UNIVERSITY
 Jl. Imam Bardjo No 3-5, Campus UNDIP Pleburan, Semarang 50241
www.pasca.undip.ac.id

Organizing Committee :
 **UNDIP** DIPONEGORO UNIVERSITY
 The excellent research university
 SPS SCHOOL OF POSTGRADUATE STUDIES

Preface

This is the proceeding of the 3rd International Conference on Energy, Environmental and Information System (**ICENIS**) 2018. The theme of ICENIS 2018 is “Strengthening Planning and Implementation Energy, Environment, and Information System Toward Low Carbon Society. ICENIS 2018 discussing the sustainability of the natural system, i.e energy management and policy, energy conservation, environmental education and planning, environmental conservation, environmental technology, environmental health, pollution control, waste management, green infrastructure and resilience, system information of supply chain and decision support system. Moreover the ICENIS 2018 introducing discussion of social aspect in low carbon society such as economic perspective, government, public policy and international relation, formal informal worker, gender, media and culture development

ICENIS 2018 organized by school of Postgraduate Studies, Diponegoro University has been conducted 14-15th august 2018. The conference has successfully performing forum to transferring and discussing research result among the researcher, students, government, private sector or industries. More than 390 participants and presenters from several countries such as Indonesia, Malaysia, Germany, Sudan, Australia, Japan, Libya have attended the conference to share their significant contribution in research related to energy, environment and information system. This proceeding contains 334 selected paper from the conference.

We would like to express our gratitude to all authors and members of scientific committee, reviewers and also organizing committee for their contribution to the success of the conference.

Guest Editors

Prof. Hadiyanto

Dr. Eng. Maryono

Dr. Budi Warsito

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)



Journals

Books

Conferences

EDPS Account



E3S Web of Conferences

All issues Series
Forthcoming About

Search Menu

[All issues](#) ▶ Volume 73 (2018)

[◀ Previous issue](#)

[Table of Contents](#)

[Next issue ▶](#)

[Free Access](#) to the whole issue

E3S Web of Conferences

Volume 73 (2018)

The 3rd International Conference on Energy, Environmental and Information System (ICENIS 2018)

Semarang, Indonesia, August 14-15, 2018

Hadiyanto, Maryono and Budi Warsito (Eds.)

Export the citation of the selected articles [Export](#)

[Select all](#)

Open Access

Statement of Peer review

Published online: 21 December 2018

[PDF \(46.1 KB\)](#)

Open Access

About the conference

Published online: 21 December 2018

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)

Study of Sensor Deflection in Hip Simulator : Numerical and Experimental Method

01022

Fabian Singgih Wicaksono, T Towijaya, Eko Saputra, Rifky Ismail, Mohammad Tauviqirrahman, J Jamari and Athanasius P. Bayuseno

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187301022>

[PDF \(1.532 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- *Environmental Education, Planning and Policy*

Open Access

[Audit Committee Characteristics and Carbon Emission Disclosure](#) 02001

Anis Chariri, Indira Januarti and Etna Nur Afri Yuyetta

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187302001>

[PDF \(1.656 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Environmental and social issues on energy policy in indonesia](#) 02002

Sudharto Prawata Hadi, Bulan Prabawani and Hartuti Purnaweni

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187302002>

[PDF \(1.164 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Undip Initiative for Sustainability \(UNITY\): A University Sustainability Program](#) 02003

Ambariyanto Ambariyanto, Yos Johan Utama, Mochamad Arief Budihardjo and Purwanto Purwanto

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187302003>

[PDF \(1.228 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Framework Development of Campus Sustainability Assessment. Case Study: Diponegoro University](#) 02004

Rahmaningtyas Wiganingrum, Naniek U. Handayani and Hery Suliantoro

Published online: 21 December 2018

By using this website, you agree that EDP Sciences may store web audience measurement cookies and, on some pages, cookies from social networks. [More information and setup](#)

OK

Open Access

[Sustainable Ecotourism Development based on Participatory Rural Appraisal: A Case Study of Thekelan Village, Central Java, Indonesia](#) 02019

Pertiwi Andarani, Dwi Fitri Lestari, Arya Rezagama and Sariffuddin Sariffuddin

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187302019>

[PDF \(1.592 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Realizing *Kampung* Pelangi as a Sustainable Village City Using Asian New Urbanism: Ideological Approach](#) 02020

Leoni Dwi Agitha and Rina Kurniati

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187302020>

[PDF \(1.300 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Facies Development of Carbonate Rock and System Tract Influence Based on Fullbore Formation Microimager \(FMI\) and Well Log Analysis on Carbonate Reservoir Tuban Formation, North East Java Basin](#) 02021

Fahrudin, Eka Sainyakit, Ahmad Syauqi Hidayatillah, Purnaning Tuwuh Triwigati and Muhajir

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187302021>

[PDF \(5.366 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Role of Government To Build Eco Community](#) 02022

Aju Putrijanti

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187302022>

[PDF \(1.132 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Study of Social Vulnerability of Climate Change at the Mountain Ecosystem](#) 02023

Muhammad Rifqi Maulana and Denny Nugroho Sugianto

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)
[PDF \(1.166 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- *Environmental Management and Spatial Planning*

Open Access

[Analysis of land use changes to the criticality level of the catchment area in eight watersheds that flow into Jakarta Bay, Indonesia](#) 03001

Fitriyanto Bobby Rachmat and Helmi Muhammad

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187303001>

[PDF \(1.971 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Physical and Facilities Factors Influencing Tourist Distribution in Bantul Regency, Special Region of Yogyakarta](#) 03002

Akhmad Shidiq Darajat and M. H. Dewi Susilowati

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187303002>

[PDF \(1.852 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Relation of Social Capital to Women's Proactive Participation in the Community for Sustainability of River in Urban Areas](#) 03003

Donna Asteria, Alin Halimatussadiah, Budidarmono, Dyah Utari and Retty Dwi Handayani

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187303003>

[PDF \(1.162 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Analysis of Forest Land Cover Change And Area Determination of Land Rehabilitation Based on Geographic Information System in Magelang Regency](#)

03004

Lidya Ernawati and Sutrisno Anggoro

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187303004>

[PDF \(3.700 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

By using this website, you agree that EDP Sciences may store web audience measurement cookies and, on some pages, cookies from social networks. [More information and setup](#)

OK

Open Access

[The Impact of Land Use on Hydrological Characteristics and Erosion Rate of Cilutung Watershed with SWAT Model](#) 03029

Nadzira Fadhilah, Eko Kusratmoko and Kuswantoro

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187303029>

[PDF \(2.215 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Environmental Conservation

Open Access

[Strategy for Biodiversity Conservation Efforts in Wasur National Park of Merauke in Merauke Regency](#) 04001

Samel W Ririhena, Marthen Nahumury and David Oscar Simatupang

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304001>

[PDF \(1.317 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Openspace Transformation in Conservation Area](#) 04002

Bangun IR Harsritanto, Kezia ES Dewi and Tia Hetwisari

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304002>

[PDF \(1.545 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Potential Formation of Acid Mine Drainage In Putra Perkasa Abadi Coal Mining Company - Girimulya Site \(BIB\), Tanah Bumbu Regency, South Kalimantan](#) 04003

Sri Maharani, Purwanto Purwanto, Jafron Wassiq Hidayat and Joko Triraharjo

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304003>

[PDF \(1.410 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Variability Chlorophyll-a And Sea Surface Temperature As The Fishing Ground Basis](#)

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)
Bony Lantang, Johannes Hutabarat and Anindya Wirasatriya

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304004>

[PDF \(2.143 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Influence of Liquid Organic Fertilizer on The Production and Carrying Capacity of Livestock from Setaria Grass \(*Setaria splendida*\)](#) 04005

Eko Hendarto, Muslihudin Muslihudin, Nur Laila Rahayu and Yuki Aliffenur Romadhon

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304005>

[PDF \(1.541 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Assessment and Composition of Fish in the River District Maro Merauke](#) 04006

Edy H.P Melmambessy, Irianis L. Latuperissa, Marius Agustinus Welliken, Nova Suryawati Monika and Rosa Delima Pangaribuan

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304006>

[PDF \(1.371 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Environmental Quality of Shrimp Ponds in The Coastal Region Of Brebes Regency](#) 04007

Giri Bayuaji, Astrid Damayanti and Tuty Handayani

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304007>

[PDF \(2.895 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Mangrove Cultivation \(*Avicennia Marina*\) as an Effort for Mangrove Rehabilitation in the Ponds Bare in Belopa, Luwu Regency](#) 04008

Bustam Sulaiman, Azis Nur Bambang and Mohammad Lutfi

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304008>

By using this website, you agree that EDP Sciences may store web audience measurement cookies and, on some pages, cookies from social networks. [More information and setup](#)

OK

Open Access

[Modeling mangrove 'blue carbon' ecosystem service in Jakarta bayas an impact of coastal development](#) 04023

Nasir Sudirman, Muhammad Helmi and Novi Susetyo Adi

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304023>

[PDF \(1.521 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Groundwater Quality Analysis in Nusakambangan Groundwater Basin/Indonesia](#) 04024

Thomas Triadi Putranto, Adrian Hanenda Qadarisman, Narulita Santi and Najib Najib

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304024>

[PDF \(10.31 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Irony of Fishermen Life in Bontang Islands, East Kalimantan, Indonesia](#) 04025

Sud!harto P. Hadi, Sri Suryoko and Bulan Prabawani

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187304025>

[PDF \(1.148 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Environmental Technology and Pollution Control

Open Access

[Potential Utilization of Sewage Sludge from Water Treatment Plant as Brick Material](#) 05001

Budi Prasetyo Samadikun, Siti Rukayah, Ika Bagus Priyambada, Sry T. Romaito Lumbantobing and Mochamad Arief Budihardjo

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187305001>

[PDF \(1.861 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

By using this website, you agree that EDP Sciences may store web audience measurement cookies and, on some pages, cookies from social networks. [More information and setup](#)

OK

Open Access

[Effectiveness of compressor machine by using overall equipment effectiveness \(OEE\) method](#) 05007

Siregar Khawarita, Syahputri Khalida, Rahmi M Sari Anizar, Rizkya Indah and M Tambunan Mangara

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187305007>

[PDF \(1.823 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Determine Environment Impacts in Upstream Processes of Oil and Gas Industries](#) 05008

Sapto Sari Mardhika

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187305008>

[PDF \(4.343 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Effect of COD/SO₄²⁻ Supply Ratio Variations of Sulfate-Reducing Bacteria of Sulphood Raise in Acid Mine Drainage](#) 05009

Hardyanti Nurandani, Utomo Sudarno, Oktaviana Angelica, Serafina Katrin and Junaidi Junaidi

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187305009>

[PDF \(1.280 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[A Review of Pyrolysis of *Eceng Gondok* \(Water hyacinth\) for Liquid Smoke](#) 05010

Rita Dwi Ratnani and Widiyanto

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187305010>

[PDF \(1.986 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Cr\(VI\) and Dye Biosorption in Batik Wastewater using Biosorbent in The Tea Bag](#) 05011

Lestari Sri, Sudarmadji, Djalal Tandjung Shilahuddin and Juari Santosa Sri

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)

DOI: <https://doi.org/10.1051/e3sconf/20187305030>

[PDF \(1.587 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Life Cycle Assessment of Food Processing Systems in Toba Samosir Regency](#) 05031

Asido Situmorang and Yosef Manik

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187305031>

[PDF \(1.954 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Environmental Health, Toxicology and Epidemiology

Open Access

[Analysis of a Prey-Predator Fishing Model for Harvesting with The Limited Effect of Density and Toxicity](#) 06001

Anies Munawwaroh Dita, Sutimin and Khabibah Siti

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187306001>

[PDF \(9.250 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Mercury toxicity potential from artisanal and small scale gold mines in Lebong Regency, Bengkulu Province](#) 06002

Munawar Ali, Suhartoyo Hery and Suci Asriani Putri

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187306002>

[PDF \(1.162 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Why it is often underestimated: Historical Study of Ammonia Gas Exposure Impacts towards Human Health](#) 06003

Mutia Pratiwi Diana, Widaningroem Soemantodjo Roekmijati and Warno Utomo Suyud

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187306003>

[PDF \(1.153 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)
DOI: <https://doi.org/10.1051/e3sconf/20187306017>

[PDF \(1.207 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Analysis of optimal harvesting of a prey-predator fishery model with the limited sources of prey and presence of toxicity](#) 06018

Sutimin, Khabibah Siti and Anies Munawwaroh Dita

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187306018>

[PDF \(800.3 KB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Habitat characteristics with *an. barbirostris* larva density in Bulukumba](#) 06019

Suryadi Iwan

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187306019>

[PDF \(1.421 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[A Model for Hypogalactia Treatment Using *Electrical Acupoint* to Increase Breast Milk Volume and Improve Prolactin Content](#) 06020

Najwatul Maula Sheyla, Nurul Widyawati Melyana and Suryono Suryono

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187306020>

[PDF \(1.296 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Evaluating Safety Climate Impact on Safety Behaviour of the Worker in Small and Medium Enterprises \(SMEs\) Wood Furniture in Bandengan Village, Jepara](#) 06021

Susanto Novie, Budiawan Wiwik and Fardiansyah Ahmad

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187306021>

[PDF \(1.238 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Technology, Culture and Society in Waste Management

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)
Permana-Citra Ari Dina, Purwanto Purwanto and Soenoko Henna Rya

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187307001>

[PDF \(1.463 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Study of Rendement of Red Ginger Essential Oil from Red Ginger Waste by Using Steam Distillation Process](#) 07002

Widayat Widayat, Ayu Sofiati Dita, Cahyono Bambang and Satriadi Hantoro

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187307002>

[PDF \(1.202 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Effectiveness of Using Hyacinth Plant As Phytoremediation Agent On Paper Industry Liquid Waste](#) 07003

Kartika Febriani Ika and Hadiyanto

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187307003>

[PDF \(1.481 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Lean Thinking in Banking Industry: Waste Identification on Credit Disbursement Process](#) 07004

Rizky Indah, Syahputri Khalida, M Sari Rahmi and Siregar Ikhsan

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187307004>

[PDF \(1.179 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Evaluation of Waste Transportation Routes at Gayamsari and East Semarang Subdistrict](#) 07005

Wisnu Wardhana Irawan, Oktiawan Wiharyanto, Samudro Ganjar, Prasetyo Samadikun Budi, Perdana Mukti Dickie and Ramadhan Khanza Ferba

Published online: 21 December 2018

By using this website, you agree that EDP Sciences may store web audience measurement cookies and, on some pages, cookies from social networks. [More information and setup](#)

OK

Open Access

[The Management Of Toxic and Hazardous Waste Materials In The Food Industry](#)

07020

Herry Setiawan Taufan and Purwanto Purwanto

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187307020>

[PDF \(1.167 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Performance of Semi-Aerobic Solid Waste Bioreactor in relation to Decomposition Process and Biogas Production](#)

07021

Oktiawan Wiharyanto, Sutrisno Endro and Hadiwidodo Mochtar

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187307021>

[PDF \(2.234 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Waste Management Model in Merauke](#)

07022

Noer Elly, Waas Samuel, Lewaherilla Esy, Rahail Emiliana and Jayadi

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187307022>

[PDF \(1.209 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Alternative Selection in Reducing Wood Scrap with Green Productivity Approach](#)

07023

Wahyuni Dini, Budiman Irwan and Tambunan Mangara

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187307023>

[PDF \(1.262 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Environment, Infrastructure Development, Culture and Society

Open Access

[Can online transportation support low carbon?](#)

08001

Ratnasari Rakhmatulloh Anita, Zuleika Islamey Talitha and Intan Kusumo Dewi Diah

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)
[PDF \(1.953 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Pattern of Public Green Open Space in Tembalang Settlement, Semarang](#) 08002

Intan Kusumo Dewi Diah, Susanti Retno, Nurini Nurini and Zulhamdi Zulhamdi

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308002>

[PDF \(5.363 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Comparison of treated coco-husk composite and its applications in architectural interior](#) 08003

Setyowati Erni, E. Pandelaki Edward and Supriyo Edy

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308003>

[PDF \(2.844 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Community Participation in Flood Disaster Management in Sumbawa Regency \(case study in Songkar Village\)](#) 08004

Wirawan Zakariah Hendra and Kismartini

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308004>

[PDF \(2.169 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Analysis of Greenhouse Gas Reduction by Using Organic Fertilizer in Boyolali Regency](#) 08005

Purnamasari Etik and Sudarno Sudarno

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308005>

[PDF \(1.586 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Minimize the impact of waste pollution in ship repair processes to Improving](#)

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308006>

[PDF \(1.215 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Product Development Using Bio-mimicry Design Spiral Approach of Swimming Aid 08007](#)

Purwaningsih Ratna, Rahardjo Danu, Budiawan Wiwik, Adi Wicaksono Purnawan and Santosa Haryo

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308007>

[PDF \(1.281 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Usability measurement of telecommunications testing website PT. Telkom Indonesia using user centered design 08008](#)

Purwaningsih Ratna, Prastawa Heru and Haedy Puspitasari Anggita

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308008>

[PDF \(1.992 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Developing Indicators to Implementing Green Material Management in Construction Industry: A Literature Review 08009](#)

Farida Nur, Naniek U. Handayani and Mochamad A. Wibowo

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308009>

[PDF \(2.094 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Cell-wall disruption and characterization of phycocyanin from microalgae: Spirulina platensis using Catalytic ozonation 08010](#)

Rame Rame, Nilawati, Djayanti Silvy, Irnaning Handayani Novarina, Purwanto Agus and R Dwi Harjanto Ganang

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308010>

By using this website, you agree that EDP Sciences may store web audience measurement cookies and, on some pages, cookies from social networks. [More information and setup](#)

OK

Open Access

[Characteristics of Traffic Flows at Kuda Mati non-traffic light Intersection in Workhour and Holidays](#) 08030

F. Betaubun Herbin

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308030>

[PDF \(1.295 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Flood Disaster Management Model in Wonosari Village Semarang City](#) 08031

Rachmawati Yuliana, Kismartini and Suharyanto

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187308031>

[PDF \(1.276 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Green Public Policy, Politic, and Equity Development

Open Access

[Regional Autonomy Dynamics in The Reformation Era: Transitioning the Authority of Environment Policies in Central Java Province](#) 09001

Retno H Nunik and Yuwanto

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187309001>

[PDF \(1.150 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Inequality in Public Decision Making Process: Case Studies of Cement Factories in Central Java, Indonesia](#) 09002

P. Hadi Sudharto, Purnaweni Hartuti and Kismartini Kismartini

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187309002>

[PDF \(1.150 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Policy Instrument of Integrated Self-Sufficient City on Transmigration Area in Northern Bengkulu, the Province of Bengkulu](#) 09003

By using this website, you agree that EDP Sciences may store web audience measurement cookies and, on some pages, cookies from social networks. [More information and setup](#)

OK

Open Access

[Evaluation Study of Human Development Index \(Policy Learned from Salatiga City and Semarang City\)](#) 09018

Taufiq Ahmad and Santoso Edi

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187309018>

[PDF \(1.168 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Government Innovation of Kulon Progo "Bela-Beli" Programme](#) 09019

Yuwono Teguh, Warsito and Ghulam Manar Dzunuwanus

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187309019>

[PDF \(1.161 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Analysis on Continous Development Strategy at Farming Production Centre of Miffee Program In Merauke Regency](#) 09020

Djaja Irba, P. Purwanto and H. R. Sunoko

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187309020>

[PDF \(1.211 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Implementation of Green Procurement in Supplier Selection of PT Kubota Indonesia with Fuzzy Analytical Network Process Approach \(FANP\)](#) 09021

Pujotomo Darminto, Rahcman Erpita and Budi Prasetyo Utomo Trio

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187309021>

[PDF \(2.419 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Green Economic and Development

Open Access

[Green Banking and Infrastructure Project Financing for Sustainable Development](#)

By using this website, you agree that EDP Sciences may store web audience measurement cookies and, on some pages, cookies from social networks. [More information and setup](#)

OK

Open Access

[Characteristics and Economic Value of Tourism Services in Coastal Area of Gunungkidul Regency](#) 10026

Triyanti Riesti and Susilowati Indah

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187310026>

[PDF \(1.164 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Analysis of the potential contribution of forestry sub-sector in economic and development in daerah istimewa yogyakarta province](#) 10027

Nurul Elmi Faid, Azis Nur Bambang and Maryono Maryono

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187310027>

[PDF \(1.227 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Gender, Formal-Informal Worker and Environmental Behavior

Open Access

[Communicating Inequalities: Social Disparity Phenomena in Health](#) 11001

Hadi Suprpto Arifin, Ditha Prasanti and Ikhsan Fuady

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187311001>

[PDF \(1.168 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Macroeconomic Determinants of Gender Inequality Index in Eight ASEAN Countries](#) 11002

Joko Sangaji, Miyasto and Akhmad Syakir Kurnia

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187311002>

[PDF \(1.173 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Innovation and Entrepreneurship Training to Empower Catfish Farmers](#) 11003

By using this website, you agree that EDP Sciences may store web audience measurement

OK

[Cultural Factors on Female Entrepreneurship: A Literature Review](#) 11018

Nurul Retno Hapsari and Noeria Soeditianingrum

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187311018>

[PDF \(1.219 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Gender Wage Gap and Education: Case in Indonesia's Labor Market](#) 11019

Rr. Retno Sugiharti and Akhmad Syakir Kurnia

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187311019>

[PDF \(1.244 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Health, Safety and Environment Information Systems

Open Access

[Clustering Analysis of Traffic Accident in Semarang City](#) 12001

Wiwik Budiawan and Bambang Purwanggono

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187312001>

[PDF \(1.956 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Modelling Infant and Maternal Mortality Rate based on slum household uses Bivariate Spline Regression Method](#) 12002

Alan Prahutama, Budi Warsito and MochAbdul Mukid

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187312002>

[PDF \(757.7 KB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Monitoring System Heartbeat and Body Temperature Using Raspberry Pi](#) 12003

Tan Suryani Solli, Alamsyah, Muhammad Bachtiar and Benyamin Bontong

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187312003>

[PDF \(4.580 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187312013>

[PDF \(4.548 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Contact Simulation Comparison of UHMWPE to the Crosslink Intensity Effect](#) 12014

Reza Azizul Nasa Al Hakim, Sigit Arrohman, Eko Saputra, Iwan Budi Anwar, J Jamari, Rifky Ismail, Athanasius P. Bayuseno and Mohammad Tauviquirrahman

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187312014>

[PDF \(2.553 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- System Information and Decision Support System

Open Access

[The dynamics change of fishpond land into settlement the east coast of Surabaya](#) 2004-2017 13001

Chahya Chairani, Ratna Saraswati and Iqbal Putut Ash Shidiq

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187313001>

[PDF \(1.422 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Information System of Performance Assesment on Startup Business using Simple Multi-Attribute Rating Technique Exploiting Ranks \(SMARTER\)](#) 13002

Alen Adriyanti Tangkesalu and Jatmiko Endro Suseno

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187313002>

[PDF \(1.216 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Spline-Fourier's Method for Modelling Inflation in Indonesia](#) 13003

Suparti Suparti, Alan Prahutama, Rukun Santoso and Alvita Rachma Devi

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187313003>

By using this website, you agree that EDP Sciences may store web audience measurement

OK

Postpartum Blood Loss Measurement Using Digital Image Processing 13023

Siska Febrina Fauziah, Suryono Suryono and Melyana Nurul Widyawati

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187313023>

[PDF \(1.409 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

A Fog Networks for Measuring the Physical Parameter of Greenhouse Plant 13024

Suryono Suryono, Sunarno Sunarno and Ragil Saputra

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187313024>

[PDF \(1.414 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

Implementation of Web Service in Processing of Data Base Financing Costumer Using Fragmentation Method 13025

Rachmat Kasim, Retno Kusumaningrum and Hamka Witri Kamase

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187313025>

[PDF \(1.903 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

- Information Pattern Development, Language, and Media

Open Access

The Issue of Low Carbon Emission in Religious Shows on Indonesian Television 14001

Amirudin Amirudin

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187314001>

[PDF \(1.328 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

Rethinking the Gap: Digital Preparedness and Social Inclusion of Young Generations in Remote Area to Lessen Digital Inequality 14002

Nindi Aristi

Published online: 21 December 2018

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)

[Digital Media Literacy in Samin Indigenous People](#) 14018

Turnomo Rahardjo, Hapsari D. Sulistyani and Taufik Suprihatini

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187314018>

[PDF \(1.171 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Cultural Development through Language Styles and Expression of Teenage Girls Identity in Indonesian Teen lit Novel Me Versus High Heels by Maria Ardelia](#) 14019

Redyanto Noor, Arido Laksono and Rukma Kawentar

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187314019>

[PDF \(1.240 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Mubalig Kondang: A Sociological Overview of Religiosity](#) 14020

Sukarjo Waluyo and Astri Adriani Allien

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187314020>

[PDF \(1.204 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The Design of Unique Lexicon Formation of Javanese Speech in Semarang Lower Class Society](#) 14021

M. Suryadi and Sri Puji Astuti

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187314021>

[PDF \(1.364 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[The specific cultural terms and expressions in the translation of literary work \(novel\)](#) 14022

Mulyo Hadi Purnomo and Baharuddin Baharuddin

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187314022>

[PDF \(1.225 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)

[A Communication Pattern of President in Infrastructure Development : The Case of Jokowi in The Daily Kompas News](#) 14023

Suharyo Suharyo

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187314023>

[PDF \(1.219 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

Open Access

[Language Choice and Attitude of Maternal Communities in Semarang](#) 14024

Suharyo Suharyo and Subiantoro Subiantoro

Published online: 21 December 2018

DOI: <https://doi.org/10.1051/e3sconf/20187314024>

[PDF \(1.446 MB\)](#) | [References](#) | [NASA ADS Abstract Service](#)

E3S Web of Conferences

eISSN: 2267-1242

Copyright / Published by: [EDP Sciences](#)



[Mentions légales](#)

[Contacts](#)

[Privacy policy](#)


By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)




Journals Books Conferences

 EDPS Account



All issues Series
Forthcoming About

 Search  Menu

[All issues](#) ▶ [Volume 73 \(2018\)](#) ▶ [E3S Web Conf., 73 \(2018\) 08007](#) ▶ [Abstract](#)

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)

Issue	E3S Web Conf. Volume 73, 2018 The 3 rd International Conference on Energy, Environmental and Information System (ICENIS 2018)
Article Number	08007
Number of page(s)	5
Section	Environment, Infrastructure Development, Culture and Society
DOI	https://doi.org/10.1051/e3sconf/20187308007
Published online	21 December 2018

Article

[Abstract](#)

[PDF \(1.281 MB\)](#)

[References](#)

[NASA ADS Abstract Service](#)

Metrics

[Show article metrics](#)

Services

Same authors

- [Google Scholar](#)
- [EDP Sciences database](#)

[Recommend this article](#)

[Download citation](#)

[Alert me if this article is corrected](#)

[Alert me if this article is cited](#)

Related Articles

[Biomimetic Architecture in Building Envelope Maintenance \(A Literature\)](#)

E3S Web of Conferences 3, 01007 (2014)

[A novel technique to neutralize the Yawing moment due to asymmetric thrust in a hybrid buoyant aircraft](#)

EPJ Web of Conferences 114, 02128 (2016)

[Mapping of Affordance and Activity as the Biophilic Design Principle of Blue Lagoon Tourism Area Yogyakarta](#)

SHS Web of Conferences 41, 06003 (2018)

[More](#)

Bookmarking



E3S Web of Conferences **73**, 08007 (2018)

Product Development Using Bio-mimicry Design Spiral Approach of Swimming Aid

Purwaningsih Ratna, Rahardjo Danu*, Budiawan Wiwik, Adi Wicaksono Purnawan and Santosa Haryo

Department of Industrial Engineering, Faculty of Engineering, Diponegoro University, Semarang - Indonesia

* Corresponding author: danu.raharja02@gmail.com

Abstract

In the search for sustainable products idea, Bio-mimicry is one of the method to find alternative solutions. Bio mimicry is a method to define solution that is filtered and developed by nature. This study used bio mimicry technology to formulate a model of "hand swimming aids" to increase hands thrust in the water when swimming. The proposed model is based on the use of the Bio mimicry Design Spiral rule. Spiral Bio mimicry Design Rules used to simulate the shape and functional design of selected natural organisms. This study learn

By using this website, you agree that EDP Sciences may store web audience measurement

OK

cookies and, on some pages, cookies from social networks. [More information and setup](#)



eISSN: 2267-1242

Copyright / Published by: [EDP Sciences](#)

[Mentions légales](#)

[Contacts](#)

[Privacy policy](#)

Product Development Using Bio-mimicry Design Spiral Approach of Swimming Aid

Ratna Purwaningsih^{1*}, Danu Rahardjo², Wiwik Budiawan³, Purnawan Adi Wicaksono⁴, and Haryo Santosa⁵

^{1,2,3}Department of Industrial Engineering, Faculty of Engineering, Diponegoro University, Semarang - Indonesia

Abstract. In the search for sustainable products idea, Bio-mimicry is one of the method to find alternative solutions. Bio mimicry is a method to define solution that is filtered and developed by nature. This study used bio mimicry technology to formulate a model of "hand swimming aids" to increase hands thrust in the water when swimming. The proposed model is based on the use of the Bio mimicry Design Spiral rule. Spiral Bio mimicry Design Rules used to simulate the shape and functional design of selected natural organisms. This study learn how frog lining model help frog to swim and select one model and apply it on hand swimmer tool design so that it can produce more sustainable products and can apply the design function of natural model well.

Keywords: **Bio mimicry; Design Spiral; Swimming aids on hand**

1 INTRODUCTION

Today, many inventions lead to sports. One sporting practice that produces many inventions of assistive devices is swimming. Swimming is a way that people or animals do to move their bodies in the water [1]. Swimming naturally does not require special equipment or clothing. Humans can swim without any equipment under any circumstances. Swimming devoted to recreation and sports. Swimming in the military sometimes require additional equipment in the form of clothing and special equipment designed to help facilitate humans moving in the water. Some of the additional equipment that is already there and often used when swimming is swimming glasses, torpedoes (simple /motor), ear and nose cover, head cover, swimsuit, and frog legs. Additional equipment designed to accelerate the movement of humans in the water, usually intended for swimming and competition activities. However, swimming equipment is designed to make it easier to swim and avoid the risks arising from swimming.

The purpose of designing the swimming aids on the hands is to facilitate the thrust and make the movement more efficient during swimming. Hand movements have an influence in swimming activities. The design of swimming aids are mostly done by using bio-mimicry approach. Examples are frog legs aid that mimic the function of frog legs, fins that mimic the functions of whale tail plates, and swimsuits of athletes that mimic the concept of shark scales. Design of a swimming aids that focus on hand tools is mimicking the concept of frog membrane on frog legs.

Bio-mimicry is an innovation approach that gradually becomes more popular. The term bio-mimicry was

popularized through a book "Bio mimicry: Innovation Inspired by Nature". The focus is on finding sustainable solutions to human challenges by looking at nature as "model, size, and mentor". Frogs have solved many of the problems we face today. The way frogs solve problems has been developed throughout history to generate new solutions and innovations. An example is, the frog's legs on the type of tree frog are imitated into mini-robots for surgical devices that have hexagonal legs and can stick to wet or even slippery surfaces. Another example is the frog's nest, where some frogs make nests like foams. Scientists mimicking those principles to be artificial foams in the laboratory. The foam will withstand the damage caused by bacteria and microbes and also be able to retain moisture.

The design process follows the Bio-mimicry Design Spiral rule through the Challenge to Biology approach published by the Biomimicry Institute. Spiral Biomimicry Design was developed by Carl Hastrich who is an industrial designer. Spiral Biomimicry Design is the stage of the process for transforming natural strategies into innovative and sustainable design solutions. In the revised Biomimicry Design Spiral there are 5 processes, namely distill, translate, discover, emulate, and evaluate [2]. One of the most powerful aspects of Biomimicry Design Spiral is the spiral process itself. Spiral models form repetitions in each round, allowing researchers to create more innovative and effective designs. Through the spiral process, researchers can start from the stage that is most appropriate to the condition of the study. If the researcher begins the design of the penicillin design, it can be expanded from the distill process. If you want to create something new or deepen innovation that is inspired from nature, it can start from

* Corresponding author: danu.raharjo02@gmail.com

the discover process. When starting with assessing and focusing the concept of sustainability on existing products then researchers can start from the evaluation process.

The purpose of this study is learn on how to apply Bio-mimicry Design Spiral rules into the design process of swimming aids on hand by mimicking the principles of frog foot lining and to knowing the application of Bio-mimicry Design Spiral rules in product design. The output of the study is to describe on how to use the rules of bio-mimicry spiral design in designing the sustainable product.

2 Literature Review

Research on biomimicry already done area of architecture [3] and Interior Design for increased the product sustainability [4], [5]. Biomimicry also applied on children's educational playground [6]. The use of biomimicry in the design of swimming aids is still a challenging topic.

2.1. The concept of Bio-mimicry

Bio-mimicry in Europe commonly called bionic is a design that is inspired by nature. Bio-mimicry does not merely imitate but the inspiration for changing the principles of nature into successful design strategies. Bio-mimicry technology uses nature as a model, then measures, and trains us to overcome problems in architecture. This is not the same as the biomorphic architecture, which uses the existing elements of nature as a source of inspiration for creating shapes. Bio-mimicry technology just look at nature as an example that can be used as inspiration, see the process of nature, then apply it into a work [7].

Nature is inspiring not only because of its perfection, but because nature produces a lot. There are some flaws in natural design: natural products require ongoing and / or reproducible maintenance, and organisms cannot borrow designs; they must evolve from their existing designs. Evolution requires solutions to be better than ever; this is not a test ground for new strategies that might get worse for generations before they get better. However, whatever we see in nature has been tested for hundreds or thousands of years, and the earth has provided innumerable intelligent solutions that we might never have imagined.

Three main factors that describe this new field of study. First, bio-mimicry studies natural models and imitates or draws inspiration from its designs to process human problems. Second, bio-mimicry uses ecological standards to assess the 'truth' of human-made innovations. And thirdly, bio-mimicry becomes a new way of seeing and appreciating nature. Bio-mimicry introduces an era, not on what we can take from nature, but what we can learn from nature [8].

The core idea of bio-mimicry is as a model, a measure, and a mentor. By using nature as a model, we can get ideas to solve our problems from organisms. Whatever we try to do, there are usually organisms that have developed successful strategies for doing so.

Applying nature as a measure, we can look at the natural world to see what is possible. Spider webs are, for example, cobwebs, stronger than steel and stronger than Kevlar (which claims to be five times stronger than steel), but the "factory" that produces it is smaller than our pinkie, and does not require boiling sulfuric acid or high-pressure engines. Taking nature as a mentor, we can recognize that we are part of a great system, and we are destroying nature as partner / partner and teacher rather than as a source to be exploited.

Bio-mimicry can be achieved at different levels: the level of shape and function, process level, and system level. The shape and function of bio-mimicry applied on Velcro is the most common embodiment of bio-mimicry. Biomimetic processes make products as nature wants. Making their own layers developed in the national laboratory of the Sandia Department of Energy is an example of a biometric process-they evolved from a solution of how shellfish grows in seawater. Incredibly powerful, transparent coatings, which can be developed rapidly in the laboratory, can revolutionize any kind of cover for everything from cars to contact lenses. Biomimetic systems display a closed loop cycle of life that recycles the outputs and products of one process as inputs for the other. In the biomimetic system "waste equals food" [9]. We can add another Level Four: design level. Biomimetic design processes in forms such as genetic algorithms and repetition designs-can produce cheap and green results that we never see in nature. The students of nature learn quickly.

2.1. The Bio-mimicry Design Spiral

The Bio-mimicry Institute has developed a design process that can promote the transfer of ideas, designs, and strategies from biology into the design of human systems. The Bio-mimicry Process Design describes a step to translate the problem in biological terms, thus bringing more opportunities for biologists to identify innovative solutions in nature. The steps in this process are also graphically depicted in the so-called "Spiral Design Bio-mimicry" shown below. The image communicates repeatedly (evolving) on the methodological properties by mapping steps based on the spiral design on the snail's shell. Snail shell (Nautilus shell) is a proper symbol, it is based on a spiral design with a ratio found throughout the natural design and human design. This redesign pattern consists of a series of so glowing productive Fibonacci measurements, dubbed "The Golden Ratio".

The design of bio-mimicry spiral describe on figure 1. The process or stage start from identify the problem or the user need identification that should be solve in the design. Stage 2 is Translate, this stage try to find the solution from nature to answer the problem. Continue by observe stage, the stage identify nature model for the solution. Then the nature model applied on design concept in the emulate stage. The evaluate stage will evaluate the design to make any adjustment by considering the human or user, the material, the method how to use the product.

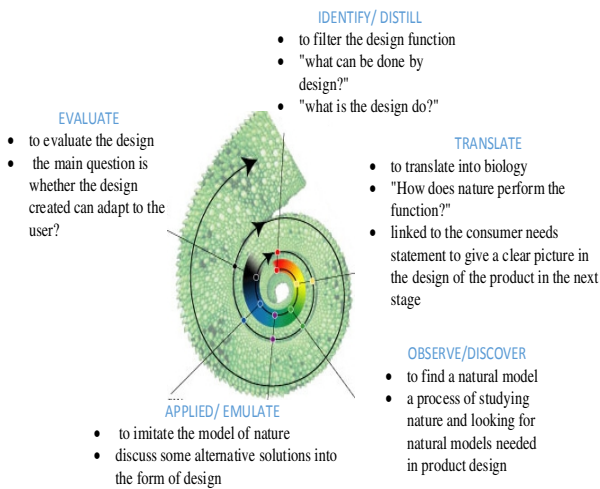


Fig. 1. The Design Spiral

Spiral Bio-mimicry Design is the stage of the process for transforming natural strategies into innovative and sustainable design solutions. There are 5 processes in the revised Bio-mimicry Design Spiral: distill, translate, discover, emulate, and evaluate. One of the most powerful aspects of Bio-mimicry Design Spiral is the spiral process itself. Spiral models form repetitions in each round, allowing designer to create more innovative and effective designs. Through the spiral process, designer can start from the stage that is most appropriate to the condition of the study. If the designer begins the design, they can be expanded from the distill process. If you want to create something new or great innovation that is inspired from nature, you can start from the discover process. If designer start with assessing and focusing the concept of sustainability of existing products then he can start from the evaluation process.

The Biomimicry Design Spiral concept, the researcher starts from the evaluate process, then distill, translate, discover, emulate, and finally return to the evaluate stage. This is because, the researchers found the product of handmade swimming aids on the existing hand and circulating in the market, so that the first process is evaluate where researchers will conduct assessment and focus the concept of sustainability on existing products. These products include paddle boards, finger lining, and swimming gloves. In the present study, the researchers attempted to systematically apply how the product design uses the rules of biomimicry spiral design on hand swimming aids.

The spiral model is also a flexible process, so it can be started from any step. If you want to create something new design, then researchers can start from the stage-distill. If interested in deepening innovation, such as sustainable design and provide solutions, it can be started from the translate process. If the goal is creativity, then it can start from the emulate process. And if starting with assessing and focusing the concept of sustainability on existing products, then researchers can start from the evaluation process.

3 Research Method

Research using the Biomimicry Design Spiral concept starts from the evaluate process, then distill, translate, discover, emulate, and finally return to the evaluate stage. This is because, the researchers found the product of handmade swimming aids on the existing hand and circulating in the market, so that the first process is evaluate where researchers will conduct assessment and focus the concept of sustainability on existing products. These products include paddle boards, finger lining, and swimming gloves. In the present study, the researchers attempted to systematically apply how the product design uses the rules of biomimicry spiral design on hand swimming aids.

3.1. Di-still

Distill or here is meant to filter the design function, in the distill process, the main question point is "what can be done by design?", And no longer question "what is the design do?". So at this stage, the design function is identified, so that it can then be linked to the consumer needs statement to give a clear picture in the design of the product in the next stage.

In the process of distill identification is done to formulate the problem faced. Do not ask what you want to design (a hand-held swimming tool), but ask what the design is doing for you (provides a stronger thrust force in the water to increase swimming speed). Ask the "why" question of the problem formulation and keep asking the question, to conclude how the desired design is to answer the emerging problem.

3.2. Translate

Translate or here it is intended to translate into biology, at this stage the design function has been filtered developed into the natural factors. The main question is "How does nature perform the function?". From these questions it is necessary to define the natural conditions that reflect the design parameters.

This process learn how nature can accommodate humans in swimming, focusing on hand tools. In this process is done to identify the desired function. Then describe what nature is doing to perform the function. Then describe influential environmental factors / conditions, then connect to what nature can do with that factor.

3.3. Discover

Discover or here is meant to find a natural model, is a process of studying nature and looking for natural models needed in product design. Natural model in the search is a model capable of performing such design functions. After studying the factors that influence the hand gestures while swimming, designer observe the environment and look for objects that can provide solutions. Then after found, it will be done in-depth observation

3.4. Emulate

Emulate or here in question is to imitate the model of nature, in it contains activities to discuss some alternative solutions into the form of design in

accordance with the design functions. The shape of the design mimics the natural model that has been selected. The result of observation to the object of research will be imitated and applied to product design to be made. Then tested the design.

3.5. Evaluate

Evaluate or here is meant to evaluate the design, the main question is whether the design created can adapt to the user? Initial stage evaluation is an initial stage assessment process conducted on the existing swimming hand tool product to know the value given by the user based on the dependent variable so as to know the weakness and the advantages of the product to get the design according to the needs and wants of the user. The intended user is a swimmer who has used a paddle board product, and / or a swimming glove product, and / or a finger film product. The selected design will be evaluated in detail, with a direct test of swimming swim measurements, and then an interview to get an assessment of whether the design is in accordance with the consumer needs or not.

3 Result and discussion

The Biomimicry Design Spiral concept, the researcher starts from the evaluate process, then distill, translate, discover, emulate, and finally return to the evaluate stage. This is because, the researchers found the product of handmade swimming aids on the existing hand and circulating in the market, so that the first process is evaluate where researchers will conduct assessment and focus the concept of sustainability on existing products. These products include paddle boards, finger lining, and swimming gloves. In the present study, the researchers attempted to systematically apply how the product design uses the rules of biomimicry spiral design on hand swimming aids.

Nature has the slightest influence in human life. No exception in swimming activities. The natural factors that influence the activity of swimming (especially in hand movements) are environment, water flow, water depth, and the movement of other objects.

Discover is a process of finding solutions that exist in nature that match human needs that have been translated into the translate process. In this step, will be classified several types of animals that swim using a tool of motion of the hands or feet of animals belonging to the classification of vertebrate animals (vertebrates) that exist around the researchers.

Designer found some animals that used to do swimming activities. The researcher's focus is to observe how the animal performs the activity in the water and whether the motion used has similar function to the researcher's design function. Frogs have hands and feet used during swimming. The goose and duck forces only use their feet to pedal the water so they can float and move in the water. The three animals perform the same function with the researcher's design function, which is moving in water by enlarging the thrust force in the water. The motion of frog swim in the water while

membrane in the frog's legs docked and stretched. Differ to the ducks and swans that are mostly always stretched and just doing the paddling motion. These observations bring the designer decision to focus on frog animals as the model that best adapts to the functioning of the human hand.

The frog pushes its legs back, then the membrane opens, creating a dam against water. When the frog pulls the leg back to its body, the membrane closes, streamlining the movement of the foot through the water back to its original position. And the hand movements tend to be straight forward. The webbed feet increase the area of propulsion (encouragement) to allow the frog to swim quickly. Frogs are famous amphibians that can jump and swim very well with the same rear-legged mechanisms, so it is important to learn the mechanics of motion to realize the ability of motion in an unstructured field. In frog swims, the joints rotate in large numbers, and due to the movement of the limbs, the frog can perform repeated routes. Here is a picture of the area of impulse (boost) generated from the back leg kick of the frog while swimming [10].

In this study, the function of addition of propulsion will be made as a reference in forming the design of swimming aids on hand. Where in the activity of human swimming, the four tools of motion with both hands and both feet active and play a role in swimming. But researchers will only focus on hand gestures, because the tools of swimming on the feet are common in the market. However, swimming aids on hand have not been found. The occurrence of additional propulsion on the swimming frog movement, not apart from the membrane on the frog legs. Because the membrane provides a wider cross section so as to increase the strength of the surrounding water.

The principle of frog foot lining that is able to provide propulsion while swimming in the water, can affect the speed of swimming. The principle will be applied to the hand swimming aids. Where the hand can provide a more optimal propulsion if it has a cross-sectional area maximized by the width of the hand so as to produce a greater thrust force than the empty hand.

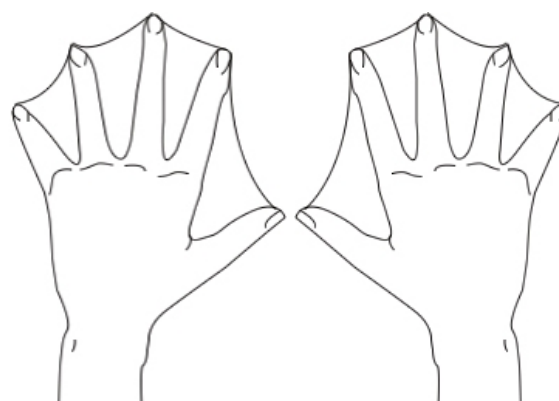


Fig 2. The membrane on hand copy of frog foot lining

By using bio mimicry, by studying natural design features and applying them into product design as

problem solvers, able to provide attractive solutions that can be applied and explored to achieve optimal design.

Imitate the membrane function in frog legs suggest to faster swimming. Frogs that stretch their webbed legs wider, allowing it to apply more force to the surrounding water. The wider the surface the greater the power generated. Leg muscle strength also plays a role, frogs with greater leg muscle strength which isn't webbed have weaker thrust against water than frogs with weak legs but have a membrane on their feet. As the frog pushes back with its legs, the membrane opens, creating a dam against water. When the frog pulls the leg back to its body, the membrane closes, streamlining the movement of the foot through the water back to its original position.

Acknowledgments

Researchers would like to thank to Diponegoro University student and all the people involved for the cooperation for this study. This research was financially supported by the Research and public service Directorate of Ministry of Research Technology and Higher Education in scheme of PTUPT (Penelitian Terapan Unggulan Perguruan Tinggi) 2018

References

1. E. C. Badruzaman, & A. Hernawan Media and learning resource for play group Jakarta: Universitas Terbuka (2007)
2. Hastrich, Carl, "The Bio mimicry Spiral," Biomimicry Newsletter, the Bio mimicry Guild, Vol. 4.1. (2006)
3. E. Zejnilović., & E. Husukić, E. Biomimicry in Architecture. International Journal of Engineering Research and Development, Volume 11, PP.75-84 (2015)
4. I. H. Anous Biomimicry "Innovative Approach in Interior Design for Increased Sustainability. American International Journal of Research in Formal, Applied & Natural Sciences , pp. 18-27. (2015).
5. D. Attia, Biomimicry In Eco – Sustainable Interior Design: Natural Ventilation Approach . Faculty of Applied Arts, Benha University : International Design Journal, Volume 5, Issue 2, pp 291-303 (2015)
6. Haslina, R. Jurnal Tingkat Sarjana Senirupa dan Desain No.1 ITB (2014)
7. J. Benyus. Biomimicry: Innovation Inspired by Nature. New York: William Morrow (2002).
8. A. J. Brookes and D. Poole. Innovation in Architecture: A Path to the Future 1st Edition, Spon press New York (2004)
9. M. William & M. Braungart. Cover of Cradle to Cradle: Remaking the Way We Make Things. United States: North Point Press (2002)
10. W. Zhang, J. Fan, Y. Zhu, Y. Qiu, & J. Zhao. A Method for Mechanism Analysis of Frog Swimming Based on Motion Observation Experiments. Heilongjiang: Hindawi Publishing Corporation (2014)



MINISTRY OF RESEARCH, TECHNOLOGY AND HIGHER EDUCATION
DIPONEGORO UNIVERSITY
SCHOOL OF POSTGRADUATE STUDIES



CERTIFICATE

Number : 4197/UN7.5.12/TU/2018

This is to certify that
Ratna Purwaningsih

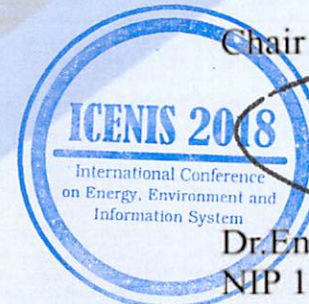
Has participated as
Presenter

in "The 3rd International Conference on Energy, Environment and Information System (ICENIS) 2018"
Held by School of Postgraduate Studies, Diponegoro University
Semarang, August 14th - 15th, 2018



Dean,

Prof. Dr. Ir. Purwanto, DEA
NIP 196112281986031004



Chair of Organizing Committee,

Dr.Eng. Maryono, S.T., M.T.
NIP 197508112000121001