





Conference Program









June 2021





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- Prof. Dr. Ir. Harjanto Prabowo, M.M., Bina Nusantara University, Indonesia
- Prof. Dr. Tirta Nugraha Mursitama, Ph.D, Bina Nusantara University, Indonesia
- Dr. Eng. Nico Surantha, ST., MT., Bina Nusantara University, Indonesia

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Christian Harito, S.T., Ph.D, Bina Nusantara University, Indonesia

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Name	Affiliation
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Dr. Eng. Nana Sutisna, ST., MT.	Kyushu Institute of Technology
Dr. Hendry Hartono, S.E., M.M.	Bina Nusantara University, Indonesia
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Religiana Hendarti, S.T., M.T., Ph.D.	Bina Nusantara University, Indonesia
Dr. Triyono A. Wahyudi	Kalbis Institute, Indonesia
Dr. Oki Setyandito, S.T., M.Eng	Bina Nusantara University, Indonesia
Dr. Rida Zuraida, S.T., M.T.	Bina Nusantara University, Indonesia
Muhammad Rum, Ph.D.	Universitas Gadjah Mada, Indonesia



Dr. Dian Purnama Sari, SE, MSA	Universitas Katolik Widya Mandala Surabaya, Indonesia
Muhammad Nanang Suprayogi, Ph.D.	Bina Nusantara University, Indonesia
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Dr. Nesti F. Sianipar, S.P., M.Si.	Bina Nusantara University, Indonesia
Utari Novella, PhD	Bina Nusantara University, Indonesia



WELCOME MESSAGE Chair of the ICOBAR 2021 June 24-25, 2021 Bina Nusantara University, Jakarta, Indonesia

Rector of Bina Nusantara University, Prof. Harjanto Prabowo Vice Rector, Prof. Tirta Nugraha Mursitama Distinguished keynote speakers and presenters of the ICOBAR

On behalf of Bina Nusantara University and the organizing committee of the ICOBAR, I am delighted to have the opportunity to deliver this opening message today. As you are well aware, due to the extraordinary situation produced by COVID-19, we have decided to prepare our conference in a virtual format to best keep you physically safe while still profiting from the stimulating, intellectual developments that we have in store.

To begin, I would like to thank our distinguished keynote speakers as well as CORIS (Cooperation Computer Research Inter University) and the Archipelagic & Islands States (AIS) as our sponsor. More than that, I also express my heartfelt thanks to the committee, reviewers, and all people who have given their time and assistance to support this event.

As we all know, this is the third conference of Bina Nusantara University, under the flag of ICOBAR. This year, the committee had received around 400 submitted manuscripts. Through double-blind peer-review process, the committee carefully selected around 200 research papers that will be presented during the conference. We have today and tomorrow to share and exchange ideas and results of our research with other scholars and colleagues. So, let's make all sessions and discussions, a fruitful one!

After the conference, the committee will prepare full paper proceedings that will be sent further for final review by the IOP EES, the publisher. As the Chair of ICOBAR, I therefore expect that all presenters and authors to give their best efforts to refine their papers for a successful future publication with the IOP EES.

In ICOBAR 2021, the topic is focused on "Sustainable Innovation: Science and Technology to Foster and Empower the Society". As we realized the continuous growth in research activities around the world, we would like to propose a movement to rethink the purpose of the research. Sustainable innovation means doing a research that considers the sustainability factor such as environmental, social, financial aspects in their proposed technology, which is integrated from ideation to commercialization and its use in the society. Such innovation may be incremental, redesign, alternative, or even disruptive technology which help us to attain the same goal that we proposed in the first and second ICOBAR, "biospheric harmony".

I do hope that through the discussion and knowledge sharing sessions, the conference will bring positive contribution and impact to the academic society, policy makers and key stakeholders in our society.



Before coming to a close of this remark, I would also like to remind you and especially our presenters and hosts to strictly stick to our time schedule and not to let any session over-run. To conclude, I wish all of us a great two-day conference with Binus University. Once again, thank you for your great contribution and participation to the success of this event. See you again next year!

Thank you very much.

Jakarta, 24 June 2021

Christian Harito, S.T., Ph.D. Chair of the ICOBAR 2021



WELCOMING REMARKS General Chair of BJIC

General Chair BINUS Joint International Conference (BJIC) 2021 Jakarta, 24 June 2021

H.E. Prof. Dr. Ir. Harjanto Prabowo, MM., Rector, BINUS University Vice rectors, Directors, Deans, and Professors,

Distinguished keynote speakers,

Prof. Dr. Nurul Taufiqu Rochman, M.Eng, Ph.D (Indonesian Institute of Sciences, Indonesia)Prof. Frank Marken (University of Bath, United Kingdom)Prof. Michael Frese (ASIA School of Business, Malaysia)H.E. Amenatave V. Yauvoli (Ambassador of the Republic of Fiji to the Republic of Indonesia)

Distinguished guests, ladies, and gentlemen,

Let us praise to God the Almighty for His merciful and blessings as we gather here to attend The Third International Conference on Biospheric Harmony Advanced Research (ICOBAR) 2021 as part of BINUS Joint International Conference (BJIC) 2021.

This year BINUS University celebrates 40 years of the contribution by empowering society building the nation through higher education. We marked it by developing better BJIC that consists of 5 international conferences, 1 international art and design exhibition and 1 industry exhibition. Those events cover many disciplines ranging from sustainability and development, information management, engineering, technology, computer science, business, international relations, social sciences, and humanities, namely:

- 1. International Conference on Biospheric Harmony Advanced Research (ICOBAR), chaired by Christian Harito, S.T., Ph.D., is held now, in Jakarta, 24 25 June 2021
- 2. International Conference on Information Management and Technology (ICIMTech), chaired by Dr. Evaristus Didik Madyatmadja, ST., M.Kom., M.T, will be held in Jakarta, 19-20 August 2021.
- 3. International Conference on Business, International Relations and Diplomacy (ICOBIRD), chaired by Ella S. Prihatini, S.IP., Master of Development Practice (Adv.), Ph.D., will be held in Jakarta, 5-6 October 2021
- 4. International Conference on Eco Engineering Development (ICEED), chaired by Diana Lo, S.TP, M. Sc, Ph.D., will be held in Jakarta, 17 18 November 2021
- International Conference on Computer Science and Computational Intelligence (ICCSCI), chaired by Dr. Rojali, S.Si., M.Si., will be held in Jakarta, 18 – 19 November 2021



6. International Academic Contemporary Art and Design Exhibition (INACADE) 2021, chaired by Arif Priyono, S.Sn., M.Sn, will be held in Jakarta, 25 June 2021

BJIC has been an integrated effort to enhance research and publication productivity of the faculty member since September 2018. This year we innovate by engaging industry closer to the academia and vice versa. Industry exhibition is first step to commercialize research product of the faculty members and to get ideas and feedback from industry pertaining to specific needs of the industry and society.

The 3rd ICOBAR, specifically, aim to promote the "Sustainable Innovation: Science and Technology to Foster and Empower the Society". The theme of the conference underlines the uniqueness, importance, and relevancy within the context of sustainability where environmental, social, financial aspects are considered in the proposed innovation. Finally, the challenges include how to manage the innovation for the society and better quality of life.

Distinguished guests, ladies, and gentlemen,

This conference is also very special because of our keynote speakers are prominent scholars and professionals from Indonesia, Malaysia, United Kingdom, and Fiji who contribute to the discussion of new insights about biospheric harmony from their perspective as academician, professionals, and experts from different fields. We combine scientific conference with industry exhibition that provide first-hand information, knowledge, and experience from various industry leaders from Indonesia and Japan.

Last but not least, I would like to appreciate all chairpersons of the 5 conferences and committee members who have been working very hard to make this conference possible. I would also like to thank presenters, participants, our reviewers, and publishers of the paper presented in the conferences as well as partner and sponsor of this event. I hope you enjoy the conference!

Thank you very much.

Jakarta, 24 June 2021

Prof. Dr. Tirta N. Mursitama, PhD General Chair BJIC 2021



WELCOMING REMARKS Rector of BINUS University

Rector of BINUS University Jakarta, 24 June 2021

Distinguished keynote speakers, Fellow professors and presenters, Ladies and gentlemen,

It is a great honor for me to welcome you to the International Conference on Biospheric Harmony Advance Research (ICOBAR) virtually host by BINUS University. This year marks the success of BINUS university achieving vision of 2021 as World Class University. We have been ranked 1001-1200 in QS World University Ranking 2022 and ranked 8th among public and private universities in Indonesia.

We realized that contribution of research and publication is indispensable in achieving this prestigious status. This conference is also part of continuing efforts in producing, deliberating and disseminating knowledge as well as creating research partnerships between faculty members and distinguished scholars from many universities in the world.

BINUS University's vision 2035 has underlined the clear message of fostering and empowering the society in building and serving the nation. Therefore, a two-day international conference that focuses on creating the future by acknowledging the fact that humans make unsustainable use of the earth, and this creates an inherent conflict between the whole ecosystems and human needs is essential to make university stay relevant to the needs of the societies.

Ladies and gentlemen,

I would like to express my highest appreciation to all invited keynote speakers and invited plenary session speakers and all presenters and participants who will make this conference meaningful. I strongly advice to make use of this conference wisely, not only discussing about research but also trying to build new joint research, publication, faculty exchanges and so on.

Finally, I also thank all the chairmen and committee members of the conference. I wish all of you great conference and make new acquaintances during the conferences.

Thank you very much.

Jakarta, 24 June 2021

Prof. Dr. Ir. Harjanto Prabowo, MM Rector, BINUS University



PAPER PRESENTATION

DAY 1 - Thursday, 24 June 2021

Session 1 (Thursday, 24 June, 10.30 – 12.00)
Session 1A (Thursday, 24 June, 10.30 – 12.00)
Room: http://bit.lv/ICOBAR3 a
Session Chair: Riza Suwondo
(4284) Assessment of Rice Husk Inventory Level Prediction as Briquette Raw Material with Adaptive
Neuro-FIS
Erni Krisnaningsin
(4367) Seismic performance evaluation of steel structures designed using SNI 1726-2019
Riza Suwondo
(4418) Systematic Literature Review: Accelerate the Rice Production for Global Food Security
Nicholas Dominic
(4478) The Effects of Information Search and Evaluation of Alternatives Through Social Media on the
Purchase Decision: Japanese and Indonesian Consumers Case
Ahmad Seiichi Ramadhan
(4493) Development of formula and product prototype of beverage made from tamarillo (Solanum
betaceum) fruit and red yeast rice using Kano method
bayu wenurawan
(4515) Water Fulfilment Analysis in Jatiluhur Regency Industrial Estates using NRECA and HBV
Models
Christian Cahyono
Sognitum 1D (TT $1 - 24$ L $- 10.20 - 12.00$)
Session 1D (Inursday, 24 June, $10.30 - 12.00$)
Room: <u>http://bit.ly/ICOBAR3_b</u>
Session Chair: Andreas Romulo
Andreas Romulo
(4578) A Framework for GIS-Based Sustainability Assessment for Palm Oil Industry: An Overview
Hakara Warid
(4579) Unange Urder Factor Identification and Management in Long Segment Road Preservation
Andi Bavu Putra
(4628) An Analysis and Design of Indicators for Sustainability Business Practice Adoption at
Manufacturing Company: An Overview
Anmad Arier Santosa



(4641) Application of Smart Gas Grid As a Form of Adaptation of Gas Distribution Companies in The 4.0 Industry Era Wahyu Sardjono

Session 1C (Thursday, 24 June, 10.30 – 12.00) Room: http://bit.ly/ICOBAR3_c

Session Chair: Yosef Dedy Pradipto

(4931) Cyber extension as the sustainable communication for farmers Ulani Yunus

(4285) Work from Home During Covid-19 Pandemic: A Preliminary Findings from Corporate in Greater Jakarta

Sevenpri Candra

(4399) Local wisdom as a sustainable strategic innovation for the business community Ajeng Mira Herdina

(4449) e-WOM on Purchase Intention Local Brand Cosmetic in Indonesia Yulianne Safitri

(4450) The Role of Multi Channel Learning During Study Abroad in Improving Mandarin Language Ability

Sofi Zhang

(5056) The Influence of Charismatic Leadership and Transformational Leadership on Job Performance in Health Workers during the Covid-19 pandemic with Commitment as a Mediator Yosef Dedy Pradipto

Session 1D (Thursday, 24 June, 10.30 – 12.00) Room: <u>http://bit.ly/ICOBAR3_d</u>

Session Chair: Moch Faisal Karim

(4457) Brand Communication of Sustainable Fashion to Empower Indonesian Society Lidya Wati Evelina

(4458) The Influence of Transformational Leadership and Charismatic Leadership on Commitment to Health Workers during the Covid-19 Pandemic Muhamad Nanang Suprayogi

(4462) The impacts of charismatic leadership on job performance among the health workers during the covid-19 pandemic mediated by commitment and moderated by generosity Irfan Rifai

(4476) The Effect of Video Conference Learning and Video-Based Learning on Japanese Language Proficiency

Linda Unsriana

(4486) The changing US climate change policy Moch Faisal Karim



(4505) Visual Communication Analysis of Poster Design with Web-based Augmented Reality as additional content. Andreas Kurniawan

Session 1E (Thursday, 24 June, 10.30 – 12.00) Room: <u>http://bit.ly/ICOBAR3_e</u>

Session Chair: Tjeng Wawan Cenggoro

(4373) A Comparison of Noisy Photoplethysmography (PPG) Signals Using Heartpy With MAX30102 and Pulse Sensor Carl Ludwi Hendiarta, Hanson Robertus

(4419) Questionnaire Design for Analyzing Important Risk Factors of Cervical Cancer Kartika Purwandari

(4435) Digital Transformation Design for Smart Farming in Java Island with Distributed System Approach

S. Pradono Suryodiningrat

(4448) A research review on the integration of BIM and Blockchain in the AEC industry Mustika Sari

(4463) A Greener AI-Based Crowd Counting via Efficient Deep Learning Tjeng Wawan Cenggoro

(4475) Count Time Series Modelling of Twitter Data and Topic Modelling: A Case of Indonesia Flood Events

Alam Ahmad Hidayat

Session 1F (Thursday, 24 June, 10.30 – 12.00) Room: http://bit.ly/ICOBAR3_f

Session Chair: Lim Sanny

(5009) Application for Sugarcane Plantation: Manpower and Transportation Planning Hangger Gahara Mawandha

(5032) GDPR: Implication to Indonesia's Business Siti Yuniarti

(5147) Information System Model for Maize Research Anzaludin Samsinga Perbangsa

(4317) Distributional Impact of Covid-19 on Currencies Return: Evidence from ASEAN. Kevin

(4368) Pandemic Covid-19: Impact on Stock Liquidity at Indonesia Stock Exchange Mulyono

(4382) Sustainable Market Entry Strategy Case on Healthcare Industry SME in Indonesia to Enter Vietnamese Market Lim Sanny

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Session 1G (Thursday, 24 June, 10.30 – 12.00) Room: http://bit.ly/ICOBAR3_g

Session Chair: Noegroho

(4289) Redesign Tanjung Priok Bus Terminal in Jakarta Wiyantara Wizaka

(4290) Adaptive-Reuse of Office into The Mixed-Use Function in Central Jakarta Yanita Mila Ardiani

(4291) Revitalization of Pasar Slipi in West Jakarta Noegroho

(4292) Horticultural exhibition with Experiential Landscape approach in Mekarsari Tourism Park Yosica Mariana

(4296) Redevelopment of Klender Flats Using Behavior Architecture Approach in East Jakarta Riyadi Ismanto

Session 1H (Thursday, 24 June, 10.30 – 12.00) Room: <u>http://bit.ly/ICOBAR3_h</u>

Session Chair: Yanita Mila Ardiani

(4293) Hospice for cancer patients with the application of therapeutic garden in West Jakarta Vivien Himmayani

(4297) ODMK rehabilitation center in East Jakarta Welly Wangidjaja

(4298) Redevelopment of Slum Area in South Duri District, West Jakarta Yanita Mila Ardiani

(4299) Psychology clinic with Healing Environment Approach in East Jakarta Riyadi Ismanto

Session 2								
(Thursday,	24	June,	13.30 -	- 15.00)				

Session 2A (Thursday, 24 June, 13.30 – 15.00) Room: http://bit.ly/ICOBAR3 a

Session Chair: Juliastuti

(4649) Study of flow characteristic of side channel spillway at flood control dry dam Oki Setyandito

(4674) Implementing Green Economy in Developing Countries: the case of India's investment in renewable energy

Dayu Nirma Amurwanti

(4682) EVALUATION AND OPTIMIZATION OF VEHICLE PARKING AREA AT CITRA TOWER KEMAYORAN JAKARTA Eduardi Prahara



(4708) Risk identification for design and build breakwater project using Risk Breakdown Structure (RBS) in Sanur Denpasar Port Project, Bali Juliastuti

(4724) Mechanical behaviours and modelling of nanostructure anode in Lithium-Ion Battery (LIB) -Enabling low-cost 3D nanostructures for novel anode design for future LIB Christian Harito

(4808) Analysis of alternative acceleration in high rise building project scheduling (case study: apartment aspena residence project) Faruq Kamal

> Session 2B (Thursday, 24 June, 13.30 – 15.00) Room: http://bit.ly/ICOBAR3_b

> > Session Chair: Oki Setyandito

(4730) Modeling Crystallographic Anisotropy Dependence of Interfacial Sliding Phenomenon in Nanoindentation of Cu/Nb ARB (Accumulated Rolling Bonding) Nanolayers Arief Budiman

(4770) Ecosystems Innovation Capabilities for Value Co-creation: Energy Transition towards Decarbonization Framework Yud Buana

Yud Buana

(4774) Application of non-thermal plasma technology to extend fruit shelf life Ovitadani Ayuputri

(4780) Implementation of Knowledge Management in the Rice Supply Chain Strategy Febby Candra Pratama

(4783) Characteristics of Hydrodynamic Flow on Coral Reef Breakwater for Beach Nourishment Profile Alignment

Oki Setyandito

(5055) The significance of disability friendly space in interior design of youth creative hub in Jakarta Titi Indahyani

> Session 2C (Thursday, 24 June, 13.30 – 15.00) Room: <u>http://bit.ly/ICOBAR3_c</u>

Session Chair: Rachmi Kumala Widyasari

(4518) Fostering Heroine's Journey on Digital Platform to Sustain Re-representation of Women Role. Devina Sofiyanti

(4583) A Semantic Study of 'Warfare" Video Game Terminologies Clara Herlina Karjo

(4584) Fashion Contemporary Design Project, Collaboration between Traditional Artisan with Young Designers. Amanda Prihutomo



(4593) Assessing Task Difficulty, Team-Member Ability, and Motivation on the Team Productivity by an Agent-based Model Luki Iswara

(4598) Storytelling for Raising Awareness of Environmental and Social Issues: Analogy Approach Angela Oscario

(4648) The Implementation of New Habit Adaptations at the Go Tik Swan Batik Workshop for the Sustainability of a Culture-Based Creative Economy Rachmi Kumala Widyasari

Session 2D (Thursday, 24 June, 13.30 – 15.00) Room: <u>http://bit.ly/ICOBAR3_d</u>

Session Chair: Dria Setiautami

(4659) A Retrospective Overview of Green Entrepreneur Research using a Bibliometric Analysis Mega Firdaus

(4676) The Moderating Effects of Perceived Organizational Support on the Relationship between Career Advancement and Turnover Intention: The Case of Financial Services Industry in Indonesia Okta Prihatma Bayu Putra

(4692) Media agenda building to contribute forest fire handling and prevention in Indonesia and Malaysia

Indra Prawira

(4747) The effects of charismatic leadership and transformational leadership on job performance among health workers during the covid-19 pandemic with the commitment as the mediator Yusuf Ratu Agung

(4749) Traditional Performances Inspiration in Popular Media: Indonesian Wayang Comics from Post-Independence to the New Millennium Dria Setiautami

(4751) Public transportation and environmental concern: Investigation intention to use bus rapid transit (BRT) Banjarbakula on female students Muhammad Abdan Shadiqi

> Session 2E (Thursday, 24 June, 13.30 – 15.00) Room: <u>http://bit.ly/ICOBAR3_e</u>

Session Chair: Gunawan Wang

(4561) Oil Palm Farmer's Income Simulator M Prasanto Bimantio

(4562) Solution of SEIRD Mathematical Model for the COVID-19 Transmission Using Microsoft Excel D P W Putra

(4563) The development of video analysis instrument to determine teacher's character Marcellinus Andy Rudhito

(4627) Kiko Good Garage Reservation and Customer Management Application Design Using Prototyping Method



Frety Andila

(4630) Landslide Potential Dynamics Using Storie Method Toward Land Use Changes in 2000, 2010, and 2020 in Ciletuh Watershed, Sukabumi, Indonesia Andhika Nurul

(4693) Designing Customer Involvement Programme with Gamification Framework Gunawan Wang

Session 2F (Thursday, 24 June, 13.30 – 15.00) Room: <u>http://bit.ly/ICOBAR3_f</u>

Session Chair: Triasesiarta Nur

(4441) A Maturity Model for Assessing the Indonesian Payment Systems Blueprint 2025 Readiness Anjar Priandoyo

(4447) Providing Public Facilities Through FAR Bonus Policy in Jakarta City: An Implementation Review

Lia Kurniawati

(4465) Factors Influencing The College Students' Behavior Intention to use E-Wallet in Jakarta Triasesiarta Nur

(4534) Utilizing Technology Acceptance Model (TAM) to Comprehend Factors Affecting Gen Z's Desire to Use Mobile Payment Services Dian Kurnianingrum

(4695) The Concept Model of E-Trust in Sustainable Marketing D Y Nugraha

(4698) The Antecedents of Purchase Intention in Sustainable Marketing Doni Purnama Alamsyah

Session 2G (Thursday, 24 June, 13.30 – 15.00) Room: http://bit.ly/ICOBAR3_g

Session Chair: Riyadi Ismanto

(4300) Cancer Shelter House with Healing Environment Approach in West Jakarta Riyadi Ismanto

(4307) Flats in Klender East Jakarta Michael Tedja

(4327) Double Cover to Reduce Sun Radiation in Offices In West Jakarta Reven Stephanus Aries

(4332) Application of Secondary Skin in Office Building in South Jakarta Wildan Pasha

Session 2H (Thursday, 24 June, 13.30 – 15.00)

Room: http://bit.ly/ICOBAR3_h

Session Chair: Aditya Andika

(4369) Post-Stroke Rehabilitation Center with Healing Garden Approach in Jakarta

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Winda Christi Dembong

(4386) Development of Mini Smarthome Application with Fan Module and Thermometer Based on Android and Raspberry Pi Sonya Rapinta Manalu

(4389) Analysis Causes of Failure and The Proposed Preventive Maintenance of Packing Machine Components Aditya Andika

(4391) System Design of Employee Attendance, Data Collection and Employee Leaves Based on Website Evawaty Tanuar

Session 3

(Thursday, 24 June, 15.10 – 16.25)

Session 3A (Thursday, 24 June, 15.10 – 16.25) Room: http://bit.ly/ICOBAR3_a

Session Chair: Adelia Dwidarma Nataadmadja

(4788) Interior Design for Increasing Airflow in Tiny Houses to Improve Well-Being Friska Amalia; Dini Cinda Kirana; Riono Aulia Abdullah; Janice Florencia Rahmat

(4793) Analysis of the Application of Design Principles on Point-of-Purchase (POP) Display as an Effort to Attract Consumers' Attention in Retail Space Dila Hendrassukma

(4806) Comparative analysis of planning cost and time to the number of workers between hollow core slab method with cast in situ method (case study: IKEA Jakarta Garden City project) Reza Kusuma Renaldi

(4810) Utilizing Rattan Waste of Furniture Industry in Trangsan Village, Sukoharjo Dyah Ayu Sekarningrum

(4819) Filtering Capability of Porous Asphalt with Natural Adsorbents Adelia Dwidarma Nataadmadja

Session 3B (Thursday, 24 June, 15.10 – 16.25) Room: http://bit.ly/ICOBAR3 b

Session Chair: Dewi Kumoratih

(4841) Development of Dinoyo Ceramic Product Variants with Bamboo Material to Maintain Business Sustainability

Tiara Ika Widia Primadani

(4847) Banjarmasin and the challenges of river-based tourism creative economy Dewi Kumoratih



INDUSTRY FORUM PARALLEL SESSION

	Thursday, 24 June 2021 <u>bit.ly/3uvsmEA</u>
	Topic I "Sustainable Westa Management"
	(10.30 ± 12.00)
10.15 10.30	Admission of Participants
10.13 - 10.30 10.30 - 10.35	Welcoming Participants by MC
10.30 - 10.35 10.35 - 10.40	Opening Remarks by Dr. Diah Wihardini, BINUS Clobal Director
10.33 - 10.40	Introduction of Moderator by MC
10.10 10.15	"Waste Bank Digitalization: An Integrated Communal Based Waste
	Management in Indonesia"
10:45 - 11.05	and a second
	Speaker: Emil R. Kaburuan, S.T., MA., Ph.D
	Lecturer at MMSI Program, Bina Nusantara University
	"Black soldier fly (BSF, Hermetia Illucens) As A Solution for Waste-
	Food-Energy (WFE) Nexus in Indonesia"
11:05 - 11:25	
	Speaker: Ir. Dave Mangindaan, S.1., M.1., Pn.D., MKSC, AMICheme,
	IF IVI Lecturer at Faculty of Engineering, Bina Nusantara University
	"#GOODforEarth: Re.iuve's Comprehensive Effort Towards Zero
	Waste''
11:25 - 11:45	
	Speaker: Richard Anthony, MBA.
	President Director of Re.Juve
11:45 - 11:55	Q & A Session
11.55 - 12.00	Closing
12:00 - 12:30	Discussion Forum with BINUS Industry Partners
	(15.00 – 16.30)
15:00 - 15:05	Opening
	"Healthcare Digital Transformation in Japan: Present and Future"
15:05 - 15:25	
	Speaker: Masahiro Ide, Ph.D
	Managing Director of Qunie Corporation, Japan
	"Smart Health Monitoring based on Internet-of-Things and Artificial
15:25 - 15:45	Interngence
	Speaker: Dr Eng Nico Surantha S T M T
L	Spound + 21 (2015) + 1100 Sut uniting St 1 (1114)



	Lecturer at Binus Graduate Program-Master of Computer Science, Bina Nusantara
	University.
15:45 – 16:05	 "Roles of AI-Powered Digital Health Technologies during the COVID- 19 Pandemic" Speaker: Nunung Nurul Qomariyah, S.Kom., M.T.I., Ph.D. Lecturer at Computer Science Program BINUS University International
16:05 - 16:30	Q&A Session
16:30 - 17:00	Discussion Forum with BINUS Industry Partners
	Evidor 25 June 2021
	Friday, 25 June 2021 bit $\frac{1}{2}$
	DILIV/SUVSIIEA
	Topic III
	"Environmental Sustainability Campaign"
10.00 10.05	(13.30 – 15.00)
13:30 - 13:35	Opening (Decide the Creater and Mind with Divited Div
	"Reach the Customers Mind with Digital Platform"
13:35 – 13:55	Speaker: Dr. Dra. Ulani Yunus, M.M. Leader of Research Interest Group - Cross Cultural Communication, Bina Nusantara University
	"The Challenges of Digital Green PR in Pandemic Era"
13:55 – 14:15	Speaker: Dr. Siswantini, S.E., Ak., M.I.Kom Faculty Member of Marketing Communication, Communication Department, Bina Nusantara University
	"Setting Your 'Green Agenda' in the Society"
14:15 - 14:35	Speaker: Sari Soegondo, S.Sos, M.Si Professional Communication Practitioner
14:35 - 15:00	Q&A Session
15:00 - 15:30	Discussion Forum with BINUS Industry Partners
	Topic IV
	"Agriculture 4.0" (15.00 $-$ 16.30)
15:00 - 15:05	Opening
	"Artificial Intelligence for Precision Agriculture"
15:05 - 15:25	Speaker: Bens Pardamean, B.Sc., M.Sc., Ph.D Director of Bioinformatics & Data Science Research Center (BDSRC) AI Research & Development Center (AIRDC)
	"Smart, Low-Cost, Self-Sufficient Drying and Storage Systems for
15:25 - 15:45	Indonesia Agriculture 4.0"
	Speaker: Dr. Arief S. Budiman, ST., MS



	Research coordinator at Master of Industrial Engineering, Binus University				
	"Impack is Impacting Life – Food Security, Resilience and				
	Sustainability for Indonesia''				
15:45 - 16:05					
15:45 – 16:05 "Impack is Impacting Life – Food Security, Resilience and Sustainability for Indonesia" 15:45 – 16:05 Speaker: Sugiarto Romelli VP of Sustainability and New Product Development, PT. Impack Pratama Industri Tbk 16:05 – 16:30 Q&A Session					
	VP of Sustainability and New Product Development, PT. Impack Pratama Industri Tbk				
16:05 - 16:30	Q&A Session				
16.00 15.00					

Solution of SEIRD mathematical model for the COVID-19 transmission using Microsoft Excel

D P W Putra¹, M A Rudhito¹, D Sudigyo², T Suparyanto², B Pardamean^{2,3}

¹ Department of Mathematics Education, Faculty of Teacher Training and Education, Sanata Dharma University, Yogyakarta, Indonesia 55281

² Bioinformatics & Data Science Research Center Bina Nusantara University Jakarta, Indonesia 11480

³ Computer Science Department, BINUS Graduate Program - Master of Computer Science Program, Bina Nusantara University, Jakarta, Indonesia 11480

E-mail: teddysup@binus.ac.id

Abstract. Mathematical modeling in the epidemiology study can be applied to describe the current transmission of viruses, one of which is compartments. However, this simulation model is rigorous to understand, especially in interpreting the parameter values in influencing the solution. Therefore, it is necessary to present a coherent mathematical model solution. This study aims to determine the SEIRD model solution in the COVID-19 transmission using Microsoft Excel with three conditions (normal, new normal, and lockdown) to facilitate the interpretation of data. The SEIRD model used in this study considers natural population growth, namely natural births and deaths. Three stages to evaluate the model solution in this study are constructing a mathematical model, deciding the parameter intervals, and creating an applet in Microsoft Excel. The system of differential equations is converted into a system of difference equations to obtain numerical model solutions. The results showed that the differences in the infection rates for old normal, new normal, and lockdown conditions were 24%, 4%, and 3%, respectively.

1. Introduction

The COVID-19 pandemic has spread in 216 countries around the world. Until now, the COVID-19 pandemic is still spreading, which is marked by more and more people who are infected. Various parties have taken several steps to anticipate the COVID-19 transmission, including the health policy implementation also predictions made by academics and epidemiologists. It is necessary to predict the COVID-19 transmission so that interested parties can take appropriate action to control this pandemic [1,2].

Mathematical modeling can be used in the field of epidemiology to describe the COVID-19 transmission. The compartment model is one of the mathematical models that can be applied. Compartment models have been used to model the COVID-19 transmission in China [3], Italy [4], and India [5]. The compartment model divides the population into compartments with specific characteristics. The compartments commonly used in modeling the spread of disease are Susceptible-Infectious-Recovered (SIR) [6]. Exposed [3,4] and Quarantine [5] are two more compartments that can be introduced based on the disease's characteristics. These characteristics of the COVID-19 virus require time for incubation before it can infect other individuals. Therefore, a compartment is needed to see how the dynamics of the population are at this stage. Furthermore, because the COVID-19 virus is still

relatively new, a separate compartment is required to study the dynamics of individual deaths caused by this virus. Finally, the demographic conditions of an area also need to be considered to distinguish the disease death rate from the natural death rate. As a result, we require a mathematical model that can account for the dynamics of each compartment while simultaneously taking into account the demographic characteristics of a given area. As a result, we require a mathematical model that can account for the dynamics of each compartment while simultaneously taking into account the demographic characteristics of a given area.

In real-time, a function represents each compartment. A system of differential equations reveals in this compartment model. Solving the model is obtained by solving systems of differential equations analytically or numerically. The solution to this model will provide an overview of the transmission and prediction of COVID-19 in this population.

The compartment model simulation results are not always easy to understand, especially in interpreting the parameter values in influencing the solution. We have used mathematical modeling in many studies such as agroindustry [7,8], environment [9–16], healthcare [17,18], and electricity [19,20]. Therefore, it is necessary to present a less complicated approach to the mathematical model solution. In addition, the public also needs to know the meaning of the influence of parameters on the COVID-19 transmission. As a result, this article will go into how to use Microsoft Excel to determine the numerical solution of the COVID-19 distribution compartment model. When selecting Microsoft Excel, we took into consideration the features that are well-known to the general public.

2. Research Methodology

The SEIRD model is a compartment model that divides the population into five subpopulations, namely *Susceptible (S), Exposed (E), Infectious (I), Recovered (R)*, and *Death (D)*. The population is dynamic, which is influenced by the rate of natural births and deaths. Natural birth rate (α), the mortality rate (μ), transmission rate (β), virus incubation rate (σ), recovery rate (γ), and death rate induced by COVID-19 are model parameters (d). The following is a flow chart of the SEIRD model.



Figure 1. Flowchart of SEIRD Model

Based on Figure 1 above, a system of differential equations has obtained as follows.

$$\begin{cases} \frac{dS}{dt} = \alpha N - \beta SI - \mu S\\ \frac{dE}{dt} = \beta SI - \sigma E - \mu E\\ \frac{dI}{dt} = \sigma E - \gamma I - dI - \mu I\\ \frac{dR}{dt} = \gamma I - \mu R\\ \frac{dD}{dt} = dI \end{cases}$$

Under $S(0) \ge 0$, $E(0) \ge 0$, $I(0) \ge 0$, $R(0) \ge 0$ and $D(0) \ge 0$. System of differential equations can be solved numerically by first converting the equations system above into a system of altering equations [21]. Furthermore, for the parameters in the model, intervals will be calculated. The parameter values in the model use data sourced from [6,22–24]. The crude birth rate (CBR) and crude mortality (CDR) in Indonesia during 2018-2020 were $8 \le CBR \le 20$ and $6 \le CDR \le 8$ [5]. The intervals for the cure rate and mortality rate parameters, namely $0.03 \le \gamma \le 0.66$ and $0.03 \le \gamma \le 0.66$, are obtained in Berger and Oliger's study [23]. The basic reproduction number (\Re_0) and mass contact incidence (*a*) [24] are used in this article to establish the virus's degree of transmission. The following are the equations used to determine the β parameter.

$$\beta(N) = a N^{-0.95}$$

And,

$$\Re_0 = \frac{N_0 \beta(N_0)}{\gamma + d}$$

In Brauer et al. [23], the interval \Re_0 is $1.4 \le \Re_0 \le 6.49$. The mass action incidence interval, $0.0443 \le a \le 3.1012$, is calculated using equations (3) and (4). In the study of Zoupeng Xiao et al. [25] obtained the value of the virus incubation rate is $7 \le \sigma \le 14$. The numerical solution of the model calculated using Microsoft Excel. Each parameter in the model is created in the Scroll Bar, is available on the Developer menu. This Scroll Bar application makes the simulation more interactive. Furthermore, iteration is carried out based on the differential equation system above with time units in weeks. The SEIRD model's solution graph is displayed using the Chart function.

3. Result and Discussion

The system of differential equations for the above system of differential equations is as follows.

$$\begin{cases} \Delta S = (\alpha N - \beta SI - \mu S)\Delta t\\ \Delta E = (\beta SI - \sigma E - \mu E)\Delta t\\ \Delta I = (\sigma E - \gamma I - dI - \mu I)\Delta t\\ \Delta R = (\gamma I - \mu R)\Delta t\\ \Delta D = dI\Delta t \end{cases}$$

Each parameter is given a value during the iteration process. Each parameter's values are listed below.

Table	Table 1. Value of Parameter of the Model							
Parameter	Value	Reference						
α	3.7×10^{-4}	CBR Indonesia						
μ	1.39×10^{-4}	CDR Indonesia						
а	1.13	Assume						
d	0.45	Assume						
γ	0.28	Assume						
σ	10.016	Assume						

Transmission rate (β), virus incubation rate (σ), recovery rate (γ), and death rate induced by COVID-19 are model parameters (d) obtained from analysis of daily COVID-19 case data in Indonesia from March to August 2021 published by KawalCOVID-19 [26]. The following figure depicts the outcomes of the iteration using Microsoft Excel. The graph in **Figure 3** depicts the SEIRD model's solution. The graphs below are made by drawing each point with the coordinates (t, N), (t, S), (t, E), (t, I), (t, R), and (t, D). According to the graph of the SEIRD model solution above, the pandemic peaked at week 8 with a total infected population of 2362 people (23%) and 585 (5%) deaths until 52 weeks. During the 52 weeks, the populaces also experienced growth due to the birth rate and crude mortality rate. As a result, as of the end of week 52, there were 9539 individuals in the population.

The SEIRD model solution presentment using Microsoft Excel simplifies for the general public to understand pandemic behavior. Also, the scroll bar feature allows users to increase or decrease the parameter values depending on their preferences. After changing the parameter values, the user will immediately read the solution graph from the model. That feature will give users an overview of the effect of parameter values on the COVID-19 transmission. In addition, the existence of interventions carried out by the government through the application of health protocols can also influence the solution of the model. The health protocol implementation through 3M activities (wearing masks, washing hands, and maintaining a distance) will reduce the risk of COVID-19 infection. In addition, lockdown areas for the strict regulation of COVID-19 transmission are present in several countries. The SEIRD model will apply any of these interventions. The application of the health protocol to the population is called the new normal condition.

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-	b	c	U		, Itomation	Table	CELIDI	Madal		R.	L.	141	
					iteratio	a rabie o	DISEIKI	Model					
1	N	ΔN	β(N)	S	ΔS	E	ΔE	I	ΔI	R	ΔR	D	
0	10008	0.29216	0.00018	10000	-0.93199	3	-2.95098	5	3.71312	0	0.462	0	0.0
0.14	10008.3	0.26878	0.00018	9999.07	-1.86428	0.04902	2.11938	8.71312	-0.79141	0.462	0.80508	0.0315	0.0
0.28	10008.6	0.27377	0.00018	9997.2	-1.66506	2.16841	-1.05171	7.92171	2.2586	1.26708	0.73194	0.08639	0.0
0.42	10008.8	0.25955	0.00018	9995.54	-2.2316	1.1167	0.98965	10.1803	0.56088	1.99903	0.94062	0.1363	0.0
0.56	10009.1	0.25602	0.00018	9993.31	-2.37168	2.10635	-0.25797	10.7412	1.89324	2.93965	0.99243	0.20044	0.0
0.7	10009.4	0.24411	0.00018	9990.94	-2.84593	1.84838	0.57808	12.6344	1.34461	3.93208	1.16735	0.2681	0.0
0.84	10009.6	0.23564	0.00018	9988.09	-3.18214	2.42646	0.10374	13.979	2.02248	5.09942	1.29156	0.3477	0.0
0.98	10009.8	0.22291	0.00018	9984.91	-3.68798	2.5302	0.46418	16.0015	1.96829	6.39099	1.47842	0.43577	0.1
1.12	10010.1	0.21052	0.00018	9981.22	-4.17967	2.99439	0.30504	17.9698	2.42488	7.8694	1.66026	0.53658	0.1
1.26	10010.3	0.19525	0.00018	9977.04	-4.7851	3.29943	0.48282	20.3947	2.61324	9.52966	1.88428	0.64979	0.1
1.4	10010.5	0.17879	0.00018	9972.25	-5.43682	3.78225	0.4576	23.0079	3.0323	11.4139	2.12571	0.77828	0.1
1.54	10010.6	0.15969	0.00018	9966.82	-6.19235	4.23986	0.57156	26.0402	3.37462	13.5397	2.40585	0.92323	0.1
1.68	10010.8	0.13844	0.00018	9960.63	-7.03208	4.81142	0.60995	29.4148	3.84295	15.9455	2.71762	1.08728	0.1
1.82	10010.9	0.11423	0.00018	9953.59	-7.9871	5.42137	0.7098	33.2578	4.31887	18.6631	3.07266	1.27259	0.2
1.96	10011	0.08702	0.00018	9945.61	-9.05869	6.13117	0.78623	37.5767	4.88782	21.7358	3.47166	1.48212	0.2
2.1	10011.1	0.05623	0.00018	9936.55	-10.2694	6.9174	0.89458	42.4645	5.50778	25.2074	3.92323	1.71885	0.2
2.24	10011.2	0.02154	0.00018	9926.28	-11.6309	7.81198	1.00186	47.9723	6.21848	29.1307	4.43207	1.98638	0.3
2.38	10011.2	-0.01764	0.00018	9914.65	-13.1646	8.81385	1.13099	54.1907	7.00945	33.5627	5.00657	2.2886	0.
2.52	10011.2	-0.0618	0.00018	9901.48	-14.8891	9.94484	1.26978	61.2002	7.9034	38.5693	5.65415	2.63	0.3
2.66	10011.1	-0.11159	0.00018	9886.59	-16.828	11.2146	1.42835	69.1036	8.90372	44.2235	6.38431	3.01556	0.4
2.8	10011	-0.16769	0.00018	9869.77	-19.0051	12.643	1.60292	78.0073	10.0276	50.6078	7.20689	3.45092	0.4
2.94	10010.9	-0.23087	0.00018	9850.76	-21.4482	14.2459	1.79858	88.0349	11.2854	57.8147	8.1333	3.94236	0.5
3.08	10010.6	-0.30197	0.00018	9829.31	-24.1862	16.0445	2.01494	99.3203	12.6934	65.948	9.17592	4.49698	0.6
3.22	10010.3	-0.38195	0.00018	9805.13	-27.2514	18.0594	2.25511	112.014	14.2657	75.1239	10.3486	5.1227	0.7
3.36	10009.9	-0.47184	0.00018	9777.87	-30.6779	20.3145	2.51996	126.279	16.0196	85.4725	11.6666	5.82839	0.7
3.5	10009.5	-0.57278	0.00018	9747.2	-34.5027	22.8345	2.81165	142.299	17.9717	97.139	13.1465	6.62395	0.8
3.64	10008.9	-0.68602	0.00018	9712.69	-38 7644	25.6461	3 13131	160 271	20.1402	110.286	14 8069	7 52043	10

Figure 2. Iteration using Microsoft Excel



Figure 3. Solution of SEIRD Model



Figure 4. Comparison of Normal, New Normal, and Lockdown Conditions for Infectious Compartment.

New normal assuming a reduction in virus transmission rates of up to 50% with apply this condition. Meanwhile, the COVID-19 infection rate can decrease to 0% by executing lockdown conditions. All of these interventions are assumed to begin at week 4. Based on the graph above, the comparison of the peak of the COVID-19 pandemic for three conditions, namely week 8 for old normal conditions, week 10 for new normal conditions, and week 6 for lockdown conditions. Furthermore, the infection rates for these outbreaks were 24%, 4%, and 3%, respectively.

4. Conclusion

The SEIRD model solution is determined numerically using a system of difference equations. The simulation results show that individual and government interventions have a positive impact in preventing the transmission of COVID-19. New Normal and Lockdown strategies can reduce infected individuals by 20% for 52 weeks. The iteration has been performed with Microsoft Excel assistance by users (the general public). The features in Microsoft Excel can be applied to understand the graphic interpretations of the COVID-19 transmission in Indonesia. The discrete method in solving the system of differential equations is a limitation in this study. The future research requires to compare the margin of the solution produced with the system's analytical solution in this study.

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Bina Nusantara University Anggrek Campus Jl. Kebon Jeruk Raya No. 27 Jakarta 11530 Indonesia



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