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MANAGING NATURE 5.0 IN INDUSTRIAL REVOLUTION 4.0 AND SOCIETY 5.0 ERA

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Advances in technology have led to more production of environmental friendly projects, products and services. As our colleagues from Germany and Japan highlight the importance of Industry 4.0 and Society 5.0, and after a series of my previous notes on technology and sustainable development, I would like now to extend our discussion on how the latest technology can be a powerful mechanism to improve our standard of living and sustain our mother earth. Industry 4.0 emerged from innovative digital technology to create value creation, whilst Society 5.0 is argued as a human-centered society that balances economic advancement with Industry 4.0. On the other hand, the environment has provided us with natural resources that speed up the growth of our industries and economies towards sustainability.

Nature 5.0 is proposed as regenerating nature, so it enables us to invent the technology that helps us in sustaining the earth as our living place. It follows creation (Nature 1.0), adaptation (Nature 2.0), evolution (Nature 3.0), and coalition (Nature 4.0). After the existence of Earth, the adaptation stage is the process that makes organisms better suited to their habitat. Interactions between organisms produce evolutions of fitness, and over hundred years later, evolution has caused us to promote and share the Earth's natural resources. The advancements in the technology revolution have allowed us to play a significant role in shaping and regenerating nature.

The technology has enormous environmental impacts, including negative impacts like rising levels of pollution, to positive impacts like revitalization of the Earth's landscape. The environmental changes have altered the evolution of life, and with the advancement of technology, changes have fed back to alter the environment. We evolve together.

We need to come out with more environmentally friendly technology that can be used in our food, farming and energy; and further, to create sustainable smart cities and industrial development as our standard for human well-being. Transforming and regenerating the Earth as well as our development pattern will be useful to future generations. The well-being of our future will be dependent on how we can produce technology that can govern our climate, health, social equity and stability. Technology 4.0 can be used to mitigate and provide a solution for enhancing our way of life by producing sustainable products and services. For example, by using an advance information technology system, we are creating new ways to reduce transportation emissions and manage resource consumption, in a way that is better for the economy, community and environment.

The creativity and innovation of technology development contributes to improving the global environment by producing green, resource-secure and inclusive economies for all. Furthermore, technologies such as Internet of Things (IoT), Artificial Intelligence (AI), data analytics, machine learning, 3D printing, etc, can be used to create, expand and monitor the effectiveness of sustainable development and environmental compliance across the globe. Industry 4.0 can be

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efficiently used to control and to improve required resources, energy, water and waste by connecting and automatically exchanging information via intra- and inter-systems. Moreover, financial incentives through government policy and market-based approaches can be implemented and monitored by charging a price on environmental and social costs, such as renewable resources deployment and pollution reduction. Partnership and collaborative processes from all stakeholders are required to enhance the acceleration and adoption of technologies for environmental regeneration and quality of life improvement. In this context, policy makers, business practitioners, scientists, and smart societies are working together to add sustainable value to reinforce the positive aspects of technology's effect on nature. As technology changes the way we live, it will continue to have a profound impact on the way we regenerate and protect our environment sustainability.

Managing Technology for Better Improvement

The creation of new technologies that foster research and stimulate innovation is thus required to accelerate various developments in all research areas. In this context, this edition of IJTech presents twenty papers dedicated to various studies in science and engineering that foster the development of technology designs and applications that improve the end-products or services.

The first paper, written by A. Khentout, M. Kezzar, and L. Khochemane, examines the taguchi optimization and experimental investigation of the penetration rate of compact polycrystalline diamond drilling bits in calcareous rocks. The authors argue that the WOB_3 (160 kgf), RPM_3 (152 rpm), $\beta_3(45°)$, and Cs_1 (640 kgf/cm^2) had significant influence on penetration rate measurement.

The next paper, written by S. Baso, H. Mutsuda, and Y. Doi, investigates the motion prediction of a fishing boat made possible by improving stern parts using a hybrid particle-grid scheme. The authors argue that the stern part improvement and the additional structure attachment effectively increased the heave amplitude of the basic form from 5% to 10%, and the pitch amplitude for all forms was increased from 5% to 9%.

The third paper, written by V.H. Dong and Q.T. Le, investigates the physical properties and spray characteristics of ultrasound-assisted emulsion based on ultra-low sulphur diesel (ULSD) and biodiesel from waste cooking oil (WOB). The authors argue that the optimum mixing ratio of ULSD to WOB was 65%:35%, with 80 mm distance from the horn tip to the bottom of the emulsification chamber, ultrasound frequency of 28 kHz and ultrasound power of 100 W.

The fourth paper, written by A. Winarta, N. Putra, R.A. Koestoer, A.S. Pamitran, and I.I. Hakim, presents an experimental investigation of a large-scale oscillating heat pipe at different inclinations. The authors argue that the inclination makes a substantial contribution to the heat transfer capability for large-scale heat pipes, e.g. decreasing the degree of inclination reduces the heat pipe's capability to handle the heat load.

The fifth paper, written by M.W. Wang, F. Arifin, and J.Y. Huang, presents optimization of the micro molding of a biconcave structure. The authors argue that the optimal process parameters for injection molding, obtained from the experiment, are a melt temperature of 240^{o}C, a mold temperature of 90^{o}C, an injection speed of 30 mm/s and a shrinkage rate of 1.641%.

The next paper, written by S. Darmawan and H. Tanujaya, presents a CFD investigation of flow over a backward-facing step using an RNG K-E turbulence model. The authors argue that the recirculation flow predicted by the RNG *k-ε* turbulence model is higher than that predicted by the STD *k-ε* turbulence model, in which the RNG *k-ε* turbulence model showed Y = 17.4 mm, the reattachment point was achieved at X/h = 7.22.

The seventh paper, written by H. Lavrenyuk, V.P. Parhomenko, and B. Mykhalichko, investigates the effect of preparation technology and the service properties of self-extinguishing

copper coordinated epoxy-amine composites for pouring polymer floors. The authors argue that the maximum temperature of gases produced through combustion is decreased, along with weight loss, for modified epoxy-amine composites compared to unmodified composites.

The eighth paper, written by I. Kambali, H. Suryanto, Parwanto, Kardinah, N. Huda, F.D. Listiawadi, H. Astarina, and R.R. Ismuha, investigates the recoiled and sputtered radioactive impurities in 11 MEV proton-based F-18 production. The authors argue that the Havar window, originated Co-56 radionuclide, and the silver body, originated Ag-110m, radioisotope were identified in the post-irradiated enriched $H_2{}^{18}O$ target.

The next paper, written by M.A. Ahmed, A. Aljumah, and M.G. Ahmad, examines the design and implementation of a direct memory access controller for embedded applications. The authors argue that the data reads can be achieved by using an Advanced Microcontroller Bus Architecture (AMBA) based DMA controller with a processor in the System on a Chip (SoC).

The tenth paper, written by D.M. Utama, D.S. Widodo, W. Wicaksono, and L.R. Ardiansyah, presents a new hybrid metaheuristic algorithm for minimizing energy consumption in the flow shop scheduling problem. The authors argue that the model can be applied to the reduction of energy consumption in a more complex permutation flow shop scheduling problem (PFSP).

The eleventh paper, written by M.O. Onibonoje, A.O. Ojo, and T.O. Ejidokun, presents a mathematical modeling approach for optimal trade-offs in a wireless sensor network for a granary monitoring system. The authors argue that the proposed model attained optimal levels with a coverage efficiency of 89% with the minimum number of nodes.

The next paper, written by Alfadhlani, T.M.A.A. Samadhi, A. Ma'ruf, and I.S. Toha, presents automatic precedence constraint generation for assembly sequence planning using a three-dimensional solid model. The authors argue that the proposed method shows the product disassembly precedence constraints; and further, will be used as an automated method to generate assembly sequences.

The thirteenth paper, written by H.M. Sitorus, R. Govindaraju, I.I. Wiratmadja, and I. Sudirman, examines the role of usability, compatibility and social influence in mobile banking adoption in Indonesia. The authors argue that people's intention to continue using mobile banking is significantly affected by satisfaction, compatibility, perceived usefulness, perceived learnability and social influence.

The fourteenth paper, written by F.A. Mustafa and F.R. Yaseen, examines the application of biophilic parameters in local buildings of Iraq. The authors argue that modifications could be made to buildings by applying patterns of biophilic design, thus helping to improve the productivity of tenants and make the building environmentally friendly.

The next paper, written by Y. Latief, M.A. Berawi, A.B. Koesalamwardi, L. Sagita, and A. Herzanita, examines the cost optimum design of a tropical near zero energy house (nZEH). The authors argue that the cost optimum nZEH design achieved 72% site-energy savings and 21% savings in the total net present value of life cycle costs, while only adding 5% to initial construction costs in enhancing the house design.

The sixteenth paper, written by A. Lekan, O. Samuel, O. Faith, A. Ladi, A. Adegbenjo, and N.J. Peter presents the building informatics approach to modeling construction quality assurance parameters to prevent structural collapse of buildings. The authors argue that the proposed model increases safeguarding against building collapses that relate to the determination of the quality of materials, construction design and operation processes.

The next paper, written by M. Sukrawa and I.A.M. Budiwati, presents an analysis and design method for walls with infilled frames and confined openings. The authors argue that the

purpose of infill walls with confined openings is to obtain more accurate and efficient results of lateral stiffness and frame strength.

The eighteenth paper, written by H.A. Lubis, V.B. Pantas, and M. Farda, presents demand forecast of high-speed rails based on a stated preference method. The authors argue that the choice probability for high-speed trains is 33.28%, and by 2050, the moderate scenario estimates that there will be 4,597,905 passengers per year.

The nineteenth paper, written by M. Alas and S.I.A. Ali, predicts the high-temperature performance of a geopolymer modified asphalt binder using artificial neural networks. The authors argue that the Levenberg-Marquardt (LM) algorithm with a 3-5-1 network architecture is the best performing model for predicting the complex modulus.

The last paper, written by Antonius, Purwanto, and P. Harprastanti, presents an experimental study of the flexural strength and ductility of steel fiber RC beams post-burn. The authors argue that the longitudinal reinforcement installed inside the beam was well protected and only lost 17% of the initial yield stress, even though the beam was burned at high temperatures.

I hope that this edition of IJTech conveys some new insights in the way we conduct our research. I am pleased to accept and respond to any comment or enquiry you may have on the direction and content of IJTech, and I invite you to join us in this venture by sending your work for consideration.

With warmest regards from Jakarta,

Dr. Mohammed Ali Berawi
Editor in Chief