

## OPTIMIZATION OF STAKEHOLDERS' BENEFITS IN SUSTAINABLE DEVELOPMENT

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Continuing our discussion on the various strategies toward achieving sustainable development, in this issue we will discuss the optimization of stakeholders' benefits. The purpose of sustainable development is to effect economic growth, social wellbeing, and an eco-friendly approach in a way that benefits to its stakeholders: the governments, private sectors, and communities. Accordingly, the concept requires such groups to nurture a culture of participation, collaboration, and continuous improvement.

Achieving sustainable development is a challenging process; the various interests of society, in terms of economic, social, and environmental perspectives, need to be integrated, and trade-offs are required should they be incompatible. A holistic viewpoint, through a multidisciplinary approach, is required to facilitate the interaction of these diverse aspects, meaning that collaboration is necessary amongst the various authorities and interested parties.

It is argued that participation and collaboration amongst stakeholders is one of the key factors for successful sustainable development. For example, the success of a sustainable infrastructure development is defined through the actions of the government, which can provide public facilities; the private sector, which can gain profits by investing in and executing the development; and the community, whose members can pay an affordable price for accessing the developed services. If sustainable development is to achieve its potential, innovation and value-added projects must be created. Investments in green technology, efficiency and effective processes, safer materials, and improved performances and outcomes are some of the results of such development.

### **Sustainable Development: Strategy and Performance**

The performance is measured based on the sustainable development's objectives and standards, as established by the government; for example, performance targets for public transport may be defined in terms of travel time and cost, fuel efficiency, and emission levels. In addition, the private sector is expected to work to meet the required standards, which are cost-effective and therefore meet the needs of the public.

The government should then consider ways in which to narrow the gap between the current state of performance and its objectives for future sustainable development. A strategy will need to be developed and executed, through public and private sector collaboration, outlining the current position and how acceleration programs can contribute to the expected results in the future. The improvement target may be focused on increasing human capabilities as well as the optimization of natural resources in the management of a sustainable environment.

The ultimate goal of sustainable development is to improve the quality of human life (wellbeing); the use of technology plays a significant part in achieving this aim. Science and technology-based and interdisciplinary approaches are expected to contribute to the enhancement of sustainable development programs that integrate the social, environmental, and economic aspects.

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In this edition, we present 20 selected papers that are dedicated to various researches in engineering design and technology application, in order to yield performance improvement and better results.

The first paper, written by M. El-Sakhawy, H.M. Awad, H.M.F. Madkour, A.K. El-ziaty, M.A. Nassar, and S.A. Mohamed investigates a method of improving the antimicrobial activity of bagasse packaging paper using organophosphorus dimmers. The authors argue that chitosan films showed some antimicrobial effect, but did not display an inhibitory zone toward microorganisms. The best condition, which offered the strongest inhibitory activity of bagasse paper, was the one coated by 1,3-diaryl 2,2,2,4,4,4-hexachlorocyclodiphosph (V) azane.

The next paper, written by A. Khormali, D.G. Petrakov, and A.R. Farmanzade, examines the effect of reservoir pressure, temperature, and mixing ratio of injection to formation water on calcium sulfate and barium sulfate precipitation under static and dynamic measurement conditions. The authors argue that calcium sulfate precipitation increased with rising temperature and falling pressure, while barium sulfate precipitation was found to increase with a decrease in the temperature.

The third paper, written by F. Zuhri, R. Arbianti, T.S. Utami, and H. Hermansyah, investigates the effect of methylene blue (MB) addition as a redox mediator on the performance of microbial desalination cells when using *tempe* wastewater. The authors argue that the optimum electricity production was obtained at an MB concentration of 200  $\mu\text{M}$  with an average power density of 25.06  $\text{mW}/\text{m}^3$ , and that the optimum condition for desalination performance was obtained without the addition of MB, with salt removal reaching 16.10%.

The fourth paper, written by A. Wahid and A. Ahmad, proposes a multi-model predictive control and proportional-integral (PI) controller switching (MMPCPIS) approach to controlling a nonlinear distillation column. The authors argue that MMPCPIS provided improvements of 27% and 31% to the ISE (integral of square error) for feed flow rate disturbance change and feed composition compared to a PI controller, and 24% and 54% for the ISE for feed flow rate disturbance change and feed composition compared to a hybrid controller (HC).

The fifth paper, written by Z.A. Majid, R. Mohsin, and N.S. Nasri, investigates the effect of bioethanol on the engine performance and exhaust emissions of diesel fuel engines. The authors argue that the most suitable blend for a six-cylinder diesel engine was 10% bioethanol with 90% diesel fuel, as it showed a slightly higher torque and lower emissions of CO, CO<sub>2</sub>, NO<sub>x</sub>, and HC, by about 10%.

The next paper, written by W. Widiyastuti, S. Machmudah, T. Nurtono, and S. Winardi, examines the effects of the duration of ultrasonic irradiation and the atmospheric environment on the characteristics of ZnO nanostructures, using a sonochemical method. The authors argue that controlling the morphology of said nanostructures was successfully accomplished by adjusting the ultrasound irradiation times from 1.0 to 2.0 h under a flow of air or nitrogen during the process.

The seventh paper, written by S. Abdulkareem, S. Ogunmodede, J.O. Aweda, A.T. Abdulrahim, T.K. Ajiboye, I.I. Ahmed, and J.A. Adebisi, investigates the thermal properties of kapok, coconut fiber, and sugarcane bagasse composite materials, using molasses as a binder. The authors argue that bagasse had the lowest thermal conductivity, followed by kapok plus bagasse (50:50), kapok plus bagasse plus coconut fiber (50:40:10), and kapok plus coconut fiber (50:50).

The eighth paper, written by G. Shankar, S.S. Sharma, A. Kini, S. Praksh, and G. Gurusamy, investigates the microstructure and hardness-related properties of age-hardened Al6061-SiC reinforced composites produced by a two-stage stir-casting method. The authors

argue that lower-temperature aging yielded a substantial improvement in hardness and wear resistance over high-temperature aging. The fine precipitates hindered the movement of dislocation and thereby increased the hardness and wear resistance after the precipitation-hardening treatment.

The next paper, written by D. Dhaneswara and N. Sofyan, examines the effect of different pluronic P123 triblock copolymer surfactant concentrations on SBA-15 pore formation. The authors argue that by evaluating the crystal structure, surface area, pore diameter, and pore microstructure, the addition of surfactant variables affected the pore characteristics of SBA-15. The optimum concentration of surfactant for the formation of mesoporous SBA-15 material was 2.70 millimoles.

The tenth paper, written by E. Yustanti, M.A.E. Hafizah, and A. Manaf, examines the effect of particle concentration and irradiation time in the synthesis of barium strontium titanate (BST) nano particles by high power ultrasonic irradiation. The authors argue that the particle concentration of liquid media had no significant effects on the reduction of particle sizes. The mean crystallite size of  $x = 0$  particles was in the range of 51-60 nm, and further finer sizes, in the range of 18-25 nm, were obtained in the particles of BST.

The 11th paper, written by W. Fatra, H. Rouhillahi, Z. Helwani, Zulfansyah, and J. Asmura, examines the effect of alkaline treatment on the properties of oil palm empty fruit bunch (OPEFB) fiber-reinforced polypropylene composite. The authors argue that the tensile strength increased with the extension of fiber length and concentration of the OPEFB ash extract solution, but decreased with a longer soaking time. Flexural strength was enhanced with an increase in fiber length, but was reduced with a rise in the concentration of the OPEFB ash extract solution and longer soaking time.

The next paper, written by T.P. Soemardi, A. Suwandi, G. Kiswanto, and W. Kusumaningsih, investigates the effect of temperature increase, holding time, and number of layers on ceramic shells using an investment casting process. The authors argue that a longer holding time would result in a more intact ceramic shell, as such times yield short crack lengths.

The 13th paper, written by Warjito, Harinaldi, and M. Setyantono, presents a visualization of angular particle-bubble surface interaction using a high-speed video camera. The authors argue that such interaction is influenced by particle size, hydrophobicity characteristics of the particle, and movement of the bubble. In the flotation process, the formation of stable bubble-particle aggregates is necessary to achieve optimum separation.

The next paper, written by R. Maheswari and V. Pattabiraman, proposes an analytic performance model using petri nets (PN) for a reconfigurable OR1200 (ROR1200) soft-core processor. The authors argue that the results obtained for ROR1200 were the upper bound latency ( $L_u$ ) as 28 ns and lower bound ( $L_l$ ) as 40 ns, with the bound ratio ( $Br$ ) as 1.42, which showed improved performance when compared to the OR1200 and MicroBlaze soft-core processors.

The 15th paper, written by M.F.H. Arif, S. Asaduzzaman, M.J.H. Biddut, and K. Ahmed presents an optimization of highly sensitive photonic crystal fiber (PCF) with low confinement loss for ethanol detection. The authors argue that the proposed PCFs work at a wide transmission band, covering 0.8-2  $\mu\text{m}$ , and exhibit high sensitivity and low confinement loss simultaneously. The circular shape of air holes is more salient for increasing sensitivity, while the square holes reduce confinement loss.

The 16th paper, written by A.B. Mohamed, A. Znaidi, O. Daghfah, and R. Nasri, examines the evolution of the mechanical behavior of aluminum alloy Al 7075 in terms of loading directions and maturation time. The authors argue that Al 7075, after one day of maturation

from quenching and loading at an off-axis angle of  $45^\circ$  yields, gave the best performance for plastic formation and deep drawing.

The next paper, written by L. Gozali, M. Masrom, T.Y.M. Zagloel, and H.N. Haron, proposes a framework for successful business incubators in public universities. The authors argue that the success factors include the performance of the business incubators, incubator governance, entry criteria, exit criteria, mentoring and networking, funding and support, governance support and protection, university regulations, and system infrastructure.

The 18th paper, written by I.I. Wiratmadja, R. Govindaraju, and D. Handayani, evaluates factors related to external economies and joint actions that affect the innovation and productivity of firms in the information technology (IT) sector. The proposed model, as suggested by the authors, consists of three factors related to external economies, i.e. access to skills, finance, and infrastructure, and three factors related to joint action, i.e. vertical, horizontal, and research and development (R&D) cooperation.

The 19th paper, written by M.Z.M. Alie, investigates the effect of symmetrical and asymmetrical configuration shapes on buckling and fatigue strength analysis of fixed offshore platforms. The author argues that the effect of lateral load has a significant influence, not only on the critical buckling load but also on the deformation and stress concentration. The fatigue life analysis revealed that the symmetrical column's structure was less than that of the asymmetrical column.

The final paper, written by A. Awaludin, A.D. Danastri, and B. Supriyadi, presents the development of a connection system of cold-formed steel-timber composite for roof structures. The authors argue that a connection system with steel side plates is capable of accommodating the strength increase of the composite member, as it has a maximum load-carrying capacity and initial slip modulus about 4.5 and 2 times larger than those of the cold-formed steel connections.

I hope that this edition of IJTech conveys some new insights into the way we conduct our research. I am pleased to accept and respond to any comment and 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