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ACCELERATING SUSTAINABLE INFRASTRUCTURE DEVELOPMENT: ASSURING WELL-BEING AND ENSURING ENVIRONMENTAL SUSTAINABILITY

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The concept of sustainable development is conceived as a balance of sustainable economic growth and ecological regeneration. For the well-being of societies, technological innovation must contribute to developing a new model of sustainable social, economic, and environmental growth to make the system more sustainable. The challenge for any nation is continuing its economic growth and distributing welfare while ensuring environmental sustainability.

Sustainable development requires institutional and values changes and cultural adjustments. Sustainable development must be incorporated into mainstream policies to promote national and international cooperation. In this context, sustainable development enables technology transfer and increased well-being.

Managing Sustainable Infrastructure Development

Developing infrastructure is arguably one of the main drivers of economy growth. Infrastructure systems form the backbone of an economy, as they provide social and economic benefits to the society. Infrastructure is an input to production, increasing the productivity of other factors, lowering costs, enlarging markets, and facilitating economic activities. The economic role and significance of infrastructure must consider other dimensions of sustainable development, particularly its environmental aspects. Thus, the greater efficiencies created by sustainable infrastructure will lead to decreased energy consumption, waste, and pollution.

Development of adequate public infrastructure is needed to achieve urban sustainability. Efficient, effective infrastructure systems that provide goods, services, and information for the public interest contribute to a nation's economic and social growth. Thus, the development of modern infrastructure enables competitive advantage in the global economy. Advances in technological innovations, including the use of the latest Information and Communication Technologies (ICT) technology, enhance global business activities. We have seen that technological innovation contributes to the structural changes needed for sustainable development in various branches of business and industry.

Sustainable infrastructure development also requires the effective participation of stakeholders, including governments, industry, academia, and society. For example, Universitas Indonesia's GreenMetric Ranking of World Universities measures universities' commitment to and performance in developing sustainable infrastructure. The ranking includes various criteria for promoting sustainable infrastructure development within a university: increasing energy efficiency, reducing waste, implementing conservation programs, advocating the use of public transport, and educating youth using a sustainability paradigm. It is argued that the role of technology when integrated with social, economic, and environmental effects can contribute to the accelerating sustainable infrastructure development to optimally benefit for society.

In this edition, we are pleased to present 20 selected papers dedicated to sustainable infrastructure development, including technology design and process improvements in transportation, energy, and information and communication.

The first paper, written by F. Firmawan, F. Othman, K. Yahya, and Z. Haron, proposes a quantitative assessment tool, the Green Construction Site Index (GCSI), to evaluate the performances of sustainable, green construction criteria. The authors argue that the three indices, the Efficiency Index (IE), Productivity Index (IP), and Awareness Index (IA), are effective indicators for assessing ongoing construction projects.

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The second paper, written by Y. Latief, M.A. Berawi, A.D. Rarasati, L.S. Supriadi, A.R.B. Berawi, and I.S. Hayuningtiyas, investigates current trends in transportation infrastructure development in 33 provincial capitals in Indonesia. The projects reviewed include road, sea, air, and rail infrastructure, and the results are expected to determine future transportation infrastructure priorities in each province in Indonesia.

The third paper, written by H.A.H. Hassn, A. Ismail, M.N. Borhan, and D. Syamsunur, examines drivers' acceptance of the information, system, and service quality inherent in the current implementation of the Intelligent Transport System (ITS). The authors argue that information quality is the most influential factor, followed by system quality.

The fourth paper, written by H.T. Zuna, S.P. Hadiwardoyo, and H. Rahadian, proposes a model of customer satisfaction using an artificial neural network for Toll Road Service Quality (TRSQ) that is based on information, accessibility, reliability, mobility, security, rest areas, and responsiveness. The authors argue that reliability, mobility, and responsiveness are the greatest contributors affecting drivers.

The fifth paper, written by M. Rizki, R.H. Karsaman, I. Santoso, and R.B. Frazila, examines commuters' behavior using a stated-preference experiment tests the effects of tariff and travel time on route choice under an Electronic Road Pricing (ERP) policy implementation. The authors argue that individual and household variables affect route behavior and that the distance of the trip influences trip chains.

The sixth paper, written by L.S. Barus, H. Martell-Flores, and S.P. Hadiwardoyo, and J-L. Batoz, proposes an Adapted Mixed Multinomial Logit Model (AMML) approach that is based on passengers' preferences to evaluate transport mode choices. The authors argue that the model contributes to a complete approach to intercity transport-mode choice by considering the influence of the intra-city transport conditions in cities.

The seventh paper, written by A.R. Prabowo, D-M. Bae, J-M. Sohn, and A.F. Zakki, investigates the characteristics of ship-collision scenarios using nonlinear simulations that use the finite element (FE) to predict damage and internal energy in the collision process. The authors argue that the structure of the car deck shows better resistance and the angle during impact contributes to the pattern of damage to the sides of the hull.

The eighth paper, written by A.H. Oluwole, A.A. Adekunle, A.O. Olasunkanmi, and A.O. Adeodu, proposes a fuzzy-based expert system, called Pain Intensity Prediction Expert System (PIPES), to predict pain severity risk (PSR) during shovelling-related tasks. The authors argue that the model produces a nonchanging rating tool for assessing ergonomic risk.

The ninth paper, written by A.H. Saputra, Johan, T.I. Sari, A. Cifriadi, D.R. Maspanger, and S. Bismo, examines the degradation characteristics of vulcanized natural rubber by varying the composition of the dimethyl ether by adding filler or plasticizer. The authors argue that increasing the filler reduces degradation, while increasing the plasticizer has the opposite effect.

The tenth paper, written by E. Kusrini, M. Lukita, M. Gozan, B.H. Susanto, T.W. Widodo, D.A. Nasution, S. Wu, A. Rahman, and Y.D.I. Siregar, investigates the potential of natural zeolites to be adsorbents for removing CO_2 and H_2S in biogas produced from the effluent of palm-oil mills. The authors argue that high capability of modified zeolites to remove CO_2 from biogas is the key factor in adsorbent potential.

The eleventh paper, written by M. Suryanegara, explores both the technical research and development (R&D) and non-technical issues regarding 5G as a disruptive innovation that creates new market value from which new services and applications emerge. The author argues that due to the anticipated massive number of cloud-based applications, security issues regarding them will pose challenges for policy-makers.

The twelfth paper, written by L. Aruna and M. Aramudhan, presents a framework for ranking the service providers of federated cloud using fuzzy-logic sets. The authors argue that the issue of starvation is resolved by introducing a scheduling algorithm and that their proposed architecture has a higher selection rate, a lower average response time, and less overhead compared to the existing architectures that support cloud environments.

The thirteenth paper, written by Pasnur, A.Z. Arifin, and A. Yuniarti, proposes a strategy for determining query region based on the value of the Region Importance Index (RII) and the relative position of the Saliency Region Overlapping Block (SROB) to produce a more-efficient Region Based Image Retrieval (RBIR). The authors argue that the proposed method can reduce the average retrieval time to 0.054 seconds with a 5×5 block size configuration.

The fourteenth paper, written by P. Rukmani and R. Ganesan, proposes an enhanced low-latency queuing algorithm for real-time applications in wireless networks. The authors argue that the proposed algorithm has yielded a 1.5-fold improvement in terms of throughput and delay compared to the existing algorithms for real-time audio and video applications.

The fifteenth paper, written by V.R. Sarobin and R. Ganesan, proposes a bio-inspired, cluster-based deployment algorithm to optimize WSN energy and ultimately increase network lifespan. The authors argue that the proposed algorithm can reduce the number of clusters by 38% and improve the network lifespan by a factor of 1/4.

The sixteenth paper, written by F.Y. Zulkifli, N.A. Saputro, Basari, and E.T. Rahardjo, discusses the use of a Left-Handed Metamaterial (LHM) structure stacked on a two-element microstrip antenna array to reduce the element size of an antenna. The authors argue that antenna dimensions can effectively be reduced up to 39% and that measured antenna gain is 8.97 dBi.

The seventeenth paper, written by K. Aparna and M.K. Nair, proposes a partitional clustering algorithm, the High-dimensional Bisecting K-Means (HB-K-Means) algorithm, from a stability-based measure and Mean Square Error (MSE). The authors argue that the proposed algorithm has improved clustering accuracy, with an average clustering accuracy of 75%.

The eighteenth paper, written by R.W. Purnamaningsih, N.R. Poespawati, E. Dogeche, and D. Pavlidis, proposes a design for a 1×3 optical power splitter using GaN on Sapphire for the third optical communication wavelength, λ = 1.550 µm. The authors argue that uniform power splitting over three output rib waveguides is obtained with an MMI structure that is 987 µm long and 40 µm wide.

The nineteenth paper, written by B. Kusumoputro, D. Sutarya, and A. Faqih, analyses the performance of a system for automatically classifying the quality of green-pellet nuclear fuel using modified, radial basis function (RBF) neural networks. The authors argue that their modified RBF neural networks show more recognition capability and optimize treatment of the quality classification problem.

The twentieth paper, written by N.R. Poespawati and M.R. Nugroho, proposes a design and fabrication method for a solar-powered system of active Radio-Frequency Identification (RFID) tags that use supercapacitors for energy storage. The authors argue that the charging speed of a supercapacitor is directly proportional to the intensity of the light obtained by the solar panel.

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