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Smart Cities: Accelerating Sustainable Development Agendas

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Continuing with my previous editorial notes on smart cities and technology advancement, this note discusses how smart cities can be enablers to achieving sustainable development agendas. Smart cities harness technological and digital solutions to address urban challenges and continuously improve citizens' quality of life. The key benefits of smart cities include maximizing benefit optimization and resource efficiency, creating sustainable built environments and infrastructure, increasing citizens' productivity, and producing better social, economic, and environmental benefits. The use of artificial intelligence (AI) for actionable insights into improving the planning, construction, and operations of city development has provided citizens with more efficient, integrated, and sustainable city services. Smart cities promote equitable access to education, healthcare, and social services, creating a more inclusive and resilient society.

Smart cities are able to deliver better services to their citizens. Big data—data collection and utilization—for different areas of public services are integrated, secured, and constantly updated to solve city problems and create faster solutions. Through the Internet of Things (IoT), sensors, and online platforms, the city can be continuously monitored and measured. This allows any policy and required action to be quickly decided upon to ensure a sustainable, positive impact on the city and its residents. Surveillance systems, early warning systems, and citizen collaboration platforms are among the pathways that are capable of preserving the city's ecosystem and environment.

For example, part of the ongoing development of Indonesia's new capital, Nusantara, is dedicated to building a smart, sustainable forest city. Besides infrastructure and physical buildings as the city's backbone (hardware) and integrated systems that enable the city to operate by connecting physical buildings through digital technology (software), they aim to build the capacity and capability of human resources through technological advancement (brainware). The six sectoral domains of the Nusantara smart city include smart governance, smart transportation and mobility, smart living, smart natural resources, smart industry and people, and smart built environments and infrastructure.

Innovative technology use is required to balance economic advancement and environmental regeneration for social well-being. Science and technology play a significant role in achieving sustainable smart cities by improving the efficiency and effectiveness of new ways of development. Investments in green technology, streamlined processes, safer materials, and improved performances and outcomes are some of the results of such development. Technological investments in utilizing renewable energy resources, building

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urban water systems and sustainable public infrastructure, increasing food production, and producing environmentally friendly materials and products are the pathways through which smart technology will significantly contribute to achieving sustainable development targets.

Accelerating Science and Technology Development

Alternative methods of science and technology, breakthrough techniques, and improved end products are required to accelerate development in all research areas. In this context, this edition presents twenty papers that are dedicated to systematic, empirical research that fosters the development of science and technology.

The first paper is written by S. Hamza, M. Heidari, M. Ahmadizadeh, M. Dashtizadeh, and M. Chitt. It investigates the effect of the angle of attack on coefficients and forces, particularly on a blade with NACA 4412 airfoil in a horizontal axis wind turbine. The authors argue that the lift and drag coefficients increase as the angle of attack increases.

The next paper, written by J. Pane, D.H. Simbolon, H. Izzudin, A. Afandi, B. Hermanto, K. Sebayang, S. Humaidi, M. Situmorang, and T. Sudiro, develops a highly resistant coating of $MoSi_2$-added FeCrAlTiY on ST41 steel to improve its oxidation resistance. The authors argue that FeCrAlTiY-10 mass% $MoSi_2$ is the coating most resistant to cyclic oxidation at 700°C in air.

The third paper, written by E. Siswanto, D. Widhiyanuriyawan, M.A. Choiron, D.B. Darmadi, and Y. Katoh, examines the effects of the thermal conductivity of porous materials under vapor flow in a sudden enlargement–contraction channel. The authors argue that the overall effective thermal conductivity of porous materials filled with vapor primarily affects the local Nusselt number.

The fourth paper, written by P. Suwignjo, M.N. Yuniarto, Y.U. Nugraha, A.F. Desanti, I. Sidharta, S.E. Wiratno, and T. Yuwono, investigates the benefits of electric vehicle implementation on ride-sharing platforms. The authors argue that electric motorcycles with 3-kWh batteries positively impact riders and increase their net personal incomes.

The fifth paper, written by D. Sarkar, A. Sheth, and N. Ranganath, presents a social benefit–cost analysis model for the feasibility assessment of the proposed electric bus rapid transit system project. The authors argue that the project can be considered sustainable due to the numerous benefits it presents to road users and its fruitful socio-economic perspectives.

The next paper, which is written by S.S. Alabsi, M.H.Md. Khir, J.O. Dennis, S.S.B. Hashwan, and A.S. Algamili, examines the optoelectronic characterization and properties of single-walled carbon nanotubes (SWCNTs). The authors argue that high conductivity and versatile dielectric behavior are features that will classify SWCNTs as the nanomaterial for future applications.

The seventh paper, written by A.M.H. Putri, M. Safaat, H. Prasetia, F. Zulpikar, J. Renyaan, and R. Noor, examines the environmental impact of ethanol production using solid waste as a raw material from the extraction of red seaweed. The authors argue that the fermentation process, followed by the production of enzymes and electricity, is the main contributor to CO_2 emissions.

The eighth paper, written by A. Arrieta, I. Barrera, and J. Mendoza, presents the use of a smart electronic tongue to discriminate between adulterated milk samples with various sucrose concentrations. The authors argue that the array of optimized polypyrrole sensors transmits sufficient information to discriminate between different sucrose concentrations in the milk samples.

The next paper, written by T. Iswanto, M. Shovitri, A. Altway, T. Widjaja, P. Lisdiyanti, and A.P. Putra, examines the caffeine-degrading ability of bacterial strains *klebsiella sp*. isolated from the feces of the Asian palm civet. The authors argue that the bacteria uses C8-oxidation as its catabolic pathway, and its growth rate increases by acclimatizing to the strain in an enrichment medium.

The tenth paper is written by S. Nukeshev, K. Yeskhozhin, D. Karaivanov, M. Ramaniuk, E. Akhmetov, B. Saktaganov, and K. Tanbayev. It investigates a chisel fertilizer for in-soil, tree-layer site-specific application in precision farming. The authors argue that the designed chisel-fertilizer ensures processing and the sloping of fertilizers with a bandwidth up to 35 cm.

The eleventh paper, written by N.L. Thai, T.M. Bui, A.T. Le, and D.A.N. Thi, examines the utilization of $BaAl_{1.4}Si_{0.6}O_{3.4}N_{0.6}:Eu^{2+}$ green-emitting phosphor to improve the luminous intensity and color adequacy of white light-emitting diodes. The authors recommend keeping the concentration of $BaAl_{1.4}Si_{0.6}O_{3.4}N_{0.6}:Eu^{2+}$ below 10 wt% for better color fidelity.

The next paper, written by Darmadi, M.R. Lubis, M. Masrura, A. Syahfatra, and Mahidin, investigates clay and zeolite-clay based monoliths as adsorbents for Hg(II) removal from aqueous solutions. The authors argue that clay-based monoliths are the most effective adsorbent for mercury removal from water.

The thirteenth paper, written by H. Heriyanto, O. Muraza, G.A. Nasser, M.A. Sanhoob, I.A. Bakare, Budhijanto, Rochmadi, K. Wijaya, and A. Budiman, examines catalyst activity improvement in methanol-to-olefin conversions. The authors argue that the role of metal (Sr/La) impregnated over ZSM-5 is important to reduce acidity and prolong activity catalysts.

The fourteenth paper, written by M. Harahap, N. Daulay, D. Zebua, and S. Gea, presents the isolation of nanofiber cellulose (NFC) and lignin from oil palm empty fruit bunches (OPEFB). The authors argue that the introduction of lignin into NFC increases its thermal stability and residual mass and maintains its crystallinity.

The next paper, written by A.H. Ritonga, N. Jamarun, S. Arief, H. Aziz, D.A. Tanjung, and B. Isfa, investigates the effect of oleic acid-grafted, linear low-density polyethylene as a compatibilizer on the properties of linear low-density polyethylene/cyclic natural rubber (LLDPE/CNR) blends. The authors argue that LLDPE-g-OA as a compatibilizer in the LLDPE/CNR blends influences the polymer blends' mechanical, thermal, and morphological properties.

The sixteenth paper, written by D.A. Tanjung, N. Jamarun, S. Arief, H. Aziz, B. Isfa, A.H. Ritonga, and V. Sisca, examines the effects of linear low-density polyethylene (LLDPE) on the mechanical properties and water absorption of thermoplastic sago starch blends. The authors argue that that higher concentrations of LLDPE lead to lower speeds of water absorption.

The next paper, written by Suhartono, A. Romli, B.H. Prabowo, P. Kusumo, and Suharto, examines the process of converting styrofoam waste into fuel by using a sequential pyrolysis reactor and natural zeolite catalytic reformer. The authors argue that liquid pyrolysis oil (PLO) can be utilized as a direct substitute for kerosene fuel.

The eighteenth paper, written by K.C. Wanta, Catherine, A. Miryanti, and A.P. Kristijarti, investigates the effect of several parameters, such as microalgae concentration, salinity, and light color, in wastewater treatments. The authors argue that the Cu(II) ions can be removed when the microalgae concentration, salinity, and light color are conditioned using certain parameters.

The nineteenth paper, written by F.N. Rahma and A. Hidayat, examines biodiesel production from free fatty acid (FFA) using a ZrO_2/bagasse fly ash catalyst. The authors

argue that the highest FFA esterification conversion is 90.6%, which is reached at certain parameters in the optimum reaction condition.

The last paper, written by Marpongahtun, Andriayani, Y. Muis, S. Gea, S.A. Amaturrahim, B. Attaurrazaq, and A. Daulay, presents the synthesis of nitrogen-doped carbon dots (N-CDs) from nanocrystalline cellulose using the pyrolysis method as a Hg^{2+} detector. The authors argue that high fluorescent N-CDs can be successfully synthesized from cellulose in a one-step synthesis by pyrolysis.

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

With warmest regards from Jakarta,

Professor Dr. Mohammed Ali Berawi
Editor in Chief