International Journal of Technology 13(4) 690-694 (2022)

International Journal of Technology

http://ijtech.eng.ui.ac.id

City of Tomorrow: The New Capital City of Indonesia

Mohammed Ali Berawi[1]*

[1]*Faculty of Engineering, Universitas Indonesia, Kampus UI Depok, Depok 16424, Indonesia*

The new Capital City of Indonesia, Nusantara (*Ibu Kota Nusantara - IKN*), is set to be inaugurated in August 2024 with celebrations of Indonesia's national day. The state capital is expected to be a smart, sustainable, and resilient city. Technology, as an enabler of smart city development, will be utilized as a solution to tackle urban problems. For the well-being of societies, technological innovation must contribute to the development of a new model of social, economic, and environmental growth to make the capital city more modern and sustainable.

The three main principles for the development of IKN will be the forest city, sponge city, and smart city concepts. Eight key performance indicators have been set up to achieve this development goal: building a city in tune with nature, easily accessed and connected, circular, resilient, safe, affordable, technologically friendly, and, especially, providing economic opportunities for everyone.

As the chairman for Technology Transformation and Innovation, Nusantara Authority, let me share with you that IKN is a green city with an area of 256,142 hectares, where 65% of the area is dedicated to tropical forest, 10% to parks and food production, and the rest as urban areas with various zones of mixed use and neighborhoods. The green city will utilize many renewable resources, from green energy to urban air mobility. This means that the city has the potential to be carbon neutral, absorbing more CO_2 than it emits. A sustainable approach is important to ensure the fulfillment of future needs by maintaining the ongoing viability of resources.

The development of IKN represents both the nation's identity and a tremendous opportunity to boost economic development and modernize infrastructure. IKN development will serve as the backbone of Indonesian economy generation, as it provides social and economic benefits to society. The development of the modern city of IKN will enable competitive advantages in the global economy and contribute to Indonesia's economic and social growth. The master plan of IKN, through 1 MPP (1 Map-1 Plan-1 Policy), reflects the latest state-of-the art technology, focusing on innovation and creating an ecosystem that is expected to improve citizens' quality of life.

The use of digital technology, such as Artificial Intelligence (AI), Internet of Things (IoT), Big Data, and various latest technology tools will serve as the city's development and

*Corresponding author's email: maberawi@eng.ui.ac.id, Tel.: +62-21-7270029, Fax. +62-21-7270028
doi: 10.14716/ijtech.v13i4.6011

operational system. Technology development and innovation will play a significant role, not only in developing a smart city as one of the solutions to urban challenges but also in creating a new model of future digitally connected urban management that is economically feasible, socially desirable, and environmentally sustainable. For example, IKN will have autonomous and electric vehicles as one mode of public transportation, offering mobility-as-a-service to citizens. The objective is to have safer, more efficient urban mobility, thereby eliminating congestion and GHG emissions and providing mobility to people with disabilities and special needs.

IKN development aims to produce a resilient and sustainable city by improving city services from transportation, energy, and water resources to waste disposal and health services. The establishment of the smart city of IKN can improve the city's ability to use natural resources efficiently, make public transportation more attractive, and provide data to decision makers for the appropriate allocation of resources. Investments in green technology, safer materials, and technological advances for utilizing renewable energy resources, building urban water systems and sustainable public infrastructure, and producing environmentally friendly products will provide pathways through which technology will significantly contribute to sustainable IKN development. The smart city will contribute to the formation of a high-quality, healthy, and regenerative built environment with an overall positive impact on citizens' lives.

IKN is also expected to focus on innovation and entrepreneurial environments to foster growth and investment to boost economic performance, as well as to improve citizens' quality of life. Regional development will be facilitated to represent the nation's progress and to serve as a catalyst for building and spreading centers of productivity and economic activity. IKN Nusantara is open to everyone—investors, manufacturers, researchers, thinkers, and supporters of innovation—to develop city ecosystems that are green, inclusive, smart, resilient, and sustainable. It will be an inclusive global city for all.

Managing Science and Technology Development

The improvement of technologies that produce alternative methods, techniques, and end products is required to accelerate various developments in all research areas. In this context, this edition presents twenty-three papers dedicated to systematic and empirical research that fosters the advancement of science and technology.

The first paper, written by V. Rezaei, S.H. Musavi-Jahromi, A. Khosrowjerdi, and B. Beheshti, presents the experimental and simulation studies on water discharge coefficients of rectangular piano key weir (PKW). The authors argue that increasing wall thickness and installing a parapet wall led to an increase in the discharge and a uniform distribution of flow lines on the weir.

The following paper, written by Supriatna, F. Zulkarnain, Ardiansyah, N. Rizqihandari, J.M. Semedi, S. Indratmoko, N.S. Rahatiningtyas, T. Nurlambang, and M. Dimyati, examines the susceptible zone of covid-19 and its exposure to population numbers through a web-GIS dashboard. The authors argue that susceptibility to COVID-19 is closer to the city center with high road density.

The third paper, written by R. Lesmana, W. Rahayu, E. Bahsan, and B.S. Soepandji, presents the stabilization of weathered clay shale using propylene glycol and potassium chloride. The authors argue that adding propylene glycol or potassium chloride to clay shale can increase the value of soaked CBR to twice the initial value and decrease the swelling percentage.

The fourth paper, written by P.N.F.N.M Fauzi and Z. Jahidi, identifies the risks exposed to the development of zakat and *wakaf* housing. The authors argue that shariah-compliant

risks, such as the requirements of business transactions and dealings (mua'malat), are included among the identified risks associated with the development of zakat and wakaf housing.

The fifth paper, written by P.S. Nugroho, Y. Latief, and W. Wibowo, presents the structural equation modeling for improving fire safety reliability through enhancing fire safety management on high-rise buildings. The authors argue that fire prevention, people safety, audit monitoring, and reactive assessment significantly affect fire safety reliability.

The next paper, written by B.H Setiadji, M.A. Wibowo, H.M. Jonkers, M. Ottele, Widayat, M. Qomaruddin, F.H. Sugianto, Purwanto, and H.A. Lie, examines the pyrolysis of reclaimed asphalt aggregates (RAA) in mortar. According to the authors, the pyrolysis method increases compression strength, decreases absorption, and reduces the formation of a water film.

The seventh paper, written by K. Agrebi, A. Belhadj, J. Bessrour, and M. Bouhafs, presents computational modeling of thermo-metallurgical behavior during the TIG welding process. The authors argue that the metallurgical structure in the heat-affected zone (HAZ) is primarily related to welding thermal power and the plate preheating temperature.

The eighth paper, written by M. Zulkarnain, K.A. Tofrowaih, and S. Ariyanti, examines the effect of natural fibers reinforcement of honeycomb sandwiches using numerical analysis. The authors argue that the fiber reinforcement enhances the structure's stiffness, significantly promoting bending resistance capacity and energy absorption.

The following paper, written by J. H. Pérez, C. Geldes, A. Flores, W. Heredia, F.C. Obando, and L.M. Obando, investigates the roles of automation and technology in manufacturing firms through new strategies and tools to reduce the risk of covid-19 employees' infection. The authors argue that automation is essential in strategies to prevent and mitigate worker infections.

The tenth paper, written by H.D.S. Budiono, G. Heryana, M. Adhitya, D.A. Sumarsono, Nazaruddin, R. Siregar, E. Rjanto, and B.D Aprianto, presents the design of electric bus power requirements using simulation methods with GPS data. The authors argue that a bus with a motor power rating of 100 kW and 200 kWh of batteries can operate over a distance of 200 km on one charge.

The eleventh paper, written by M. Akbar, M.J. Ramadhani, M.A. Izzuddin, L. Gunawan, R.A. Sasongko, M. Kusni, and J.L. Curiel-Sosa, evaluates the piezo-aeroelastic energy harvesting potential of a jet transport aircraft wing with multiphase composite. The authors argue that the energy can be utilized to improve the efficiency of aircraft systems, i.e., a gust alleviation system.

The next paper, written by A.H. Halim, N.P.A. Hidayat, and W. Aribowo, proposes a batch-scheduling (BS) model to minimize the total actual flow time (TAF) of parts to be processed in a flow shop. The authors argue that the backward-scheduling approach is solved by dividing it into batching and scheduling subproblems.

The thirteenth paper, written by E. Nugraha, R.M. Sari, Sutarman, A. Yunan, and A. Kurniawan, establishes a correlation between information technology, competence, and commitment to customer satisfaction. The authors argue that the quality of service is strongly influenced by the use of information technology, competence, and commitment.

The fourteenth paper, written by P.D. Huu and D.A.N. Thi, presents the selection of multi-layer remote phosphor structures for heightened chromaticity as well as lumen performance within WLED devices. The authors argue that the triple-layer structure improved the color quality more effectively due to higher attained CRI and CQS and smaller DC figures.

The next paper, written by S. Lukman, Y.Y. Nazaruddin, B. Ai, and E. Joelianto, presents path loss modeling for high-speed rail in a 5G communication system. The author argues that the utilization of the Generalized Reduced Gradient (GRG) and Genetic algorithm (GA) achieved excellent results with RMSE and MAPE evaluation, converging to 2.779 and 1.701 %.

The sixteenth paper, written by R. Ulfiati, D. Dhaneswara, S. Harjanto, and J.F. Fatriansyah, describes the synthesis of ZSM-5 Zeolite based on kaolin as catalysts for catalytic cracking of heavy distillate. The authors argue that middle distillate hydrocarbon is obtained by the catalytic cracking of heavy distillate using Ni-Mo commercial catalyst and HZSM-5 Formula E catalyst.

The following paper, written by I. Sukmana, Y. Hendronursito, S. Savetlana, K. Isnugroho, M. Amin, and D.C. Birawidha, examines the characterization and potential production of glass-ceramics biomaterial from local basalt rock. The authors argue that the chemical and mineral composition of basalt allows the formation of glass ceramics at relatively low temperatures.

The eighteenth paper, written by F. Angellinnov, Y.K. Krisnandi, D.U.C. Rahayu, and D. Dhaneswara, compares the xylene and ethyl acetate as a solvent in the isolation of levulinic acid from the conversion reaction of cellulose rice husk. The authors argue that ethyl acetate is the best solvent and esterification agent in separating levulinic acid.

The nineteenth paper, written by N.H. Riedel and M. Špaček, examines the innovation options and profitability of pharmaceutical brand manufacturers. The authors argue that launches of New Molecular Entities (NMEs) do not necessarily lead to higher profitability, suggesting that many launches of NMEs are not particularly successful from an economic point of view.

The next paper, written by A. Riyadhi, Y. Yulizar, and B.H. Susanto, examines the catalytic conversion of beef tallow to biofuels using MgO nanoparticles green synthesized by zingiber officinale roscoe rhizome extract. The authors argue that all fatty acids derived from beef tallow are converted to gases and liquid fractions.

The twenty-first paper, written by A. Arrieta, I. Barrera, and J. Mendoza, investigates the pH's effect on elaborate films of solid biopolymer electrolytes from cassava starch. The authors argue that the production pH has a marked effect on the impedantiometric behavior of films of solid biopolymer electrolyte from cassava starch.

The next paper, written by P. Prihutami, W.B. Sediawan, A. Prasetya, and H.T.B.M. Petrus, presents a product diffusion model for the extraction of cerium and yttrium from magnetic coal fly ash using a citric acid solution. The authors argue that the leaching capacity of either cerium or yttrium rises along with the temperature.

The last paper, written by F.I Prihadiyono, W.W. Lestari, R. Putra, A.N.L. Aqna, I.S. Cahyani, and G.T.M. Kadja, modifies natural zeolite (NZ) with nickel and apply it as a catalyst in green diesel production from crude palm oil (CPO). The authors argue that NZ shows suitability with the simulated pattern of mordenite (MOR) and clinoptilolite (HEU) phases.

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

With warmest regards from Jakarta,

Professor Dr. Mohammed Ali Berawi
Editor in Chief