

## FORECASTING THE FUTURE: ACCELERATING COUNTRIES' DEVELOPMENT AND THE WORLD'S SUSTAINABLE DEVELOPMENT

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The process of making predictions of the future based on previous data and trends plays a significant role in improving performance and sustaining competitiveness. Understanding why a certain result occurred enables us to create a future outlook that serves as the foundation for building current plans. In this regard, many institutions are now actively pursuing innovativeness, effectiveness, and efficiency to develop value-added products and service outcomes.

Performance improvement is an indicator of the progress of established plans. For example, a country's progress is measured by the Human Development Index (HDI) and Global Competitiveness Index (GCI) indicators. Three-dimensional HDI covers health, education, and economy, whereas GCI describes the progress of a country in its efforts to achieve prosperity, which includes the fulfillment of basic needs and achieving efficiency and business innovation. A country is expected to mobilize the potential of its existing resources to achieve a high HDI and GCI.

The continuity of long-term strategies and development plans is required to achieve the aforementioned targets. Various industries and sectors require the use of technology to improve productivity and efficiency and to create added value for products and services. In this case, the acquisition and use of information and data technology as a tool to accelerate development is considered significantly important.

Increasing the skills and expertise of human resources that are capable of utilizing technology and developing breakthrough solutions in managing natural resources can be seen as a way to enhance countries' competitiveness in the global arena. Bonus demography can be utilized as productive asset in the development of creative industries. The other sectors in which some countries are strong at can be harnessed and developed further for sustainable eco-tourism, modern agriculture, and manufacturing. Furthermore, transforming societies from being consumers to prosumers – consumers and producers of their own products and services – contributes to economic development.

### **Working Together: Sustainable Development for the World**

The United Nations (2013) predicts that the world population will reach 9.6 billion by 2050. As a consequence, the world will need to increase its food production and provide other human basic needs. The use of technology will contribute to improving agricultural productivity, creating massive renewable energy, and combating climate change. Mutual collaboration among countries is required to ensure a good future for the world.

A primary task in fostering sustainable development for the world is maintaining the motivation among countries to work together in mutual partnerships. Aligning values to share perspectives, strengthen commitment, and build a common ground is required for attaining world prosperity and peace. The success of collaboration does not only depend primarily on efficient coordination and control of cooperation efforts, but on the establishment and maintenance of a cooperative dialogue among countries and interests groups that may influence relevant activities and expectations. The concepts of justice, equity, and social rights might have a major impact on the way that the development of the future of the world will progress. The ultimate goal is to improve the quality of human life (well-being), and the use of technology contributes a significant role in achieving this goal.

This season, we are pleased to present 20 selected papers dedicated to various studies in engineering design and technology application with the goal of improving product, project, or service performance and thus achieving better results.

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The first paper, written by A. Han, B.S. Gan, and M.M.A. Pratama, examines the effects of graded concrete on compression strength. Basing on the mechanical properties of graded concrete and using finite element analysis, the authors argue that concrete gradation negatively affects the ultimate strength and alters the stress distribution and displacement response of the specimen.

The second paper, written by S.F.S.M. Johan and C.M. Chan, investigates the shear resistance of ballast-rubber composites in simulated water and acid-soaked conditions. The authors argue that rubber inclusions are useful in deformation control because of their increased ductility and impact absorption, which lead to enhanced breakage resistance of the ballast in rail tracks.

The third paper, written by A. Ajayi-Banji, A. Ajimo, and I.O. Igboade, examines the use of coconut husks as a biosorbent for polluted surface water treatment. The treated water samples collected at different time periods were examined for  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ , and  $\text{PO}_4^{3-}$  ion concentrations. The authors argue that coconut husk char as a biosorbent is a solution to significant concentrations of polyatomic ions in polluted surface water.

The fourth paper, written by S.D. Shetty and N. Shetty, investigates the inhibiting effect of N-benzyl-N'-phenyl thiourea (BPTU) on the corrosion of low-carbon steel in 0.1 M hydrochloric acid solution by using Tafel extrapolation and linear polarization techniques. The authors argue that BPTU can be used to mitigate the corrosion of mild steel in hydrochloric acid media at elevated temperatures.

The fifth paper, written by M. Faisal, I. Machdar, A. Gani, and H. Daimon, presents a combination of baffled air flotation and a membrane system for the treatment of palm oil mill effluent. The authors argue that the air flotation process can reduce the concentration of suspended solids and fats/oils contained in wastewater and increase the performance of the membrane by reducing clogging.

The sixth paper, written by A.A.A. Wahab, S.H. Chang, and A.M Som, examines the reaction stoichiometry between Cu(II) and di-2-ethylhexylphosphoric acid (D2EHPA) in waste palm cooking oil. The authors argue that the proposed chemical equation can be used to determine the reaction mechanism involved and show that the reaction stoichiometry for Cu(II) to D2EHPA is 1:2 in Cu(II) organic complexes.

The seventh paper, written by S. Nasir and S. Faizal, examines the performance of ceramic filters made from a mixture of natural clay, rice bran, and iron powder in removing cadmium from pulp industry effluent. The authors argue that ceramic filters have a random pore structure and can thus be categorized as microfiltration filters.

The eighth paper, written by T. Hussain, M. Shamraiz, S.U. Abrar, Z.A. Khan, and I. Rehan, investigates the effect of temperature intervention on the drying rate with the use of an indigenously vacuum drying system. Drying quality tests included prong test, warp measurement, surface checking and moisture content measurement were performed on fresh green wood. The authors argue that the drying rate increases with the temperature.

The ninth paper, written by H. Santoso, S. Hadi, and Purwanto, examines the current progress of the furniture industry in producing eco-label products as a way to address illegal logging, illegal trading, and forest conversion. The authors argue that industries with a chain of custody certification have a positive effect on the industrial environment, improve corporate image, and increase market share and profit.

The tenth paper, written by C.N. Rosyidi, A. Fatmawati, and W.A. Jauhari, presents an optimization model for product selection process to minimize manufacturing cost and quality loss. The authors argue that the model can be used to define optimal tolerance and production allocation, which takes into consideration production capacity and process sequence.

The eleventh paper, written by A.P.J. Dwiyantoro, I.G.D. Nugraha, and D. Choi, proposes a method to recognize activities by using the combination of an accelerometer and gravity sensor. A hierarchical design system with energy-efficient application is implemented in smartphones. The authors argue that an average of 95% activity recognition accuracy and energy efficiency is achieved.

The twelfth paper, written by M. Gupta, D. Bhaskar, and R. Bera, presents a technique to classify individual targets depending on radar cross-section values. The authors argue that the proposed classification method with the Chebyshev polynomial feature can be used to classify targets in an airborne ground moving target system.

The thirteenth paper, written by A.A. Abdillah and Suwarno, presents a classification technique using support vector machines in combination with radial basis function kernels (SVM-RBF) to predict diabetes. Basing on the experimental results, the authors argue that SVM-RBF obtains promising results that aid in the diagnosis of diabetes in its early stage.

The fourteenth paper, written by S.B. Bhushnan and C.H Pradeep Reddy, proposes a linear discriminant analysis-based four-level matching model for service selection that considers the quality of service parameters. The authors argue that efficient service selection can be achieved with a minimal discovery overhead and a significant reduction in the computation time and number of candidate services.

The fifteenth paper, written by M. Syafrizal, B. Sugiarto, S.S. Moersidik, J. Fortin, N. Hamani, and E. Bretagne, proposes a model of dynamic vehicle emissions reduction by considering vehicle fleet and emission calculation. The authors argue that the intentional approach has a significant effect to improve the intention of private car users to switch to public transportation.

The sixteenth paper, written by G. Barlin, A. Arifin, and D.K. Pratiwi, investigates thermal evolution profile analysis for the pyrolysis of coal–*acacia mangium* wood blends with different weight ratios and non-isothermal conditions at different heating rates. The authors argue that the biomass of *A. Mangium* wood can be used in a mixture with coal because of its low ash and high volatile matter content.

The seventeenth paper, written by T.F Go, D.A. Wahab, Z.F. Fadzil, C.H. Azhari, and Y. Umeda, explains a socio-technical perspective on end-of-life vehicle (ELV) recovery for a sustainable environment. The authors argue that a socio-technical perspective needs to be adopted to ensure the effective implementation of ELV recovery through reuse and remanufacturing.

The eighteenth paper, written by Warjito and Nurrohman, describes the use of flotation via electrolysis to separate a synthetic dye of Batik from liquid waste. The authors argue that flotation could be an effective method to reduce turbidity and color at a low voltage, i.e., 10 V, while the total suspended solid reaches more than 90% for all voltages applied.

The nineteenth paper, written by T.B. Sitorus, F.H. Napitupulu, and H. Ambarita, investigates the performance of a solar adsorption refrigerator using activated alumina and methanol adsorption pair. The authors conclude that the adsorption pair system can deliver an evaporator temperature of about 9.92°C, and the cooling load can be achieved by a heat source with a temperature range of 83.95°C to 95.39°C.

The last paper, written by A. Martin, Miswandi, A. Prayitno, I. Kurniawan, and Romy, examines the performance of a 20 MW gas turbine power plant by using exergy analysis. The authors argue that the highest and lowest exergy destruction was up to 71.03% or 21.98 MW, which occurs in the combustion chamber, and 12.33% or 3.15 MW, which occurs in the compressor.

I hope that this edition of IJTech conveys some new insights into the way we conduct our research. I am pleased to respond to any comments and inquiries you may have on the direction and content of IJTech. Likewise, 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