MANAGING TECHNOLOGY TOWARDS SUSTAINABLE PRODUCTS AND SERVICES DEVELOPMENT

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It is our utmost pleasure to welcome you to the International Journal of Technology (IJTech) publication. Considering the significant increase in the number of paper submissions to IJTech, we are pleased to inform you that IJTech publication will increase its publication volumes to heighten our journal's service and quality. Following five years of biannually published issues, starting from this edition IJTech will increase both its publication time (from two times in a year to four times in a year–January, April, July, October) and the number of articles in each issue (from ten to twenty articles). It is expected that this policy will attract more papers and boost research dissemination on development in technology around the globe.

Technological development is a significant key effort to gain product and project competitive advantage. Furthermore, designs and technologies evolve through different phases and may require different methods, processes and technology improvements to speed them along – from creating ideas, producing new prototypes to product commercialization. Methods and process improvements are also among the important tools to introduce process changes to improve the quality of a product or service and to better match end users' needs. Thus, the development of technologies that includes improvements to design, methods and processes should be properly and carefully managed.

In response to these issues, we are pleased to present twenty selected papers dedicated to managing technology towards sustainable products and services development. Within this theme, the issue discusses technology management to define creative alternative processes to produce an effective solution for improvements in design and technology. The following paper focuses on modification, optimization, improvement, and technological implementation towards sustainable product and services.

The first paper, authored by M. Suryanegara, I.G.D. Nugraha, B.A. Adhi, M.F. Lubis, and M.R.E. Putra discussed the development of *m-herbal* as a local innovation in Indonesia. They present a framework that signifies the importance of communications channels among actors in the mobile cellular network and the necessity of facilitating mutual interaction between multiple actors involved in the development of *m-herbal* services. This model can be used to determine health applications that are relevant to Indonesian market behavior.

The second paper, written by H.A. Nugroho, K.Z.W. Oktoeberza, T.B. Adji, and F. Najamuddin proposes a method to enhance successfully retinal fundus images and facilitate segmentation of exudates based on K-means clustering. The results show that classification based on the 'naïve' Bayes algorithm achieves accuracy, specificity and sensitivity of 92.13%, 96% and 87.18%, respectively. These findings are useful to assist ophthalmologists in detecting and recognizing hard and soft exudates from retinal fundus images for diagnosis of diabetic retinopathy that 300 million people are estimated to suffer from as of 2025, (WHO, 2025).

The third paper, presented by M. Asvial, G. Dewandaru, and A.N. Rachman proposes a new scheduler algorithm by considering the trade-off between throughput and fairness among users. In downlink LTE, the scheduler is an important element that assigns resource block (RB) allocation for different users in a cell. In the comparison of fairness based on its minimum and maximum range, on a standard deviation of RB

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allocation and on Jain's fairness index, the new scheduler yields a better fairness value than the Best CQI. The average queuing delay is slightly worse than that for Round Robin, but it is much better than that for the Best CQI.

The next paper, authored by M. Widjaja, and S. Hansun develops, improves and implements Porter's stemming algorithm in a word error detector plugin application. The test results have shown that the the modified Porter's stemming algorithm produces more accurate results in the analysis than Porter's original stemming algorithm with an average difference in precision of about 3%.

The fifth paper, written by A.S. Arifin, and T. Ohtsuki investigates potential benefits of full-duplex technique in relay networks, which uses multiple antennas for transmission and reception combined with the Amplify-Forward (AF) scenario and considers the relay operation in full-duplex, which occurs when transmission and reception are conducted in the same channel. The results show that the capacity of the full-duplex model cannot achieve twice the capacity of the half-duplex. This is because the capacity of full-duplex uses half antennas for transmission and the other half antennas for reception.

The sixth paper, presented by Basari, and J.T. Sri Sumantyo proposes a compact circularly polarized array for satellite tracking aimed at land mobile vehicle applications. The MoM-based software is applied for numerically designing the array and studying the characteristics of array performances. The array is constructed by three patches so that its beam pattern can be switched in three 120°-coverage beams in the azimuth plane with minimum gain requirement at a fixed point of the elevation angle. By applying this pattern, data communications with a large geostationary satellite can be achieved. The results show that the array meets the specifications at the targeted looking angle of 48° when the gain is more than 5-dBic for each three-selectable beams in the azimuth plane.

The next paper, written by Ardiansyah, I. Paramitha, M. Salman, and D. Choi, presents an OpenFlow-based Wi-Fi environment approach using an OpenFlow-based Access Point (OFAP) and an OpenFlow controller. Each OFAP is deployed in two different rooms and several experiments were performed to evaluate handoff delay. The result shows that OpenFlow-based network delivers a more stable process than a traditional network because of the installed flows that are given to each packet. By using this system, a high performance network and an increased reliability for real-time traffic over WLAN could be delivered by reducing the handoff delay compared to a classical Wi-Fi environment.

The eighth paper written by A.D. Wibisono, and E.A. Setiawan proposed a new approach in order to determine mathematical equations for optimum tilt angle of solar panels in a tropical region, particularly in Indonesia. Existing research has determined the optimum tilt angle of solar panels in subtropical locations. The results show that the influence of degrees latitude (Y) and longitude (X) to the optimum angle of solar panel installation in the territory of Indonesia can be represented by the equation 0.0093 X + 1.3042 Y, with an RMSE value of 1.88 and an R squared value of 0.928.

The next paper authored by S.D. Gunjal, and R.D. Raut proposed the Discrete Wavelet Transform (DWT) supported by the same psychoacoustic model for speech compression. Even though the traditional psychoacoustic model was used in our proposed coder, the selection of the Daubechies wavelet family with DWT yielded comparable improvement in the performance parameters with a good quality reconstruction of the speech signal. The compression factor improves at the cost of the SNR with progressive levels.

The tenth paper, written by D.T. Santos, and B.V. Vardhan formed the basis for creating/upgrading the (available) OWL Ontology that can be used as a structured data model with rich semantics for supervised machine learning. With this method, the classified sentiment categories are validated in relation to precise sentiments and are sent back to the interface in corresponding "feature/sentiment" pairs so that reviews are filtered clearly, which helps to satisfy the feature set of the customer.

The eleventh paper, written by V. Chandwani, V. Agrawal, R. Nagar, and S. Singh, proposes an efficient and quick method to estimate a customized slump value of ready mix concrete (RMC) based on its design mix constituents. Workability of concrete was measured using a slump test, while Artificial Neural Networks (ANNs) gathered from a RMC plant were used to model the functional relationship between the input parameters and the slump value of concrete. The research showed ANN model provided promising results compared to first-order and second-order regression techniques for modeling the unknown and complex relationships exhibited by the design mix proportions and the slump of concrete.

The next paper, written by Antonius, investigates the behavior of high-strength steel fiber-concrete confined by hoops with round cross-sections subjected to concentric loadings. Fibrous concrete test specimens were made by varying concrete's compressive strength and characteristics of the hoops' reinforcement. The characteristics of the installed confining reinforcement have a strong effect on the strength enhancement of confined concrete reinforced with steel fiber; if the value of K ductility in fibrous concrete decreases, then the concrete strength for the specimens increases; especially when the volumetric ratio of the installed hoop reinforcement increases, the ductility of specimens increases; and the confined concrete with fiber specimens has a higher *toughness index* (TI) value $\approx 0.85-0.89$.

Following onwards, the thirteenth paper, written by H.W. Ashadi, B.A. Aprilando, and S. Astutiningsih, examines the effect of steel slag substitution as coarse aggregate on compressive strength in fly ash based-geopolymer concrete and corrosion rate of steel reinforcement in seawater or in an acid rain environment. The compressive strength was evaluated using compression test equipment to measure the maximum acceptable load, while the reinforcement corrosion was examined by measuring the corrosion current density using a linear polarization potentiostatic scan. Steel slag substitution increases the compressive strength of geopolymer concrete up to 21.89 Mpa, which was a higher value than that of geopolymer concrete with gravel aggregate (15.89 Mpa). The steel slag aggregate was found to effectively lower the corrosion rate under acid rain (0.03974 mm/year), compared to the gravel aggregate specimen (0.05619 mm/year).

The next paper, written by Nahry, T. Tjahjono, and T. Brotoadi, develops an optimization model for off-street parking space management that considers freight cars and passenger cars as two different entities. Dynamic simulation was carried out to minimizing the joint function of the parking index of freight cars and the parking index of passenger cars, by employing a weighting factor to both parking indexes and parking space of both vehicles. The authors argue that the proposed model solution provides a better parking index than the actual parking index (without simulation) when it is applied to the parking activity in Jatinegara Trade Center (JTC), Jakarta.

The fifteenth paper, written by J. Sumabrata, T. Tjahjono, and M. Gituri, assesses the existing bicycle infrastructure in a campus-setting and evaluates its suitability to attract new cyclists. Five standard criteria, namely safety, convenience, accessibility, reliability, and facility, were reviewed and combined strategically to fit the context of a campus-setting. A randomized quantitative questionnaire survey was conducted over 204 students, which was then analyzed using descriptive statistical and non-parametrical methods to determine the correlation with linear regression. The regression analysis shows that the principal factor influencing infrastructure is facility (regression coefficient 0.84), while reliability factor is strongly influences the willingness to ride a bicycle.

The sixteenth paper, written by I. Budiman, I. Soedigdo, and W.A. Prakoso, investigates the behavior of suction piles in under-consolidated clays and consolidated clays, as extracted from actual deepwater soil conditions. Suction piles with two different aspect ratios (L/D = 2 and 6) were evaluated using geotechnical 3D finite element software Plaxis, focused on the effect of load angles (0°−90°) and the effects of pad-eye positions (0.5L−0.9L). The authors concluded that the overall behavior of suction piles in combined clay conditions is practically similar to that of piles in normally consolidated and over-consolidated clays.

The next paper, written by G.A. Kristanto, I. Gusniani, and A. Ratna, analyzes the economic and environmental potential of municipal solid waste as a source of raw materials for the industrial sector, from a waste treatment unit (WTU). The Indonesian National Standard SNI 19-3964-1994 method was used for collecting and measuring the samples to estimate the waste generation, waste composition, and waste density. The potential use of waste was calculated based on the economic value and the theoretical and actual recovery factor. The results showed the theoretical recovery factor in WTU is 83%, the actual recovery factor is 26% which means the sale of recycled materials in the site study is still far below its potential. The authors challenge the WTU to increase the amount of waste being recycled and the recyclable waste quality, which will enhance the economic value.

The eighteenth paper, written by C.N. Rosyidi, R.D. Astuti, and I. Priadythama, discusses the optimization and improvement of gas spring design. Deterministic and stochastic optimizations are employed using two models to determine the optimal design variables of the gas spring: cylinder diameter, cylinder length, extension stroke, and compression stroke. The process capability index (Cp) is

used as a criteria to improve the models while considering the contribution in variation of the design variables to the objective function. The authors found that Cp was improved by about 70%, and the stochastic optimization resulted in extension and compression strokes shorter than deterministic optimization, with a 1.55 process capability index.

The next paper, written by M. Dachyar, Yadrifil, and N.R. Pratama addresses the challenges in developing strategic model formulation for higher education innovation in Indonesia, which is driven by strategic management that covers information systems and strategic innovation measures. Expert judgement and structural equation modeling (SEM) are used to obtain the variables of the designated model. The factor, significantly affecting organizational innovation performance is organizational change with values of 0.619, 0.679, and 0.679 for Jakarta, Bandung, and Bogor, respectively. The authors argue that in Bandung, this change relied more on Enterprise Resource Planning (ERP) implementation than was the case in Jakarta and Bogor.

The last paper, written by F.T.A. Wibowo, R. Diansari, S. Tagiyyah, and Slamet, synthesizes a carbon nanotube–titania (CNT-TiO$_2$) composite that coats diapers and tested for the removal of ammonia (self-cleaning test) and *Candida albicans* fungi (self-sterilizing test). The composite was characterized by FTIR, FESEM-EDX, XRD, and UV-Vis DRS. Results of XRD and UV-Vis DRS measurement that showed the CNT-TiO$_2$ composite has a high crystalline and low band gap. The self-cleaning and self-sterilizing tests revealed that the optimum composition of the composite was 1–3 wt% of CNT and 97–99 wt% of TiO$_2$. The authors found that ammonia and fungi on the modified diapers were removed up to the standard minimum values required to prevent odor and diaper rash.

We hope that this special volume of IJTech conveys new insights to our readers and researchers in conducting their research. We are pleased to accept and respond to any comment and enquiry you may have on the direction and content of IJTech. Last but not least, we invite you to join us in this venture by sending your work for consideration.

With warmest regards from the Editorial Desk,

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