STIMULATING INNOVATION AND CREATIVITY: THE WAY FORWARD

Mohammed Ali Berawi [1*]

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

One of the most difficult challenges that companies face today is the rapidly changing market and its highly competitive environment. Those companies that are unable to adapt and correspondingly innovate face stiff competition. Continuing our discussion on innovation and technology development, my current note explains how stimulating innovation and creativity in technology development can be used by companies to remain competitive in the market and further produce innovative products and services that meet customer requirements. Companies and the market, in general, have benefited from technology-driven improvements, such as efficient and effective products and services that provide value for money.

Companies must exploit their innovative capabilities by developing and using innovation programs and techniques. Innovation management starts with idea generation, so a theory of how to improve ideas (creativity) marks a contribution to this field.

Creativity and Innovation

In the context of innovation, a function is a role that needs to be performed to achieve the purpose of the system designed; setting the function is an important step in product creation and innovation (see my note in Volume 6, Number 4). In science, the functional concept plays an important role in determining the core process of evolution and adaptation. In the development of technological artefacts, for example, the function of a television set is to display "moving pictures" with sound, which explains the existence and causal history of the invention of the television. Using the function of the television to display moving pictures with sound, we can innovate it further to produce a handheld mobile television and a video-enabled mobile phone, to name a few. The transformation of function-directed causal relations into manufacturing helps bridge the gap between physical structure and intentional function in a technological design.

As identifying the function enables us to propose alternative ways of performing such a function in the act of idea generation, an "extended function" will set the new context (purpose and goal) of the system. It also leads to the improvement of products. The ability to consider alternative ways or processes that could perform the same function with added benefits stimulates inquiry and the further exploration of the origin of ideas. This ability to produce new ideas is essential for creativity and is a requisite to innovation.

Companies need to continuously improve their end products and services by transforming creativity into innovation that benefits customers and the business venture. The essential purpose of improvement is to stimulate creative ideas and innovative approaches as a source of competitive advantage and value added. Companies need to foster creativity and flexible ideas through an innovation process that generates a positive impact on the quality of the end product and on competition. Innovation leads to an improvement in the processes of planning, designing, manufacturing, and delivering outcomes. Through innovation, we can anticipate changes in market demands and evaluate the various alternatives ways available to produce winning products in a highly competitive market.

*Corresponding author's email: maberawi@eng.ui.ac.id, Tel. +62-21-7270029, Fax. +62-21-7270028

In this edition, we present 20 papers that discussed the technology design and process to improve end products or projects.

The first paper, written by N. Hossain, J.H. Zaini, and T.M.I Mahlia, reviews the commercialization of bioethanol given its low-cost production, sustainability, and greener fuel energy composition. The authors present a detailed overview of the biological conversion processes of lignocellulosic waste biomass to bioethanol, the diverse performance of different types of yeasts and yeast strains, plus bioreactor design, growth kinetics of yeast fermentation, environmental issues, integrated usages in modern engines and motor vehicles, as well as the future process development planning with some novel co-products.

The next paper, written by A. Mirwan, Susianto, A. Altway, and R. Handogo, proposes a modified shrinking core model to leach aluminum from the sludge solid waste of drinking water treatment. The authors argue that the proposed model could describe the kinetics of aluminum leaching and can be further used for the simulation, optimization, scaling-up, and design of the leaching process.

The third paper, written by Slamet, Oktrianto, A. Hendarsa, Ratnawati, and S. Mustofa, examines the photocatalytic degradation of methylcyclohexane (MCH) in two phases (aqueous and vapor) with the use of modified titania immobilized on pumice and performed in the system of a specific condition. The authors argue that the loading of a 7.5% mass photocatalyst immobilized on pumice degraded MCH in two phases simultaneously during a 120-minute period and can be considered the optimum condition.

The fourth paper, written by N.A. Othman, N.F. Yusof, R. Daik, and F.S. Mehamod, presents isotherm studies of pyrogallol-imprinted polymers (Py-IP) via precipitation polymerization. The authors argue that the maximum adsorption capacity by Py-IP is above 50% and the value of k' is >1, which indicates that Py-IP has a good selectivity toward pyrogallol and can potentially be used as an adsorbent.

The fifth paper, written by A. Pradityana, Sulistijono, A. Shahab, and L. Noerochim, investigates *Sarang semut* (*Myrmecodia pendans*) extracts as a green corrosion inhibitor for mild steel in acid solution. The authors argue that the *M. pendans* extracts contained a high-benzenediol compound with rich oxygen atom content, which played an important role in the inhibition process. The 300 mg/L *M. pendans* extracts had the highest effect; they decreased the rate of corrosion from 177.73 mpy to 47.4 mpy.

The next paper, written by Suryadi, A.P. Kusuma, A. Suhadi, D. Priadi, and E.S. Siradj, examines the effect of annealing temperature on the microstructure and mechanical properties of ultrafine-grained brass produced by equal channel angular pressing (ECAP). The authors argue that the microstructure after four passes of ECAP was an ultrafine-grained structure dominated by a lamellar-structure grain with a shear band. On the other hand, the microstructure after annealing changed because of recrystallization, nucleation, and grain growth.

The seventh paper, written by Y.E. Gunanto, W.A. Adi, B. Kurniawan, S. Poertadji, T. Ono, H. Tanaka, and E. Steven, investigates the phase transitions in perovskite manganite ($La_{0.73}Ca_{0.27}Mn_{1-x}Cu_xO_3$) compounds with $0<x<0.19$. The research is evaluated on the basis of the interplay between various states of Cu and Mn ions at low and high concentrations. Results show that the Cu ions reduce chemical pressure, localize the eg electron, and weaken the double exchange interactions between Mn ion networks.

The eighth paper, written by A. Fisli, Ridwan, Y.K. Krisnandi, and J. Gunlazuardi, investigates the characterization of $Fe_3O_4/SiO_2/TiO_2$ composite for methylene blue removal in water. The authors argue that $Fe_3O_4/SiO_2/TiO_2$ (50% containing TiO_2 in the composite) was

able to eliminate 87.3% of methylene blue in water through adsorption and photocatalytic processes. Therefore, it has high potency as an efficient and simple implementation for the dye effluent decolorization of textile waste in slurry reactor processes.

The next paper, written by M. Iqbal and Samuel, proposes a new hull form by using the Lackenby method to modify an existing hull form in such a way that the total resistance is reduced. The total resistance was calculated with computational fluid dynamics because the Navier–Stokes equation is built into the Tdyn software. The authors argue that the proposed hull form changes can reduce the total resistance by 6.5%.

The 10th paper, written by K. Suastika, F. Nugraha, and I.K.A.P. Utama, examines the relative significance of parallel middle body and stern form in the wake formation of single-screw large ships and their contribution to ship viscous resistance. The authors argue that an increase in parallel-middle-body relative length for ships with the same stern form results in an increase in the drag coefficient. Furthermore, the stern form affects the nominal wake fraction much more significantly than the parallel-middle-body relative length does.

The 11th paper, written by M. Saleh, Y. Muharram, and Y.S. Nugroho, presents a model of the crossing-point temperature phenomenon in low oxidation of coal. The authors argue that porosity and oxygen concentration have major effects on cross-point temperature behavior and should be considered in an attempt to prevent spontaneous combustion.

The 12th paper, written by M. Setiyo, S. Soeparman, and N. Hamidi, examines the characteristic of LPG compositions in the fuel line during the discharging process. The results of the lengthwise LPG tank indicate that propane and butane 2-methyl molecules are unevenly during the discharge process of the tank. Furthermore, the authors argue that the large potential cooling effect is only obtained when the LPG coming out of the tank is in the liquid phase.

The next paper, written by A. Puri, presents a curve model of the displacement factor for the determination of the additional modulus of subgrade reaction in a nailed-slab pavement system. The author argues that the installed piles under the slab contribute to increasing the modulus of subgrade reaction, which is represented by the additional modulus of subgrade reaction.

The 14th paper, written by Y. Haryanto, B.S. Gan, and A. Maryoto, presents a finite element simulation to verify the behavior of T-section reinforced concrete beams strengthened by bonded wire ropes in the negative moment region with a pretensioned initial prestressing force, compared with the experimental tests. The authors argue that the load–displacement relationship resulting from the finite element simulation behaves similarly to that resulting from the experimental test and had a higher accuracy in flexural load capacity. However, a consistent difference in stiffness was observed between the two methods.

The next paper, written by D. Sutjiningsih, examines the water quality index for determining the development threshold of an urbanized catchment area. Basing on the presented case study in accordance with land cover distribution, the author argues that spatial tendency indicates the imperviousness to be decreasing in the downstream direction, although the water quality index is increasing in the downstream direction, in line with the characteristics of cascade ponds.

The 16th paper, written by R.A Wahab, M.N. Borhan, and R.A.A.O.K. Rahmat, investigates the problems of bus arrival times by producing the forecast arrival times at a stop with multiple routes. The proposed forecast arrival times at the stop are modelled with the adaptive neuro fuzzy inference system. Furthermore, several models between the real arrival times and the predicted ones are produced with the MATLAB Curve Fitting Tool.

The 17th paper, written by S. Chopade and D.V. Padole, proposes a pile gate fin field-effect transistor structure to reduce the leakage current. The authors argue that the proposed model resulted in a 100% reduction in random dopant fluctuation and an increase in ION/IOFF value. The model can also improve the drain-induced barrier lowering at smaller technological nodes.

The 18th paper, written by T.M. Akhriza, H.Y. Sahaduta, and A.D. Susilo, proposes a method to improve the efficiency, mobility, and interoperability of base transceiver station (BTS) location finding with the use of Telegram's bot and command-line interfaces. The authors argue that the proposed method requires only 30 seconds to locate the covering BTS, which is 20 times and 4 to 7 times faster than manual telnet and the proprietary tool, respectively.

The 19th paper, written by H. Hugeng, J. Anggara, and D. Gunawan, investigates the implementation of 3D head-related transfer function (HRTF) interpolation in synthetizing virtual 3D moving sound. The authors argue that the 3D tetrahedral interpolation results in the best average MSE of 3.72% for minimum-phase HRIRs and the best average SD of 2.79 dB for magnitude HRTF compared with 2D bilinear interpolations, i.e., rectangular and triangular interpolation.

The last paper, written by A. Muntasa, presents windowing system facial detection based on Gabor kernel filter, fast Fourier transform, and probabilistic learning vector quantization. The method proves that the highest accuracy is observed on the image enhancement result that uses single-scale retinex, whereas the lowest accuracy is observed on the image enhancement result that uses the histogram equalization method. The author argues that facial detection with the highest accuracy of 83.44% is achieved.

We hope that this special edition of IJTech conveys some new insights into the way we conduct our research. We are pleased to accommodate and respond to any comments and inquiries you may have on the direction and content of IJTech.

We wish everyone the best for 2017!

With warmest regards from Jakarta,

Dr. Mohammed Ali Berawi
Editor in Chief