

IMPROVING BUSINESS PROCESSES THROUGH ADVANCED TECHNOLOGY DEVELOPMENT

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Technology has become a very useful tool for driving new styles of business processes that embrace innovation and breakthroughs into new competitive markets. Technology has been used to manage people, products, and projects across the globe. Connected devices, big data analytics, cloud computing, and 3D printing are commonly used to generate more efficient and effective business processes.

Companies use a wide range of communication channels and social media platforms to connect with their employees, peers, and customers and to foster collaborative partnerships. Thus, technology is used to create more participatory businesses by improving stakeholders' collaboration. Furthermore, technology can support effective monitoring of business processes across diverse products, projects, and customers.

Advanced technology improves transparency through greater information sharing and distributed decision-making. For example, blockchain technology offers the business benefits of traceability and cost-effectiveness and simplifies such processes as ownership transfer, production quality assurance, smart contracts, and payments.

Managing Business Processes

Cross-sector business is crucial for gaining competitive advantages in a global market. Enhancing cooperation and strategic alliances is an effective way to develop breakthrough solutions to make businesses more competitive and create new markets. Technological innovation creates opportunities to gain advantages over business competitors and capitalize on business opportunities.

The fourth industrial revolution, as discussed in my previous editorial notes, is a business process innovation. Technology has been used to fundamentally transform customer behavior, business operations, and the business environment. Companies need to innovatively utilize technologies to develop their business processes and secure more benefits and competitive advantages. With customers demanding constant change, companies must keep pace with market patterns by continuously innovating their products and services to generate added value for their business processes. Companies must explore how technological changes in artificial intelligence, mobile devices, and social media networks are affecting business growth. Business models require new platforms and applications to meet market needs.

Both companies and markets have benefitted from such technology-driven improvements as more efficient, effective, and valuable products and services. Companies must exploit their innovative capabilities to produce suitable technologies to improve their business process performance.

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Advancing Technology Development

Technology improves project, product, and service performance. In this edition, we are pleased to present 20 selected papers dedicated to technology improvements in science and engineering. The papers discuss a variety of studies that use technology to improve end-result performance.

The first paper, written by A.P.I. Cercado, F.C. Ballesteros, Jr., and S.C. Capareda, investigates biodiesel production from three microalgae transesterification processes using different homogenous catalysts. The authors attained the best fatty acid methyl ester (FAME) yield when the optimum process parameters were a methanol-to-oil ratio of 12:1 and catalyst loads of 2% for NaOH and 3% for KOH.

The next paper, written by N. Hossain, R. Jalil, J. Zaini, and T.M.I. Mahlia, examines the enzymatic hydrolysis rate of oil palm (*Elaeis guineensis*) trunk (OPT) sap in terms of the length of the saccharification process. The authors optimized a conventional saccharification method through the addition of nutrients and a prolonged (10-day) hydrolysis process that increased sugar production.

The third paper, written by Supriyono, evaluates the dynamic modeling and discharge performance of a magnesium battery activated by sea water. The author argues that the maximum allowed safety limit for steady battery operation was found at a maximum state of charge (SOC_{max}) of 93%.

The fourth paper, written by Gunawan, K. Hamada, T. Deguchi, H. Yamamoto, and Y. Morita, presents a design optimization of piping arrangements in series ships based on the concept of modularization. The authors obtained a common modularization for both common and optional parts for various types of series ships.

The fifth paper, written by H. Muzakki, A.S. Baskoro, G. Kiswanto, and Winarto, investigates the mechanical properties of the micro-resistance spot welding of aluminum alloy to stainless steel using a zinc interlayer. The authors argue that the micro-hardness of the SS–Zn dissimilar joint tended to decrease, while the micro-hardness of the dissimilar joint near the AA and Zn layers increased.

The next paper, written by F. Aziz, M. Panitra, and A.K. Rivai simulates improved concrete composites for enhanced x-ray/gamma ray radiation shielding. The authors argue that concrete with added alloy steel has the best shielding properties, although concrete with other added fillers also exhibited enhanced shielding performance.

The seventh paper, written by A.A. Kumar and S. Raguraam, compares the fresh and hardened properties of normal concrete, self-compacting concrete (SCC), and smart dynamic concrete (SDC). The authors find that the SDC attained higher compressive strength, splitting tensile strength, and flexural strength than the normal and SCC concrete mixtures.

The eighth paper, written by G.S. Anaokar, A.K. Khambete, and R.A. Christian, evaluates the performance index for municipal wastewater treatment plants using Multi-criteria Decision Making (MCDM) – Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS). The authors propose a field-based approach to explore the suitability of the weight allocation method for the respective utilization of the fuzzy approach in environmental monitoring systems.

The ninth paper, written by M.M. Alhaji and M. Alhassan, examines the effect of reclaimed asphalt pavement (RAP) stabilization on the microstructure and strength of black cotton soil. The authors argue that black cotton soil stabilized with RAP can be used as a sub-base material for roads with light traffic.

The next paper, written by D.G.N. da Costa, S. Malkhamah, and L.B. Suparma, examines the use of a safety factor and a margin of safety in motorcyclist accident risk management. The authors argue that objective and appropriate accident risk management strategies could be developed based on the minimum margin of safety value.

The eleventh paper, written by A. Nursin, Y. Latief, K. Muchtar, and H.G. Soeparto investigates the collaboration of parties to reduce construction waste on a design-build project. The authors argue that a collaborative model, an understanding of culture, a minimization of conflict, and improved communication can reduce construction waste on design-build construction projects.

The twelfth paper, written by A. Y. Y. Alfakhri, A. Ismail, and M. A. Khoiry, evaluates the effects of road construction delays through a questionnaire survey and assesses them using an empirical method. The authors argue that delays in road construction projects often lead to cost overrun, time overrun, litigation, and disruption to traffic movement, all of which are highly unfavorable for construction firms.

The thirteenth paper, written by B. Kumar, R. K. Singh, and S. Kumar, presents a genetic algorithm-based multi-criteria approach to product modularization. The authors argue that the proposed method considers multiple Design Structure Matrix (DSMs) to map the relationships among components.

The fourteenth paper, written by A. Mubarak and F. Zainal, proposes a CO₂ emissions framework that uses actual regional conditions to calculate the level of emissions. The authors argue that the model can be used to assess the impact of different distribution network scenarios on the amount of CO₂ emissions.

The next paper, written by M.L. Singgih, P. Dalulia, M. Suef, and P.D. Karningsih, presents performance modelling based on the KANO model. The authors argue that the model can be used to evaluate the performance of maintenance outsourcing providers.

The sixteenth paper, written by N. Rahmatin, I. Santoso, C. Indriani, S. Rahayu, and S. Widyaningtyas, proposes the integration of fuzzy failure mode and effect analysis (FMEA) and the analytical network process (ANP) in marketing risk analysis and mitigation. The author argues that the primary strategy is to improve promotion, information, and communication media and to maintain service quality.

The seventeenth paper, written by T.O. Ejidokun, T.K. Yesufu, K.P. Ayodele, and A.A. Ogunseye, investigates an implementation of an on-board embedded system for monitoring drowsiness in automobile drivers. The authors show that the mean system usability scale (SUS) score is 77.38, with a standard deviation of 9.40, these indicates that the system effectiveness, efficiency and user satisfaction is adequate.

The eighteenth paper, written by S. Ali, T. Al-Balushi, Z. Nadir, and O.K. Hussain, discusses improving wireless sensor networks' (WSNs) resilience against security threats. The authors argue that the main challenges faced by WSNs are issues related to attack types, features, and vulnerabilities; trust; and reputation.

The nineteenth paper, written by M.A. Nanda, K.B. Seminar, D. Nandika, and A. Maddu, presents discriminant analysis as a tool for detecting the acoustic signals of termites (*Coptotermes curvignathus*). The authors argue that the integrated discriminant analysis–acoustic feature termite detection system has an accuracy of 83.75%.

The last paper, written by K. Ramli and A. Jarin, proposes a new *ns*-3-based emulation platform for the performance evaluation of TCP-based speech recognition. The authors argue that when the propagation delay is 120 seconds, the loss rate is less than 0.3%, and when the propagation delay is 50 seconds, the loss rate is less than 0.5%.

I hope that this edition of *IJTech* conveys new insights into the way we conduct our research. I am pleased to accept and respond to any comments or enquiries concerning the direction and content of *IJTech*, and 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