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PUBLIC–PRIVATE PARTNERSHIP: GENERATING MUTUAL BENEFITS FOR STAKEHOLDERS

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Infrastructure is arguably one of the main drivers of developmental growth, as it provides social, as well as economic, benefits to society. The development of infrastructure becomes a way to combat poverty as well as increase productivity and enable competitive advantage. Continuing my notes last year on the role of public–private partnership (PPP) in accelerating infrastructure development, I would now like to extend our discussion to deepening the important principles to optimize the partnership.

Many governments are now developing closer partnerships with the private sector to achieve mutual benefits in generating massive development of sustainable projects by stimulating private sector participation as well as increasing infusions of investment funds. The need to deliver adequate PPP due-diligence analysis is important to ensure that projects are well designed and developed. This is required to ensure that PPPs are successful by creating fair sharing of resources, risks, responsibilities, expertise and rewards planned for implementation among stakeholders.

A key factor for the successful implementation of the PPP scheme is project feasibility, which is assessed through value for money and optimum benefits for stakeholders. The partnership requires delivering measurable results through stakeholders' mutual benefits. Therefore, there are three principles that need to guide the partnership: (1) the government can succeed in providing public infrastructure; (2) the private sector can gain adequate profits; and (3) there can be reasonable community pricing for accessing infrastructure services. Failure to comply with any of the above principles contributes to the lack of partnership success in public project development.

Furthermore, in order to create optimum benefits and to increase project feasibility, innovative and value-added infrastructure projects must be contemplated during project development. In other words, creating value-added infrastructure projects can be defined as a way to increase the feasibility of projects by creating innovation, generating efficiency and conducting technology transfer, thereby optimizing benefits for all stakeholders through multi-sector collaboration in producing integrated and multi-functional public projects. The underlying concept is to maximize project benefits and enhance total cost efficiency; for example, the production of multi-functional infrastructure such as the PRASTI (Public RAilways and STormwater Infrastructure) Tunnel or highway bridges above the sea that are able to generate renewable tidal energy attached to the sub-structure.

Efforts to achieve cost effectiveness and to generate additional benefits form the basis for project planning and development. Value-added projects will directly affect financing and partnership schemes. There are four financial scenarios that can generate the project feasibility of partnerships between the government and the private sector: first, the initial cost-sharing scenario; second, the operation and maintenance cost-sharing scenario; third, the initial cost and

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operation and maintenance cost-sharing scenario; and fourth, the initial cost, operation and maintenance cost, and revenue-sharing scenario. As a consequence of the first three financial scenarios, there are several types of partnership schemes that are commonly used, including Design-Build-Finance- Operate (DBFO), Design-Build-Operate (DBO), Design-Build-Maintain (DBM) and Build-Operate-Transfer (BOT). Furthermore, it is argued that the last scenario can produce optimum benefits for stakeholders by generating a new form of contractual partnership agreement, the Build-Operate-Share-Transfer (BOST) scheme. In BOST, the public and private sectors share costs and revenues during projects' life cycles. Based on our research findings, the system engineering that produces value-added project planning and development could increase feasibility by up to 10%, and furthermore, the financial engineering and partnership scheme could contribute up to another 10% in project feasibility. Optimizing planning systems and financial partnerships clearly contributes to the achievement of optimum feasibility, not only to distribute the investment burden but also to improve project benefits.

Advancing Science and Technology Development

The creation of new technologies that foster research and that stimulate innovation is required to accelerate various developments in all fields of study. In this context, this edition presents twenty papers dedicated to various studies in science and engineering that foster the development of technology design and application to improve the end results.

The first paper, written by V. Athiyamaan and G.M. Ganesh, investigates the alignment of Micro-Steel Fibers in admixture-based Self-Compacting Concrete (MSFR-SCC) using non-destructive testing (NDT) and the evaluation of its effect on the modulus of rupture. The authors argue that an increase in steel fibers affects the flow, filling and passing ability of MSFR-SCC and that the addition of steel fibers increases the flexural strength of the concrete and resists the development of micro cracks.

The next paper, written by D.S. Agustawijaya, evaluates the practical applications of strength criteria in civil engineering designs for shallow tunnels in weak rock. The authors argue that the implications of variations and uncertainties in rock properties for tunneling at shallow depths, where instability is mostly due to gravity loads, can be best practically measured using the linear criterion.

The third paper, written by I.T. Yusuf and A.E. Zava, investigates the suitability of coconut husk ash (CHA), a waste product from crop plants, as a road-soil stabilizer. The authors argue that CHA produced measurable effects on the strength characteristics of the soil and can be used to improve the strength of subgrade materials.

The fourth paper, written by W.P. Utama, A.P.C. Chan, Sesmiwati, H. Zahoor, and R. Gao, examines the motivation of construction enterprises with respect to overseas business expansion. The authors argue that there are four categories that influence the expansion, namely, the source of motivation, the pattern of motivation, the response to motivation and the motivation objective.

The fifth paper, written by S. Safinia and A. Mirsiaghi, investigates the factors that cause the unpopularity of drywall in the Iranian building industry. The authors argue that culture, clients, availability of installation teams, and high skills requirements were among the significant factors that affected the situation.

The next paper, written by J.A. Yacim and D.G.B. Boshoff, investigates the comparison of bandwidth and kernel-function selection in geographically weighted regression in house valuation in Cape Town. The authors argue that the adaptive kernel performs the best analysis and is a viable alternative measurement in situations where price estimation is the principal concern.

The seventh paper, written by S. Shaharudin, N. Khalil, and A.A. Saleh, investigates maintenance variables for tropical green roofs. The authors argue that drainage, fertilization, irrigation, vegetation, waterproofing and weed control are among significant variables that affect the maintenance of green roofs.

The eighth paper, written by V. Basten, I. Crévits, Y. Latief and M.A. Berawi, presents Cost-Benefit Analysis (CBA) based on regional, knowledge, and economic aspects of green building. The authors argue that the CBA framework generates a need for green building incentives in the decision-making and evaluation process, in which developers and owners occupy the highest positions in green building initiatives and operational financing.

The next paper, written by N.B.R. Mandi, I.B.P. Adnyana, and I.P.E. Gunapatniyatsunu, investigates the success factor for improving building permit licensing services. The author argues that transparency, time, convenience and employees' ability, performance, and responsibility are among factors that influence the success of the services.

The tenth paper, written by A. Sheth and D. Sarkar, analyzes the feasibility of electric buses based on a functional unit of one bus driven 100 kilometers per day. The authors argue that electric bus mobility is a promising initiative and can be a beneficial investment considering long-term value.

The eleventh paper, written by S. Sumaryo, A. Halim, K. Ramli, and E. Joelianto, presents a model for accelerating the discharge of lane traffic to facilitate intersection access by Emergency Vehicles (EV). The authors argue that using the proposed model, the emptying process can be achieved using the defined system indicator.
The next paper, written by G. Natesan and A. Chokkalingam, proposes optimal task scheduling in the cloud environment using a mean Grey Wolf Optimization (GWO) algorithm. The authors argue that the proposed mean GWO algorithm achieves an 8.85% makespan (execution time) improvement and a 9.2% improvement in energy conservation compared to other algorithms.

The thirteenth paper, written by M.R. Lubis, D.S. Fujianti, R. Zahara, and Darmadi, presents an optimization of the electrocoagulation of palm oil mill effluent with a box-behnken design. The authors argue that the optimization is more economical and useful for predicting and controlling total suspended solid (TSS), total dissolved solid (TDS), and chemical oxygen demand (COD) removal efficiencies in different conditions.

The fourteenth paper, written by A. Bramantyo, K. Murakami, M. Okuya, A. Udhiarto, and N.R. Poespawati, investigates the morphological and structural properties of vertically aligned zinc oxide (ZnO) nanorod (NR) grown on spin-coated seed layers. The authors argue that a high seed-layer density leads to ZnO NRs with high density and fewer empty spaces between each ZnO NR.

The next paper, written by Haryuni, T.S.K. Dewi, E. Suprapti, S.F. Rahman, and M. Gozan, examines the effect of *Beauveria bassiana* on the effectiveness of biopesticides for robusta coffee. The authors argue that the dosage of *Beauveria bassiana* had a significant effect on the impact of tobacco biopesticide extract on the percentage and the intensity of coffee berry borer (CBB) attacks.

The sixteenth paper, written by A. Qosasi, E. Maulina, M. Purnomo, A. Muftiadi, E. Permana, and A.F. Febrian, investigates the impact of Information and Communication Technology (ICT) capability on the competitive advantage of small businesses. The authors argue that ICT capability is able to create competitive advantage in small businesses, but only when present in conjunction with entrepreneurial orientation and organizational agility.

The next paper, written by R. Nurcahyo, A.D. Wibowo, R. Robasa, and I. Cahyati, presents the development of a strategic manufacturing plan from a resource-based perspective. The authors argue that the most important capabilities when developing a manufacturing strategy are flexibility, product delivery, quality, and cost reduction.

The eighteenth paper, written by I. Masudin, T.E. Saputro, G. Arasy, and F. Jie, proposes a model of a reverse logistics network for battery recycling with consideration of environmental and manufacturing costs. The authors argue that the parameters associated with transportation, disassembly and inventory decisions, such as holding costs and service levels, impact significantly on profit.

The nineteenth paper, written by Q.M.B. Soesanto, P. Widiyanto, A. Susatyo, and E. Yazid, proposes the use of the genetic algorithm (GA) method in hydraulic turbine optimization for renewable energy applications. The authors argue that the optimized design, which is obtained by applying the shock-free criterion using the GA, successfully improves the performance of the initial turbine design.

The last paper, written by Sudarsono, A.A.P. Susastriawan, and Sugianto, analyzes the performance of a 3D computational fluid dynamics (CFD) simulation on a modified NACA-4415 airfoil-based horizontal axis wind turbine (HAWT). The authors argue that the rotor is expected to generate power in the range of 92 to 255 watts at a typical wind speed of 4 to 5 meters per second.

I hope that this edition of IJTech conveys some new insights into the way we conduct our 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 venture by sending your work for consideration.

With warmest regards from Jakarta,

Dr. Mohammed Ali Berawi
Editor in Chief