

A Supply Chain Management Model to Achieve Sustainable and Regulatory-Compliant Performance of Concrete Plants Based on Material Availability in Bali

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Abstract

Infrastructure development in Bali is accelerating rapidly, as the region serves as a major contributor of foreign exchange through tourism projects. The government continues to enhance Bali's tourism by developing new destinations in underdeveloped areas, including the construction of the Bali Cultural Center in Gunaksa Village, Klungkung, on a former mining site. The PKB project has currently reached the stages of land preparation, construction of connecting roads, bridges, and water reservoirs to supply raw water. It is expected that by 2025, the construction phase for the buildings that will support the PKB's cultural activities will commence. Given the number of planned buildings, the demand for concrete comprising fine and coarse aggregates and sand will be substantial. Fortunately, Mount Agung still holds reserves of construction materials to meet this need. Several concrete plant businesses in Bali are supplied by multiple quarry owners, as land ownership in Bali is relatively limited. Therefore, the supply chain for concrete materials involves numerous variables and influencing factors. This study aims to develop a performance model for the supply chain in concrete plants based on local and environmental variables. By elaborating all variables affecting supply chain performance, the resulting model is expected to serve as a reference

for concrete plant management and stakeholders in formulating improvements to the concrete material supply chain in Bali.

Keywords

Model, Management, Supply Chain, Performance, Concrete Plant

Biographies

Putu Ika Wahyuni is a lecturer in the Master of Infrastructure and Environmental Engineering program at Warmadewa University, Indonesia focusing on construction management and environmental studies. She has several important works and publications, including “A Study of Rainfall Thresholds for Landslides in Badung Regency Using Satellite-Derived Rainfall Grid Datasets,” published in the International Journal of Advances in Applied Sciences. Additionally, she authored “Risk Analysis on the Use of Heavy Equipment with the HIRARC Method,” included in the AIP Conference Proceedings, as well as “Performance of High-Resolution Satellite Rainfall Datasets in Developing Rainfall-Duration Thresholds for Landslide Incidents Over Badung Regency,” published in the IOP Conference Series: Earth and Environmental Science. With her extensive experience and research, Putu Ika Wahyuni significantly contributes to the advancement of knowledge in the fields of construction and the environment.

Ahad Ali is an Associate Professor and Director of Industrial Engineering Program in the A. Leon Linton Department of Mechanical, Robotics and Industrial Engineering at the Lawrence Technological University, Southfield, Michigan, USA. He earned B.S. in Mechanical Engineering from Khulna University of Engineering and Technology, Bangladesh, a Master’s in Systems and Engineering Management from Nanyang Technological University, Singapore and PhD in Industrial Engineering from the University of Wisconsin-Milwaukee. He has published journal and conference papers. Dr Ali has completed research projects with Chrysler, Ford, New Center Stamping, Whelan Co., Progressive Metal Manufacturing Company, Whitlam Label Company, DTE Energy, Delphi Automotive System, GE Medical Systems, Harley-Davidson Motor Company, International Truck and Engine Corporation (ITEC), National/Panasonic Electronics, and Rockwell Automation. His research interests include manufacturing, simulation, optimization, reliability, scheduling, manufacturing, and lean. He is a member of IEOM, INFORMS, SME and IEEE.

Ni Luh Putu Indiani is an Associate Professor in the Master of Management Postgraduate Program at Warmadewa University, Denpasar, Bali, Indonesia. Her research interests include digital marketing, consumer behavior, and strategic marketing management. She has authored numerous publications in national and international journals, focusing on influencer marketing, e-commerce behavior, and brand engagement. Dr. Indiani also lectures in the Warmadewa International Program and serves as a member of the editorial board for the *Warmadewa Management and Business Journal*.

Anak Agung Gede Sumanjaya is a lecturer in the Civil Engineering Study Program at Warmadewa University, Denpasar, Bali, Indonesia. His academic focus lies in transportation engineering, road infrastructure planning, and pavement design. He has conducted studies on road service life analysis, traffic load implications, and pavement thickness design, with several publications in engineering and infrastructure-related journals.

Nyoman Ari Triatmika Nyoman Ari Triatmika is a graduate student in the Master of Infrastructure and Environmental Engineering Program at Warmadewa University, Denpasar, Bali, Indonesia. His expertise lies in managing complex development initiatives and effectively collaborating with multidisciplinary teams to ensure successful project outcomes. He holds a total of nine professional certifications that demonstrate his broad skill set in the construction and design fields. These include two Construction Work Competency Certificates (SKK) as a Certified Intermediate Landscape Designer and an Expert in Construction Quality Management Systems. In addition, he holds six Professional Engineer Certifications (SKA) in Project Management (AL602), Construction Management (AL601), Lighting Design (AA104), Landscape Architecture (AA103), Interior Design (AA102), and Architecture (AA101). He also possesses one Construction Skills Certificate (SKT) in General Building Work Supervision (TA022).

Putu Agus Indika Puspayana is pursuing his graduate degree in the Master of Infrastructure and Environmental Engineering Program at Warmadewa University. His academic interests include green construction practices, environmental policy compliance, and material logistics in infrastructure development.