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ABSTRACT BOOK



Editors

Utku Canci Matur
Meltem Kasapoğlu Çalık
Redvan Ghasemlounia
Gözde Konuk Ege
Ali Köse
Cansu Tüysüz

İSTANBUL GEDİK ÜNİVERSİTESİ YAYINLARI

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10:00-11:30	Presentation Session 15: Blue Hall **Moderator:** Asst. Prof. Dr. Mücahit Ege, Head of the Software Engineering Department, İstanbul Gedik University **ID: 35,** "Digital Pneumatic Systems in the Industry 4.0 Era: Energy Efficiency and Carbon Footprint Analysis with App-Based Valve Terminals'' Ekrem Keleş **ID: 102,** "Development of a Modular Test System for Gas Sensor Performance Analysis" Umut Çavlan, Gözde Konuk Ege **ID: 48,** "From National Technology to a Sustainable Future: Energy and Environmental Management with Autonomous Area Scanning Drones" Mümin Efehan Girişmen, Ekrem Keleş, Gözde Konuk Ege
11:30-12:00	**Coffee Break**
12:00-13:00	Presentation Session 16: Main Hall **Moderator:** Assoc. Prof. Dr. İzzet Paruğ Duru, Head of the Department of Medical Services and Techniques, Gedik Vocational School **ID: 10,** "Agent-Based Modeling for Green Hydrogen Adoption in Heavy-Duty Freight: A Policy Analysis for Pakistan" Gordhan Das Valasai **ID: 11**, "Assessing Techno-Economic Constraints of Green Hydrogen Production in Pakistan: A Modelling-Based Benchmarking Study" Saad Raza, Gordhan Valasai, Abdul Arain **ID: 92**, "Passive Energy Efficiency Strategies in the Conservation of Listed Historic Buildings in Türkiye: An Expert-Based Evaluation" Gülşah Kaba, Fatih Yazıcıoğlu
12:00-13:00	Presentation Session 17: Green Room **Moderator:** Asst. Prof. Dr. Enda Tolon, Director of Sustainability Office, Istanbul Gedik University **ID: 50,** "New Legal Approaches for the Sustainable Development. Some Theoretical Considerations" Kutluhan Bozkurt, Przemyslaw Osobka **ID: 36,** "Addressing Energy Poverty Through Climate Finance and Digitalization: Lessons From Developing Countries" Syed Anees, Haider Zaidi, Rana Umair Ashraf **ID: 80,** "Determination of Materials Used in Green Roofs in Sustainable Structures via Value Engineering Method" Ahmet Eren Çelik, Şenay Atabay
12:00-13:00	Presentation Session 18 : Blue Hall **Moderator:** Asst. Prof. Dr. Tuğçe Sena Altuntaş, Head of Electrical and Energy Department, Gedik Vocational School **ID: 47**, "A Comparative Time Series Analysis of Türkiye's Energy Dynamics Using ARIMA and Prophet Models'' Selin Saraç Güleryüz **ID: 52**, "The Impact of Recycled Raw Material Usage on Process Capability and Energy Efficiency" İpek Bilmez, Selin Saraç Güleryüz **ID: 64**, "Comparative Analysis of Deep Learning Architectures for Thermal Image-Based Anomaly Detection in High-Voltage Equipment'' Mehmet Burak Tunç, Muhammet Fatih Aslan **ID: 61**, "Machine Learning-Based Passenger Demand Forecasting for Sustainable and Energy-Efficient Smart Transportation Systems in Istanbul Rail Systems" Yusuf Ali Gün, Hikmet Canlı
13:00-13:30	Lunch Break

Determination of Materials Used in Green Roofs in Sustainable Structures via Value Engineering Method

Ahmet Eren Çelik[1,*], Şenay Atabay[1]

[1]*Yildiz Technical University, Department of Civil Engineering, Türkiye (*Corresponding Author)*

Abstract

Global climate change and uncontrolled urbanization have compelled the construction industry to seek a challenging balance between environmental responsibilities and economic constraints. Emerging as a critical solution from this search, green roofs reduce the carbon footprint of buildings, mitigate the urban heat island effect, and ensure energy efficiency. However, they fail to achieve expected widespread adoption due to the prevailing perception of high initial investment costs in the sector and import dependent material solutions. This study aims to overcome this cost barrier and demonstrate the economic feasibility of green roofs by integrating Value Engineering methodology with Life Cycle Cost analysis. Within the scope of the research, a Shopping Center project with large terrace areas located in Balikesir province was selected as a case study. Three distinct scenarios were constructed in the study, which are the Conventional Roof representing the current market standard, the Standard Imported Green Roof based on common specifications in the sector, and the Optimized Local Green Roof developed using the value engineering methodology. During the function analysis and creativity phases of the Value Engineering Job Plan, a hybrid system was designed by substituting Balikesir Pumice, a rich local resource of the region, for imported plastic drainage plates and peat-based substrates, which increase system costs and have high logistics-based carbon emissions. The findings indicate that this hybrid system, optimized with local materials, achieved a 42 percent saving in Initial Investment Costs compared to the standard imported green roof. More importantly, the 40-year Life Cycle Cost projection revealed that, due to energy savings and the extended lifespan of the waterproofing, the proposed system is more economical than even the Conventional Roof, amortizing the initial investment difference within approximately 6 to 7 years. Consequently, this study demonstrates with concrete data that the Value Engineering approach transforms green roofs from an import dependent luxury option into a high value added, sustainable, and profitable engineering investment constructed with local resources.

Keywords: Value engineering; Green roof; Life cycle cost; Sustainability; Local material.