Identification and prioritization of affecting environmental factors of sustainable development on decision-making in projects by DEMATEL method

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January 9, 2023

Abstract

Considering economic, social, and environmental aspects of contemporary sustainable development, not enough attention has been paid to the environmental aspects in current design and engineering agendas. Although new well-defined mechanisms are still developing for usable implementation of environmental aspects in sustainable design, the impact of the output on human needs is usually neglected. In other words, considering the engineering and construction, the sustainable-based decision-making process usually focuses on the prioritization of environmental factors based on comprehensive factors like meeting standards and benchmarks which leads to inadequate attention to social aspects. Consequently, in recent years, integrating environmental management practices into human-centered design has found a decent place among heated research topics in sustainable design and development.

This research focuses on the novel methodology of prioritizing different environmental aspects in sustainable development to meet social needs. First, to define the importance of each environmental factor, a state-of-art study is done on previous sources, including Environmental Management Practices, to extract critical environmental factors. Then, the relationship between selected factors is determined as well as the effects of operating pairs on each other. This step implemented the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method on the resulted information from 30 experts in the fields of sustainable design and construction. As a result, the direct and indirect effects of the factors on each other were quantified. All the experts are active members of the construction sector in Iran, which lead to generating more reliable final outputs for sustainable development in targeted developing countries. Next, the environmental factors are ranked, and the most critical ones are identified. Finally, with the help of data replication, a meaningful contribution of defined ranking methodology is defined for the complex decision-making process and environmental management conditions. By integrating environmental factors into sustainable development criteria, this methodology can lead the construction industry toward a comprehensive human-centered design that meets all social needs.

Online Poster Presentation at AGU Fall Meeting, Chicago IL – 12 to 16 December 2022

interactive poster web link

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ABSTRACT

Considering economic, social, and environmental aspects of contemporary sustainable development, not enough attention has been paid to the environmental aspects in current design and engineering agendas. Although new well-defined mechanisms are still developing for usable implementation of environmental aspects in sustainable design, the impact of the output on human needs is usually neglected. In other words, considering the engineering and construction, the sustainable-based decision-making process usually focuses on the prioritization of environmental factors based on comprehensive factors like meeting standards and benchmarks which leads to inadequate attention to social aspects. Consequently, in recent years, integrating environmental management practices into human-centered design has found a decent place among heated research topics in sustainable design and development.

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Keywords: sustainable development, environmental management, MCDM methods, DIMATEL, project management