Applying the Dynamic Z-Number Fuzzy Delphi Method to Identify the Core Obstacles to ESG Implementation in Hospitals under Uncertainty

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Abstract

In 2021, the United Nations Climate Change Conference introduced, for the first time, sustainability commitments specifically targeting healthcare systems, positioning Environmental, Social, and Governance (ESG) principles as a global priority. In response to national policy initiatives, Taiwan's Ministry of Health and Welfare has incorporated ESG concepts into the hospital accreditation system. However, as an emerging issue, the promotion and implementation of ESG in hospitals are characterized by a high degree of uncertainty. Moreover, decision-making processes rely heavily on expert judgment, which may lead to inconsistencies in opinions and further increase the complexity of ESG-related decisions.

In light of these challenges, this study aims to identify the primary barriers to ESG implementation in hospitals under conditions of uncertainty and divergent expert opinions. To address these issues, the study adopts a Dynamic Z-number Fuzzy Delphi Method with dynamic scales (D-Z-FDM), which incorporates dynamic scaling mechanisms to reduce uncertainty, facilitate the convergence of expert consensus, and enhance the consistency and reliability of analytical results. In addition, comparative analyses are conducted against the traditional Fuzzy Delphi Method (FDM) to validate the methodological advantages of the proposed approach.

Ultimately, this study not only identifies the key barriers to ESG implementation in hospitals but also proposes corresponding improvement strategies, providing an important reference for healthcare institutions in formulating sustainable development strategies and supporting evidence-based policy decision-making.

Keywords

ESG (Environmental, Social, and Governance), D-Z-FDM (Dynamic Z-number Fuzzy Delphi Method), FDM (Fuzzy Delphi Method), Uncertainty.