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Design and validation of a corporate governance measurement model with an emphasis on physical asset management using a fuzzy Delphi approach and factor analysis.

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Abstract

The aim of this research is to design and validate a corporate governance measurement model with an emphasis on physical asset management with a fuzzy Delphi approach and factor analysis (case study: thermal power plants in the country). This research is classified as mixed research (quantitative-qualitative) in terms of strategy. The fuzzy Delphi method was used in the qualitative part and the first and second order confirmatory factor analysis was used in the quantitative part. The panel members in the fuzzy Delphi method were fifteen experts and the number of samples in the confirmatory factor analysis was estimated to be 156 samples. The fuzzy Delphi method was implemented in three rounds and the experts reached a consensus on the selected indicators. The number of panel members in this part was fifteen. The fuzzy Delphi method was used for data analysis in the qualitative part, and SPSS and PLS were used in the quantitative part. The results showed that the designed model consists of ten dimensions include 1) strategy; 2) process optimization; 3) equipment; 4) management and support systems; 5) supply chain management; 6) performance management and evaluation; 7) work management and organization; 8) primary care; 9) teamwork with a focus on a systems perspective and 10) employees. According to the results obtained in line with the identified dimensions, the process optimization dimension with a path coefficient of 0.856 was identified as the most important dimension, performance management and evaluation with a path coefficient of 0.832 as the second dimension and equipment with a path coefficient of 0.83 as the third important dimension in the model.

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Extended Abstract

Introduction

Corporate governance is recognized as a requirement for achieving market integrity and efficiency, financial stability, and economic growth, and several mechanisms are used to strengthen the supervisory and control functions of corporate governance, effectively regulate management power, and protect stakeholder interests (Hassan & Saleh, 2023), and this view can be explained according to agency theory (Shepardson, 2019). In general, the role of corporate governance as a tool for legitimizing and its relationship with investment risk and return can be analyzed. In this analysis, legitimacy is understood as the adoption of voluntary practices to obtain the highest level of corporate governance and, as a result, gain more credibility in the market (Miranda et al., 2021). Hence, one of the main motivations for companies to adopt corporate governance practices is to legitimize them in the market. Legitimacy can be defined as the need for an organization to establish itself as an existential philosophy in the face of the market. For this reason, adopting management practices that are well accepted by the market can be a strategy for legitimizing the organization, which is beneficial to the investment environment and encourages investment. Legitimizing causes the organization to experience less volatility among other organizations in the event of financial crises and its investors to bear less risk. Therefore, for organizations, considering their ability to legitimize themselves and provide higher returns to investors, being at a higher level of corporate governance would be a logical strategy (Rossoni & Mendes-Da-Silva, 2018). Therefore, corporate governance with a focus on physical asset management can be one of the acceptable strategies in the market of various industries (Elnahass et al., 2022). The management of physical assets such as buildings, infrastructure, facilities, and transportation is a branch of the asset management discipline. Today, asset management is widely used in academia and industry as a business process and as a strategic discipline. Asset management is defined as a coordinated activity of an organization to monitor, control, use, and value the assets of an organization. This mechanism involves balancing costs, opportunities, and risks against the desired performance of assets to achieve organizational goals. The life cycle of a typical asset consists of five main stages: acquisition, deployment, operation, maintenance, and retirement. In this regard, physical asset management takes steps and moves with appropriate strategies for each of the five stages. However, physical asset management in various industries has shown that despite numerous measures, shortcomings were identified after its implementation, which led to poor performance for the organization. These shortcomings occurred not only from a safety and financial perspective, but also from a social and environmental perspective and have a destructive impact on organizations (Moerman et al., 2021). Considering the material presented in this article, we are looking for the question: how is the designing and validating of a corporate governance measurement model with an emphasis on physical asset management using a fuzzy Delphi approach and factor analysis (case study: thermal power plants in the country)?

Theoretical Framework

Physical Asset Management

Physical asset management is known as a set of activities related to the identification of required assets, which generally follows the identification of financial needs; acquisition of assets; provision of logistical and maintenance support systems for assets and disposal or renewal of assets, to effectively and efficiently achieve the desired goal. Hence, physical asset management focuses on asset identification; identification of performance requirements; asset performance assessment; maintenance plan; management of repair and maintenance

operations; life cycle cost analysis; life cycle analysis and asset life prediction (Brous et al., 2019).

Farahmand et al. (2025) studied the modeling of corporate governance in the economic growth of companies listed on the Tehran Stock Exchange. In their research, they acknowledged that corporate governance has a significant effect on the economic growth rate.

Yusefi et al. (2025) examined the provision of an integrated framework for managing physical assets of oil and gas wells with a focus on life cycle management. The results show that the six dimensions of cultural change and organizational context, well equipment information management, prevention of premature deterioration, optimization of programs and resources, life cycle management and performance management and continuous improvement, will have a significant impact on the coherence and optimal management of programs and activities in the management of physical assets of equipment-oriented manufacturing companies.

Research Methodology

This research is classified as mixed research (quantitative-qualitative) in terms of strategy. The fuzzy Delphi method was used in the qualitative part and the first and second order confirmatory factor analysis was used in the quantitative part. The panel members in the fuzzy Delphi method were fifteen experts and the number of samples in the confirmatory factor analysis was estimated to be 156 samples. The fuzzy Delphi method was implemented in three rounds and the experts reached a consensus on the selected indicators. The number of panel members in this section was fifteen.

Research findings

For data analysis in the qualitative section, the fuzzy Delphi method was used, and in the quantitative section, SPSS and PLS were used. The results showed that the designed model consists of ten dimensions, which include 1) strategy; 2) process optimization; 3) equipment; 4) management and support systems; 5) supply chain management; 6) performance management and evaluation; 7) work management and organization; 8) primary care; 9) teamwork with a focus on a systems perspective, and 10) employees. According to the results obtained in line with the identified dimensions, the process optimization dimension with a path coefficient of 0.856 was identified as the most important dimension, performance management and evaluation with a path coefficient of 0.832 as the second dimension, and equipment with a path coefficient of 0.83 as the third important dimension in the model.

Conclusion

The present study aimed to design and validate a corporate governance measurement model with an emphasis on physical asset management using a fuzzy Delphi approach and factor analysis (case study: thermal power plants in the country). The results of this study are consistent with the results of Farahmand et al. (2025), Yusefi et al. (2025), Aslani et al. (2025), Ghaeed et al. (2024), Kazemi (2024), and Maletič et al. (2020). Yusefi et al (2025) showed that six dimensions; cultural change and organizational context, well equipment information management, prevention of premature deterioration, optimization of programs and resources, life cycle management and performance management and continuous improvement, will have a significant impact on the coherence and optimal management of programs and activities in the management of physical assets of equipment-oriented manufacturing companies.To improve and strengthen corporate governance with an emphasis on physical asset management, it is recommended that special attention be paid to these three dimensions, process optimization, performance management and evaluation, and equipment, compared to other dimensions.