A systematic review and conceptual framework for Natural Resource performance management

Abstract

The topic of "Performance management of natural resources" has drawn more attention in the last few decades. Investigating how to manage natural resource performance more optimally is crucial for the long-term social and economic advancement of a nation. This study reviews the research progress of performance management of natural resources (including water resources) based on the pertinent literature of "Performance management of natural resources" and "performance management and evaluation of nature resources" in Web of Science. Through a review of the literature and inductive analysis, the authors found that the pursuit of sustainable resource consumption and management has emerged as the frontier direction of study. However, there is still room for development in the natural resource performance management evaluation system and methods, as well as the requirement for a comprehensive conceptual interpretation and analytical framework. As the literature on the factors impacting the success of natural resource management is currently lacking in depth, future research should concentrate on bolstering the usage of quantitative models. Enhancing the combination of research and quantitative models is also essential. This study builds research framework for natural resource performance management based on the body of current literature and the real-world experience of nations worldwide. In order to support decision-making for the sustainable use of natural resources, the authors describe the process and mechanism of performance management of natural resources and provide some workable evaluation methods based on a variety of evaluation objectives, subjects, and means.

Keywords

Natural Resources; Performance Management; Conceptual Framework

Introduction

Owing to environmental concerns, the majority of organizations worldwide are required to assume responsibility for maintaining a sustainable or green environment. Different environmental experts claim that China should prioritize environmental management because growing industrialization will spur economic growth there while also necessitating the use of more effective resource management techniques to achieve sustainable performance [1, 2]. The increasing limitations on the environment and resources have made the promotion of efficient resource management strategies such as corporate social responsibility, process and equipment, human resource practices, product design, and manufacturing planning—a mainstream trend in sustainable development. Emissions of industrial pollutants are decreased by these methods [3, 19]. Given the concerns regarding social difficulties, stakeholders need to put pressure on the manufacturing industries to be sustainable [4]. Due to stakeholder demands for legal and social responsibility, businesses have become more conscious of the strategic value of sustainable performance for a competitive advantage [5, 20]. Businesses are under increasing pressure to make wise decisions that benefit the environment and future generations and to take the environmental effects of their actions into consideration in light of the numerous global environmental pollution and global warming concerns that exist [6, 21, 22, 23]. For most firms, resource management is seen as an extension of a more comprehensive accounting agenda in order to achieve long-term performance.

Different approaches have been taken in the past by resource management researchers [7, 24, 28]. Scholars have investigated methods and strategies to reduce energy, waste, and resource usage in order to attain sustainable performance [8, 27]. A different team of academics has looked at the many difficulties in managing resources to gain a competitive edge [9]. However, other scholars have examined how an organization's resource management strategies affect its financial, social, and environmental performance [10, 26]. According to [11], environmental legislation, customer pressure, social responsibility, and environmental uncertainty are some of the environmental elements that have been linked to manufacturing enterprises' environmental activities. Though many parts of the literature have been covered previously, a closer examination of earlier studies reveals several gaps in the knowledge [12, 25]. These gaps might be attributed to the use of resource management strategies to achieve sustainable performance.

Process and equipment, production planning and control, human resource practices, product design, and corporate social responsibility on sustainable performance are some of the variables that are crucial to the development of effective resource management techniques. According to [13], "environmental procedures and standards imposed on businesses by institutions in order to encourage them to implement environmental initiatives" are referred to as "sustainable performance" in this context. Previous studies have demonstrated the significant effects that many factors, including consumer pressure, assumed business benefits, environmental uncertainty, and environmental regulatory pressure, have on environmental, social, and economic performance all of which are components of sustainable performance. For example, [13] discovered that long-term corporate performance is better by minimising greenhouse gas emissions. To close all of these gaps, this study employed waste, energy, and resource management as a "second-order construct" in conjunction with sustainable performance, which was moderated by innovative culture. To successfully transition toward resource management, innovative culture must be developed over time. [14, 29] claim that a creative culture is a necessary condition for manufacturing companies to succeed. An innovative culture can be defined as the employees' comprehension of management techniques combined with the present. To our knowledge, no research has been conducted on the impact of innovative culture in enhancing the effects of resource practices on a firm's performance, despite earlier studies emphasizing the significance of creative culture in implementing resource practices [15]. Innovative cultures give businesses the freedom to select from a variety of solutions to please their clients throughout time, which will give them a foundation for survival. Furthermore, there appears to be consensus in the research on inventive cultures that tackles the fundamental aspect of the culture, such as the reasons behind why things happen the way they do. Therefore, the aim of this research is to elucidate how an inventive culture, in conjunction with efficient waste, energy, and resource management, impacts an organization's capacity to operate in a sustainable manner [16]. [17] claim that through lowering the managerial cost of emission reduction either by increasing awareness of the value and necessity of emission reduction or by lowering the cost of progressing sustainability improvements management practices boost the performance of firms. The most significant element influencing a company's long-term success is its inventive culture [18]. In summary, the study has shown that management practices and a company's long-term performance are positively correlated. Because managers can utilize the study's findings to apply suitable waste, energy, and resource management dimensions to improve their companies' long-term success, it also has managerial value. Manufacturing directors can also realize that resource management will improve their company's overall performance by understanding how it affects sustainable performance.

Advances in Research on Natural Resource Performance Management

Four main areas of research have made significant progress in the field of performance management of natural resources: the concept and connotation discussion of natural resource management and performance; measurement and evaluation of the management system and performance of natural resources; analysis of the factors that influence natural resource performance; and development of pertinent institutions and laws related to performance management of natural resources. These three factors allowed us to assess the development of research on natural resources performance management in the paragraphs that follow. Furthermore, water is one of the most valuable natural resources we have, it affects human food security and regional crop productivity significantly [30, 31, 32, 33], and water scarcity is now one of the major global issues facing the 21st century. In order to better examine the advancement of natural resource study, this article also used water as an example. Talk about the idea and meaning of performance and management of natural resources. In light of the tragic circumstances of severe resource limits and massive environmental contamination, realising sustainable resource management has gradually gained support [34]. Performance management is one tactic to help with the sustainable management of natural resources. Scholarly discussion on the performance and management of natural resources has been extensive. A number of authors discussed the evolution of natural resource management, the concept of comprehensive management, the interests of diverse constituencies, etc [35, 36]. Ecological performance and the performance of natural resources were studied by certain scholars [37, 38, 39, 40]. Furthermore, it is important to remember that various national contexts have led to the formation of diverse natural resource management models in various nations worldwide. The United States has established a comparatively comprehensive management system for the value of natural resource assets and has placed a high priority on the asset management of natural resources [41]. China uses the property rights and spatial planning systems to carry out its natural resource management [42].

Japan has established public and state ownership of natural resources with significant ecological sites and places a high value on the preservation of key ecological resources [43]. Australia has put in place a system for registering property rights related to natural resources, which includes explicit laws defining the responsibilities and rights of various kinds of natural resources on land [44]. Scholars have conducted pertinent study from various angles about the management and performance of water resources, which has enhanced the meaning and concept of water resource management performance. After analyzing the watershed's environmental performance, water governance, and water management, Knieper and Pahl discovered that good water management practices are the result of polycentric governance paired with additional contextual characteristics including low corruption and high per capita income [45].

The formation of water use associations encouraged the improvement of water management in these communities, according to Wang et al.'s analysis of the performance of water management in villages supported by the World Bank [46]. Measurement and evaluation of natural resource systems and management performance: Rauschmayer et al. examined ideas surrounding natural resource assessment in Europe, contending that approaches that are both process- and results-oriented are required for water governance and biodiversity [47]. While all scenario assessments address many sustainability challenges, more complex scenarios based on stories, simulations, and model coupling are the most thorough, according to Reinhardt et al.'s assessments of integrated natural resources management under various scenarios [48]. Efficiency has been evaluated as a critical performance indicator for natural resources in a number of studies. To gauge ecological efficiency, several researchers compare environmental performance measures [49, 50, 51]. From the standpoint of land use efficiency, related research has been done by others [52, 53]. Still others have examined agricultural ecological efficiency and conducted related research [54,55,56]. Still others considered ecosystem service value as an evaluation index of the performance of natural resources [57,58,59,60]. When it comes to measuring and evaluating water performance, scholars have made numerous discoveries in the development of evaluation indicators and the application of methodologies. Wang established a comprehensive benefit evaluation model for policies related to urban water resources. Using the main component analysis method, Cao et al. assessed the natural carrying capacity of the water resources in the case area [62]. Wang et al. measured agricultural water use efficiency in the Heihe River Basin in China because they believed it to be a crucial indicator of the performance of water resources. They discovered that there was a clear variation in agricultural water use efficiency across different counties [63]. A new set of water resources performance management indicators should be developed, according to certain academics who focus on the management of water resources related to tourism [64].

Examination of the variables affecting the performance of natural resources: Auty et al. demonstrated how the System of Integrated Environment and Economics Using case studies from Chad and Mauritania, accounting and net savings can be utilized to identify policy shortcomings and enhance economic performance [65]. Anshasy and Katsaiti investigated the relationship between various institutional qualities and fiscal policy and its effect on growth in resource-rich economies through the use of an empirical approach. They concluded that improved governance enhances fiscal performance, which in turn leads to higher growth rates [66]. Natural resource regulation may encourage the growth of the bidding market, which could have an indirect effect on land management, according to Wang et al.'s analysis of the impact of natural resource regulation on the efficiency of construction land using the difference method and stochastic frontier analysis method [67]. Researchers have talked about the impact of many elements on the performance of water resources in their study on the influencing factors of water resources. Pan and Xu estimated the influencing factors of water resources management performance in irrigation areas using a multiple regression approach coupled with correlation analysis. According to this study, the management system and enabling environment have the most effects on performance [68].

According to Song et al.'s research, there is a non-linear relationship between the degree of economic growth and water resource efficiency, and technical advancement plays a significant role in enhancing water resource efficiency [69]. The elements influencing my nation's industrial water resources' efficiency of use were examined by Zou and Cong. According to this study, industrial water use efficiency is strongly hampered by environmental regulations and industrial water use intensity, but it is highly encouraged by the endowment of natural resources, economic development, industrialization level, and technological advancement [70]. Yi et al. examined how the performance of water resource governance was affected by cross-regional collaboration networks in 41 cities in the Yangtze River Delta region of China [71]. The development of pertinent legislation and organizations for natural resource performance management: It is vital to manage natural resources legally and institutionally in order to make them provide economic benefits that will enhance human wellbeing both now and in the future. Developed nations have enacted laws governing the occupation, use, income, and disposal of natural resources, as well as resource accounting, to maintain a comparatively flawless system of property rights over natural resources. It also comprises the water resource accounting [72]. Some nations or areas use planning to manage their natural resources; examples of these include Germany, Denmark, the United Kingdom, and others [73]. Numerous nations have developed relatively developed laws pertaining to the management of natural resources as a result of ongoing development; examples of these laws include the national environmental policy law of the United States, the natural environmental protection law of Russia, and others. When it comes to management organizations, more emphasis should be paid to those run by the government centrally and those that involve the public.

When prior study and relevant literature are combined, it becomes clear that the management practices of human civilization are continuously influencing the linked ideas of natural resource performance and management. In order to enhance the performance of natural resources and discover new ones, researchers both domestically and internationally have conducted a vast number of theoretical and empirical investigations from individual (such as water resources) or complete natural resources. The cutting edge of research is now focused on resource management and use that is sustainable. Within the institutional and legal frameworks pertaining to the management of natural resources, there are also certain established worldwide cases. Nonetheless, there is still a dearth of a broad conceptual interpretation and analysis framework, and there are still wide differences in opinion about concepts like natural resources, natural resources performance, and ecological performance. Principal component analysis and data envelopment analysis are two model methodologies that are mostly used to statistically calculate the performance of natural resource systems and management. The majority of previous research focused on evaluating individual natural resources or included ecosystem service value, carrying capacity, and efficiency of resource consumption as key performance indicators. A contemporary study trend is the comprehensive and quantitative examination of various natural resource performance types and associated challenges. There is still room for improvement in the methods and system for evaluating the performance of natural resources. The primary goals of the pertinent research on the examination of the influencing variables of natural resource performance in academic circles were to identify important influencing factors and enhance natural resource performance. This direction's primary research methodology was quantitative analysis. Nevertheless, there is still a dearth of thorough study on the elements that influence the performance of natural resources, and the use of quantitative models needs to be enhanced.

Because of this, it is extremely valuable to conduct research on the creation of a performance management analysis framework for natural resources, including fields, lakes, mountains, water, forests, grasslands, and sands, as well as to offer theoretical justification for the sustainable use and management of these resources.

Natural resource intake has always increased along with economic progress, and natural resources have always been crucial to social and economic development [76]. Nonetheless, China is placing a growing priority on managing its natural resources, and the concept, system, and approach for doing so are all steadily improving. But there are also a lot of real-world issues with managing natural resources. In the real world of natural resource management, the cases must be sorted. It is necessary to identify real-world issues that impede the management of natural resources and come up with remedies. However, assessing the performance of natural resources is a crucial step in the management of those resources.

It supports the advancement of science and democracy in policymaking and raises the standard of governance and capability for governance in departments that handle natural resource management. The evaluation subject for the natural resource performance management assessment must be determined first. It could be for a specific element of natural resources, such forest, land, or water resources. An assessment of performance is carried out by the management of a natural resources sector. For various assessment aims and objectives, distinct evaluation indicators must be chosen. The indicators are primarily separated into four categories: value, efficiency, quality, and quantitative indicators. Empirical evaluation, value evaluation, third-party evaluation, and so forth are examples of evaluation techniques.

Conclusions

The system for managing natural resources is always evolving and getting better. Studies that have already been done fall short in terms of generalizing the system's evolution, analyzing the state of performance management for natural resources now, and addressing pressing issues. Within academic circles, disagreements persist over the associated notions of natural resource performance management, and a broad understanding has yet to be achieved. The amount of water resources accessible in the region and the environmental capability remain unresolved in the evaluation of natural elements. In order to better clarify the study object and its scope, future research must first begin with theoretical analysis and conceptual definition. Next, it must further clarify the research ideas of performance management of natural resources, and finally it must progressively develop a comprehensive assessment process and an advanced method system. Evaluation and management of the performance of natural resources are still in their infancy, and the evaluation's conclusions are obviously insufficient to serve as a foundation for policy or other useful decisions. Subsequent endeavours ought to prioritise the creation of methods and scientific investigations concerning the utilisation of natural resource performance evaluation results. One possibility is to incorporate the evaluation results into the annual assessment made by the governing body. The appraiser can evaluate the evaluation outcomes, do comparative analysis across different units, and develop suitable rewards and punishments in order to fully pique managers' attention. We can also enhance the analysis of the evaluation results and propose specific policy recommendations.

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