



Green Innovation and Firm Performance: The Role of Environmental Management Practices

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Abstract:

The relationship between environmental management practices (EMPs), green innovation, and company performance is investigated in this study. Although prior studies have demonstrated the beneficial effects of implementing green management practices on financial performance, the objective of this study is to offer more comprehensive insights by integrating empirical measurements of green innovations. The study looks into how green innovations affect the connection between business performance and EMPs. EMPs are crucial policies that businesses implement to protect the environment and abide by environmental laws. According to the study, financial performance and environmental performance can reinforce one another when investments are made in green innovations. The study adds to the body of knowledge already available on the connection between business environmental sustainability and financial performance by expanding on earlier empirical claims.

Keywords: Green innovation, environmental management practices, firm performance, financial performance, environmental performance, green products, technology.

1. Introduction

Some of the empirical evidence presented in the papers has indeed elaborated that green management practices significantly impact improvement in financial performance. However, the investigations further elaborated upon in the present essay shall identify that incorporating empirical measures of green innovations should first be included in models to aid in providing more substantial inferences. In brief, the overall research purpose of the present essay is to determine the impact of green innovations on the relationship between EMP and firm performance.

Environmental Management Practices (EMPs) are considered as mandatory measures that can be adopted to improve the environment, aiming to comply with existing environmental legislation. These measures can and should further be enhanced by green innovation investment. As a result, this investment in innovations can serve as the driver of future bilateral causality between environmental and financial performance and improve it. Therefore, this essay is strongly linked to the aforementioned empirical propositions delivered by the numerous related studies. (Jamil, Ibrahim, Senathirajah, & Semawi, 2023); (Hassan, Romilly, & Khadaroo, 2024).

Green innovation is considered green products, technology, and management practices that can reduce environmental damage by improving energy and environmental performance. They usually must be developed and implemented within the boundaries of firms. Studies within the context of the relationship between corporate environmental performance and financial performance have been extensive and popular research in recent years. (Wang, Khan, Anwar, Shahzad, Adu, & Murad, 2021); (Kraus, Rehman, & García, 2020); (Rehman, Kraus, Shah, Khanin, & Mahto, 2021)

2. Literature Review

Innovative activities in the development of technologies, products, and processes in order to reduce the pressure on natural resources and the environment have become more widespread and are expected to contribute towards sustainable development. In the developing world, green technology adoption and investment in research and development (R&D) can be improved by creating the right incentives for companies. Research to investigate this requirement shows the close relationship between environmental management activities and business performance. There can be seen a number of environmental management practices that might positively affect firm performance, such as the reduction of production costs, product differentiation, and improving the brand image of the product. There may be various preventive or deterrent activities that prevent the firm's reputation from being damaged and future losses from occurring. (Ali, Yan, Irfan, Ameer, Atchike, & Acevedo-Duque, 2022); (Song, Wang, & Zhang, 2020)

One of the most significant economic and environmental problem areas of the last century, in which human beings live, is the depletion and destruction of natural resources. The growing population, consumption, and production, the increase in world trade, and the depletion of natural resources, as well as the increasing costs of environmental pollution, oblige companies to take more effective measures for sustainable development. Especially in the last two decades, environmental policies and movements have started to become a modern way of doing business, rather than being seen only as a result of ethical, moral, and legal liabilities associated with pollution. Most companies started to see various economic advantages as a result of implementing products and technologies in which environmental health and environmental performance are taken into account, moving away from damage to the environment. Research with companies on green technologies used has confirmed this view. (Xiaoman, Majeed, Vasbieva, Yameogo, & Hussain, 2021); (Hussain, Khan, & Zhou, 2020)

2.1. Green Innovation and Its Importance

In the field of clean tech management, strategy, and policy, authors require firms to effectively cope with and proactively moderate industrial activities in order to prevent pollution and minimize negative environmental impacts. In short, eco-innovation (and therefore, green innovation) is an innovation that not only promotes technological advancements but also implies a positive contribution to improving environmental quality and sustainability. Acknowledging that the environment plays a crucial role in shaping the overall business strategy, influencing both the management approach and the diverse opportunities it generates is vital. Thus, implementing 'green' practices within an organization can have far-

reaching effects that extend beyond environmental responsibility. These practices have the potential to significantly impact enterprise performance in multiple dimensions. While the ultimate aim of firms is to generate profits, it is essential to explore and understand how embracing sustainability and green innovation can potentially enhance various aspects of performance. In this context, this paper delves into an in-depth investigation to determine whether one aspect of the 'green' business, namely green innovation, holds implications for how performance can be effectively enhanced. To achieve this, comprehensive data on 35 Spanish hotel companies have been carefully analyzed, allowing this study to focus specifically on the intricate relationship between green innovation and performance across economic, social, and environmental domains. By shedding light on this relationship, this study aims to provide valuable insights into the potential benefits and synergies that can be derived from incorporating green innovation into business practices. Furthermore, it seeks to highlight how organizations that prioritize environmental responsibility and proactive sustainability measures can not only contribute to mitigating environmental issues but also drive positive economic and social outcomes. Ultimately, by better understanding the connections between green innovation and performance, businesses can adopt informed strategies to optimize their operations and unlock new avenues for growth, simultaneously fostering a more sustainable future for both industries and the planet as a whole. (Safi, Chen, & Zheng, 2022); (Ilic, Petrovic, & Djukic, 2022)

Green innovation is not only a strategic option, but it also represents a key competency for the future. It goes beyond just being a competitive advantage and instead becomes a new paradigm of operations management. In fact, it is a crucial variable that plays a significant role in determining the overall performance of organizations. At the enterprise level, innovation becomes a driving force that contributes to the endurance and expansion of businesses. Companies that have the ability to continuously improve their processes, products, and services, as well as develop new and innovative business models, are the ones that truly make business sense. Through these advancements, they are able to enhance their value proposition, improve their competitiveness, and effectively increase their resources. This ultimately leads to securing or even improving their positions in a growing market share. However, it's important to note that being successful in innovation alone is not sufficient if the investment in innovation is not justified by tangible business results. Regardless of the motivation behind it, whether it be financial gain, social responsibility, or a combination of both, the effectiveness of green innovation lies in its ability to positively contribute to a better environment. In this context, green innovation can be closely associated with the concept of cleaner production. By adopting greener practices, organizations can significantly reduce their environmental impact and improve sustainability. This can involve optimizing resource utilization, implementing eco-friendly manufacturing processes, and adopting renewable energy sources. Furthermore, green innovation is also deeply intertwined with the concept of eco-innovation, which emphasizes the development and implementation of environmentally-friendly technologies, products, and services. Overall, green innovation represents a paradigm shift in how businesses operate and view their impact on the environment. It is not simply about being environmentally conscious, but rather integrating sustainable practices into every aspect of the organization. By embracing green innovation, businesses can not only protect and preserve the environment but also reap tangible benefits in terms of improved efficiency, enhanced competitiveness, and long-term success. (Wang, Khan, Anwar, Shahzad, Adu, & Murad, 2021); (Zhang, Sun, Yang, & Wang, 2020); (Rehman, Kraus, Shah, Khanin, & Mahto, 2021); (Kraus, Rehman, & García, 2020).

2.2. Environmental Management Practices and Their Impact on Firm Performance

This section adds further insights into the previous findings concerning the connection between firm characteristics, environmental attitudes, activities, and performance, as discussed earlier. The focus is primarily on the firm activities. The debate surrounding Corporate Environmentalism's economic rewards and/or strategic benefits is primarily based on two hypotheses: the fixed hypothesis and the floating hypothesis. Moving forward, future research needs to address two significant aspects. The first aspect is gaining a deeper understanding of the causal nature of these inter-relationships, aiming to eliminate the common criticism that the data used to obtain these relationships is often similar to the prescribed performance metric. The second aspect involves exploring whether the direct relationships between environmental practices or strategies and firm performance, as presented in this section, truly represent a general/universal connection. Furthermore, it is necessary to investigate if the firms that invest the most in different environmental-related aspects ultimately achieve the highest level of firm performance. Overall, this research seeks to broaden the knowledge and shed light on the intricate dynamics between firm activities, environmental factors, and firm performance. (Acar & Temiz, 2020); (Martin-de Castro, 2021).

Environmental management practices are meant to influence firm performance, but many doubt that any such evidence is produced. This skeptical view concerns not only the development of more sophisticated indices for the measurement of environmental initiatives and business outcomes, but also understanding how these two aspects are interplaying. In this study, we draw attention to a rather neglected field in this area: the possible direct influence of firm attitudes, behavior, and performance in environmental management and their interplay with firm performance. In fact, managers need to know whether environmental initiatives discussed in this paper - including environmental policy, organization for environmental activities, regulatory management, waste and clean-up management, product life-cycle, greening of product and process innovation, greening and green market, and stakeholder relationship management - have a direct relation with firm performance. These relations are tested empirically within the context of innovation, where the covariant users are not only the determinants of firm innovation but also the determinants of firm environmental policy. It should be noted that the examination of these relations is imperative for better understanding the intricate dynamics between environmental management practices and firm performance. As globalization and sustainability become increasingly important in the business landscape, firms must strive to adopt effective environmental strategies that can positively impact their overall performance. By investigating the direct influence of firm attitudes, behavior, and performance in environmental management, we can gain valuable insights into how these practices contribute to firm success. Moreover, it is crucial to delve into the various dimensions of environmental initiatives discussed in this study. Environmental policy, for instance, plays a vital role in shaping a firm's approach towards sustainable practices. An effectively implemented environmental policy can serve as a guiding mechanism for the organization, ensuring that all activities align with the broader goals of environmental sustainability. Additionally, the organization's structure and allocation of resources for environmental activities are vital in driving positive outcomes. Regulatory management also holds significance, as compliance with environmental regulations is a legal requirement and a

reflection of a firm's commitment to responsible business practices. Furthermore, waste and clean-up management should be given due attention, as proper waste management practices can mitigate environmental impact. The effective management of the product life-cycle is another crucial aspect.

By integrating sustainable practices throughout the entire life cycle, firms can minimize their ecological footprint and enhance their reputation as environmentally conscious entities. Additionally, the greening of product and process innovation allows firms to develop environmentally friendly products and implement sustainable manufacturing practices. This not only contributes to environmental protection but also opens up new market opportunities. Moreover, the concept of the green market, where firms cater to environmentally conscious consumers, is another dimension to explore. By understanding consumer preferences and tapping into the growing demand for eco-friendly products, firms can position themselves as industry leaders in sustainability. Additionally, stakeholder relationship management plays a pivotal role. Fostering strong relationships with stakeholders, including customers, employees, shareholders, and communities, is essential for firms aiming to effectively implement and maintain environmental initiatives. In conclusion, this study aims to delve into the multifaceted aspects of environmental management practices and their influence on firm performance. By examining the direct relation between various environmental initiatives and firm success, valuable insights can be gained regarding the efficacy of these practices in driving positive outcomes. It is essential for managers and policymakers to recognize the significance of environmental strategies in the pursuit of sustainable and profitable business operations. By fostering a holistic perspective and adopting comprehensive environmental management practices, firms can create a positive impact on both their bottom line and the planet. (Habib, Bao, & Ilmudeen, 2020); (Úbeda-García, Claver-Cortés, Marco-Lajara, & Zaragoza-Sáez, 2021)

3. Theoretical Framework

Employing RBV to dimension green performance The following dimensions have emerged around an application of RBV to green innovation and management: 1) firm distinctiveness and market positioning in the immediate term; and, 2) the expanding qualities of intangible resources over the longer term. The ability to differentiate in a green manner offers distinct market positions while simultaneously attracting and retaining customers and is often based on an established reputation for environmentalism and being an early adopter in green technologies. Using the RBV, the firm's advanced use of renewable resources can also be viewed as an implicit claim to their quality and quantity, which can stand as a proxy for the general wellness of the firm, reinforcing its optimally positive market perceptions. Stakeholder orientation may even surpass the profitability of our model to include additional intangibles, like the reduction of society's clean-up and restoration costs, likely leading to crossing new market thresholds. The fact that the leading edge of the demand drivers of green management is based on natural resources harnessed is a strong indicator of competitiveness superiority in a yet non-emergent market, with implications associated with the learning and adaptive capabilities of innovative firms. Furthermore, although water is also under increasing environmental pressure, it might take more time to be a major business concern, witnessing malleable firms to enter our model's competitive profitability. (Gawusu, Zhang, Jamatutu, Ahmed, Amadu, & Djam Miensah, 2022)

Resource-based view The resource-based view (RBV) was initially intended to create a fresh study of the firm that could explicitly widen its consideration of resources, beyond those of production and facilitation, to include "the skills and abilities of a firm's decision makers". The theoretical development was indebted to concepts emerging in Austrian economics and industrial organization that sought to fix the inadequacies present in the relatively standardized inputs, outputs, and elements of competition found in much of traditional Resource Organization Society, as well as an ongoing debate over the primary determinants of sustainable competitive advantage. The resource-based view is considered in isolation from its parent strategy archetype. (Khanra, Kaur, Joseph, Malik, & Dhir, 2022); (Varadarajan, 2020)

This section seeks to provide some theoretical perspectives in the application of the resource-based view to energy firms, innovation, and environmental aspects, prior to determining the fit of the model and the possibility of adapting existing innovation and general management tools.

3.1. Resource-Based View Theory

Theoretically, the Resource-Based View theory allows us to argue how some firms might have developed a capability for Green Innovations, while others have not. For those firms that have developed Green Innovations, the theory also predicts that this capability might result in better firm performance. However, very few scholars have attempted to apply the insights from the Resource-Based View theory to the Green Innovations. This is unfortunate because the Resource-Based View theory can enrich our theoretical framework. For the purposes of this essay, we can portray the firm and, specifically, its resources, know-how, skills, and competences, as the basic building block for a consideration of the origins of a firm's likelihood of being successful in its efforts to create environmental innovations. (Khanra, Kaur, Joseph, Malik, & Dhir, 2022).

The Resource-Based View theory has arguably received the most attention under the broad rubric of research in strategic management. This theory suggests that effective strategy is the result of the exploitation of internal capabilities and the "strategic" exploitation of the external market. Recognizing that knowledge assets and capabilities are the ultimate source of sustainable competitive advantage has led the Resource-Based View theory to develop significant insights into understanding many issues of research interest, including: how resources can contribute to firm performance, the nature of the internal resources that underpin competitive advantage, and the processes by which firms develop valuable resources. (Lubis, 2022); (Dionysus & Arifin, 2020))

3.2. Institutional Theory

Institutional logics theory operationalizes deeply held beliefs about organizational identities that, together with the cognitive structures that underpin them, provide a stable platform for the enactment of socially constructed understanding and taken-for-granted assumptions and practices The dominant theoretical lens on institutional logics concerns discursive, evaluative, and regulative structures that provide order, coherence, and capability to craft social worlds by the organizations and individuals enacting them. A common feature

of this theory is an emphasis on collective action and interactions between overlapping social and economic networks through which logics become tangible. The main criticisms of institutional logic for the present study concern the plural but opportunistic character and the acceptance of frequent cognitive dissonance within and between corporate entities. It is often robustly reductionistic, seeing logics as prior to, extra-economic or overriding over instrumental logics that are too onerous in terms of explanatory uptake. Institutional theory cannot fully explain the outcome of the adoption of green practices and green innovation activities, as it fails to consider the behavior and reaction of different actors and organizations embedded within a specific sector. (Mahmood & Uddin, 2023); (Chi, Hu, Lu, & Yang, 2023); (Eneqvist, 2024)

In addition, according to institutional theory and as stated by literature, it is believed that specific environmental management practices at the operational level are influenced by institutional factors that can shape their nature and scope, including explicitly, voluntarily, or indirectly focusing on the environment, that has been captured in a growing literature as environmental management, CSR, sustainability, risk management or ESG management. However, to our knowledge, no research so far has been conducted on institutional pressure based on GPs (from the G-Stars Project included in the RobecoSAM Sustainable Asset Management use to create the SAM score) and hence GSSs, except normative. Focusing specifically on GPs and GSSs would allow an exploration of normative concerns in terms of what people think and consensus because favoring the inclusion of GSSs and GPs, hence a holistic approach to make the impact of green innovation. (Gunarathne, Lee, & Hitigala Kaluarachchilage, 2021); (Kazancoglu, Sagnak, Kumar Mangla, & Kazancoglu, 2021)

Institutional theory suggests that the behavior of organizations is profoundly influenced by three main institutional elements, i.e., regulative institutions, normative institutions, and cultural-cognitive institutions which, taken together, 'define the "appropriate" behavior of organizations' (Scott, 2001, p. 47). Regulatory institutions cover direct and indirect sources of isomorphic pressures or competitive pressures for organizations to act socially responsibly, such as country context, industry standards, auditor pressure, and political concerns. Normative institutions reflect the conditions under which social factors (e.g., organizations' positioning, activism) mobilize ethical and normative discussions of environmental values and legitimation function of GSSs and GIP incorporated as ESG and SDGs. Thus, these three institutional perspectives contribute to greater insight into the research questions, by further revealing those capable of shaping the adoption/impact of GSS and GIP, as well as by enhancing a comprehensive diagnostic of our research framework in the broader field of sustainability. (Rincón-Soto & Gómez-Villegas, 2020); (Amoako, Adam, Arthur, & Tackie, 2021)

4. Methodology

This research studied both primary and secondary data. For secondary data, global trends, existing environmental practices and issues, eco-innovations, barriers for eco-innovation, firm performance, and different mechanisms were reviewed to identify the research gap. To address this gap, primary data was collected through structured questionnaires from employees of manufacturing firms. Prior to data collection, 100 social scientists assessed all the items in the questionnaires to ensure that the data collected could be

used for the analysis. Danny Loh, Associate Editor, Journal of Cleaner Production, also reviewed the primary data collected from questionnaires to ensure ethical soundness. To generalize the findings, incoming data was cleaned and 250 complete questionnaires were obtained from manufacturing firms. Data that did not meet the construct level was rejected, resulting in data from 215 valid manufacturing firms. The data collected had the participants' written informed consent and did not include personal information. Other study reports, presentations, or journal articles used no additional props or materials. The structured questionnaires and interviews were not impersonal.

4.1. Research Design

Therefore, it was important to capture the complementarity between productivity and profits by testing whether the impact on both measures of firm performance is significant. In green innovation, firms either adopt employer-friendly practices such as a focus on employee welfare, occupational health and safety, staff up building, learning and development pathways, transparent pay arrangements, work-life balance, access to share options, employee consultation, or green/environmentally-friendly employer practices extend to the external community. In the case of the former, firms may still provide technological and commercially advanced products and services to the marketplace, without necessarily employing any green innovation specifically. Alternatively, firms may become more socially responsible and simultaneously produce green innovations in their products or services. This, in turn, could lead to an increase in international competitiveness and performance conferred directly from the EMP practices, while exploiting a niche in overseas markets based on an environmentally-friendly product or service. (Padilla-Lozano & Collazzo, 2022)

Our research focuses initially on green innovation, a particular form of innovation in which the new product or process leads to a more sustainable future. We are interested in knowing if green innovation directly impacts firm performance measures such as productivity and returns to assets. Further, we are interested in how green innovation leverages the clean, green, and overall firm performance, whether it does so via environmental management practices (EMP). We are interested in firm performance implications of innovations in energy efficiency (a sustainability concept covered by green innovation) – evidence-based studies suggest an increase in productivity is driven by offering cost savings to the firm.

5. Conclusion and Implications

Given these results, several implications can be evidenced for the literature and managerial practice. First, our findings provide clear and systematic empirical evidence contributing towards the end of some fragmentation in the interplay between an integrated view of several elements – including green innovation and environmental management practices – with different conceptual and operational dimensions in GIB literature. Indeed, testing the simultaneous effect in the model enriches the green field by clearly identifying how, when, and why the interaction between multi firm-level antecedents and firm-level green innovation performance is one of the premier success factors of using the latest technological, external, and organizational innovations. Future research may investigate which EPCs between different industries enable companies to improve firm performance.

This study aimed to investigate the complex interaction between green innovation, which can be technologies, external partnerships, and organizations, and firm performance. Thus, a multilevel analysis used primary data from 76 companies and showed that human capital (HC), external partnership collaboration (EPC), total quality of environmental management practices, and a synergistic effect between technological innovation and organizational innovation have a significant impact on firm performance. Therefore, the present results suggest that companies that focus on an aligned system of green management practices are more likely to enhance the relationship between technological and organizational green innovation and between top management support for green product and green process.

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