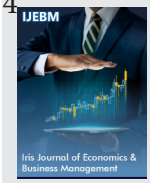

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Green Innovations and Corporate Carbon Emissions

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Abstract

Greenhouse gas emissions, including CO2 emissions have significantly contributed to climate change [1]. Indeed, the sixth IPCC Assessment Report states that global warming may reach or surpass 1.5°C in the upcoming 20 years. In addition, BP's World Energy Statistics Yearbook (2022) shows that carbon emissions have returned to pre-Newcastle pneumonia epidemic levels, reversing the temporary decline caused by the pandemic in 2020. Firms are considered as the primary contributors to carbon emissions. Therefore, regulators and stakeholders are increasingly pressuring managers to reduce these emissions. Decarbonization is one of the central challenges facing businesses [2]. Hence, managers are making significant efforts to respond to this challenge by adopting strategies that consider both economic factors and environmental performance.

Keywords: Climate change; carbon emissions; green innovations; eco-innovation

Introduction

Greenhouse gas emissions, including CO_2 emissions have significantly contributed to climate change [1]. Indeed, the sixth IPCC Assessment Report states that global warming may reach or surpass 1.5°C in the upcoming 20 years. In addition, BP's World Energy Statistics Yearbook (2022) shows that carbon emissions have returned to pre-Newcastle pneumonia epidemic levels, reversing the temporary decline caused by the pandemic in 2020. Firms are considered as the primary contributors to carbon emissions. Therefore, regulators and stakeholders are increasingly pressuring managers to reduce these emissions. Decarbonization is one of the central challenges facing businesses [2]. Hence, managers are making significant efforts to respond to this challenge by adopting strategies that consider both economic factors and environmental performance.

Environmental innovation is considered as an efficient tool to enhance firm environmental and economic outcomes [3,4]. This includes developing, implementing or using a new product, production process, service, management strategy or corporate strategy aiming at reducing environmental risk, damage and other negative consequences of resource use [5]. Many scientists, authorities, experts and academics agree that a green economy is critical and that achieving one without innovation will be impossible [6]. Scholars have extensively examined whether green innovation may reduce carbon emissions, however, a consensus has yet to emerge [7]. The aim of this article is to review how previous studies have investigated the impact of eco-innovation on corporate carbon emissions.

Brief Literature Review

Growing concern about climate change has prompted researchers to extensively investigate the factors that influence carbon emissions. According to the stakeholder theory, firms face increasing pressure from different stakeholders to reduce their carbon footprint and implement sustainable practices [8]. In addition, scholars have also widely used the Resource-Based View to explain the factors that influence carbon emissions. The RBV approach postulates that companies that amass scarce, valuable, unique, non-substitutable resources and capabilities gain an advantage over their competitors [9]. Stakeholders play a crucial role in driving businesses towards achieving this competitive advantage by promoting sustainable practices, including the adoption and development of environmental innovation. In this context, several studies emphasize that green innovation is considered as an effective tool for reducing pollution and mitigating the adverse impacts of climate change. For instance, Qureshi [10] examined the impact of eco-innovation index on carbon emissions among companies from 17 European countries. The findings indicate a negative relationship between eco-innovation index and CO_2 produced by these companies. Similarly, Khurshid [11] find that innovation and environmental policies help in reducing emissions both in the long and short run for a sample of 15 European countries.

In addition, Balsalobre-Lorente [12] show that energy innovation improves environmental quality in the European Union 5 (EU-5) countries (Germany, France, Italy, Spain, and the United Kingdom). Furthermore, Ostadzad [13] finds that innovations contribute to reducing emissions and improve clean energy advancements in 29 European Union countries. Ji, et al. [14] utilize data from seven highly fiscally decentralized countries, that is, Australia, Austria, Belgium, Canada, Germany, Spain, and find that eco-innovation limits CO_2 emissions. In addition, Mensah [15] investigate the mitigating power of patent and trademarks in the OECD economies. Their findings show that jointly, eco-patents and trademarks reduce CO_2 emissions. The study of Ampedu, et al. [16] examines the effect of green innovation on carbon emissions in 13 Asian countries and finds that eco-innovation significantly reduces carbon emissions, highlighting its importance in long-term decarbonization strategies. Supporting this view, Chein [17] examine the impact of eco-innovation on improving China's environmental quality. Their findings show that eco-innovation has proven to be the most important channel to mitigate CO_2 emissions in China.

The reviewed studies suggest that innovation plays an important role in reducing carbon emissions. However, another strand of studies postulates that innovation cannot reduce CO_2 emissions. For instance, Weina, et al. [18] show that green innovations have not a crucial role in reducing carbon emissions in Italy. Furthermore, Liu, et al. [19] find a significant positive relationship between technological innovation and carbon emissions in China. In addition, some research suggests that there is an inverted U-shaped relationship between innovations and emissions (e.g., Mensah [20], Zhang and Chen [21]).

Conclusion

There are still questions about how to fully benefit from innovation in order to achieve significant and long-lasting reductions in carbon emissions. To address this, further empirical research is needed to understand the relationship between eco-innovations and carbon emissions. This would offer decision-makers a solid basis to develop effective strategies and enhance environmental performance.

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Conflict of Interests

None.

References

1. Hafner S, Speich M, Bischofberger P, Ulli-Beer S (2022) Governing industry decarbonisation: Policy implications from a firm perspective. J Clean Prod 375(1): 133884.
2. França A, López-Manuel L, Sartal A, Vázquez XH (2023) Adapting corporations to climate change: How decarbonization impacts the business strategy–performance nexus. Bus Strategy Environ 32(8): 5615-5632.
3. Khan SJ, Dhir A, Parida V, Papa A (2021) Past, present, and future of green product innovation. Business Strategy and the Environment 30(8): 4081-4106.
4. Zhang YJ, Peng YL, Ma CQ, Shen B (2017) Can environmental innovation facilitate carbon emissions reduction? Evidence from China. Energy Policy 100: 18-28.
5. Iqbal N, Abbasi KR, Shinwari R, Guangcai W, Ahmad M, et al. (2021) Does exports diversification and environmental innovation achieve carbon neutrality target of OECD economies? Journal of Environmental Management 291: 112648.
6. Swainson L, Mahanty S (2018) Green economy meets political economy: Lessons from the "Aceh green" initiative, Indonesia. Global Environmental Change 53(3): 286-295.
7. Li X, Qin Q, Yang Y (2023) The Impact of Green Innovation on Carbon Emissions: Evidence from the Construction Sector in China. Energies 16(11): 4529.
8. Chithambo L, Tingbani I, Agyapong GA, Gyapong E, Damoah IS (2020) Corporate voluntary greenhouse gas reporting: stakeholder pressure and the mediating role of the chief executive officer. Bus Strat Environ 29(4): 1666-1683.
9. Barney JB (2001) Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. Journal of Management 27(6): 643-650.
10. Qureshi MA, Ahsan T, Gull AA (2022) Does country-level eco-innovation help reduce corporate CO_2 emissions? Evidence from Europe. J Clean Prod 379(1): 134732.
11. Khurshid A, Rauf A, Qayyum S, Calin AC, Duan W (2023) Green innovation and carbon emissions: the role of carbon pricing and environmental policies in attaining sustainable development targets of carbon mitigation—evidence from Central-Eastern Europe. Environ Dev Sustain 25(8): 8777-8798.
12. Balsalobre-Lorente D, Shahbaz M, Roubaud D, Farhani S (2018) How economic growth, renewable electricity and natural resources contribute to CO_2 emissions? Energy Pol 113: 356-367.

13. Ostadzad A (2022) Innovation and carbon emissions: fixed-effects panel threshold model estimation for renewable energy. Renew Energy 198(1): 602-617.

14. Ji X, Umar M, Ali S, Ali W, Tang K, et al. (2021) Does fiscal decentralization and eco-innovation promote sustainable environment? A case study of selected fiscally decentralized countries. Sustain Dev 29(1): 79-88.

15. Mensah CN, Long X, Dauda L, Boamah KB, Salman M (2019) Innovation and CO_2 emissions: the complimentary role of eco-patent and trademark in the OECD economies. Environ Sci Pollut Control Ser 26: 22878-22891.

16. Ampedu R, Wang X, Jotham K (2025) The tug of war: Will regulatory quality and green innovation outpace carbon emissions? Journal of Open Innovation: Technology, Market, and Complexity 11: 100555.

17. Chein F, Hsu CC, Andlib Z, Shah MI, Ajaz T, et al. (2022) The role of solar energy and eco-innovation in reducing environmental degradation in China: evidence from QARDL approach. Integrated Environ Assess Manag 18(2): 555-571.

18. Weina D, Gilli M, Mazzanti M, Nicolli F (2016) Green Inventions and Greenhouse Gas Emission Dynamics: A Close Examination of Provincial Italian Data. Environ Econ Policy Stud 18(2): 247-263.

19. Liu X, Zhang S, Bae J (2022) Nonlinear analysis of technological innovation and electricity generation on carbon dioxide emissions in China. J Clean Prod 343: 131021.

20. Mensah CN, Long X, Boamah KB, Bediako IA, Dauda L, et al. (2018) The effect of innovation on CO_2 emissions of OCED countries from 1990 to 2014. Environ Sci Pollut Control Ser 25: 29678-29698.

21. Zhang Y, Chen X (2023) Spatial and nonlinear effects of new-type urbanization and technological innovation on industrial carbon dioxide emission in the Yangtze River Delta. Environ Sci Pollut Control Ser 30(11): 29243-29257.