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Reshaping Tomorrow through Green Governance and Circular Economy: An Emerging Paradigm

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Abstract.

Circular economy and green governance are gaining momentum and traction with industry and policymakers. The circular economy is viewed as a restoration and regeneration system in which resources, energy usage, and greenhouse gases are minimized. At the same time, the Green Governance structure is a good transition to a circular economy and helps enterprises to move toward sustainable development. This study's objective is to explore the hidden possible relationship that exists between the Green Governance of companies and the much-anticipated Circular Economy for low waste and carbon society. Furthermore, an extensive literature review was undertaken to create the first green governance circular economy framework (GGCE) for businesses to integrate the proposed model into their operational activities. This GGCE framework will be developed by exploring the similarities between green governance and circular economy. This study has three expected findings; firstly, the proposed framework will help firms to change their business approach to addressing climate change. Secondly, the GGCE framework will help policymakers to develop policies for circular economy governance. Lastly, it will be the point of reference to the academician for further extension of the GGCE framework.

Keywords: green governance, circular economy, GGCE framework, Nigeria oil and gas sector

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1. Introduction

In the nineteenth century, environmental awareness and the danger that man poses to the environment by using natural resources attracted attention on a global scale[1, 2]. Since the 1960s, numerous worldwide conferences and treaties have addressed this environmental challenge [3]. According to [4], business challenges that impact the environment have been highlighted concurrently[5] [6, 7]. These issues include gas emissions, climate change, ozone layer safety, waste management, and disposal [8, 9]. Due to the severity of environmental issues brought on by human conduct in recent decades, the global green governance challenge has gained significant study attention

[10-13]. The development of a structure for green governance is complex because it calls for the inclusion of essential concepts, the identification of all stakeholders who have an impact on and are affected by the design of a governance mechanism, green governance, and the choice of a governance model. Lin, et al. [10] developed an evaluation system of the green governance structure based on green concepts, strategies, values, and organizational structures as part of an endeavour into CSR concerns. With this, it can be claimed that the topic of green governance is developing, gaining academic attention at an increasing rate, and progressively influencing how governments formulate policies.

Due to growing environmental, social, and economic challenges, studies on green governance have arisen in recent years [10]. There are numerous ways to interpret the term "green governance". Lin, et al. [14] have examined it from the standpoint of the colour "green," defining it as the deployment of governance mechanisms to sway firms' green practices. A revolutionary invention termed "green governance" that integrates the idea of sustainability in organizations is nevertheless liable for the long-term impacts on the economy, society, and environment. Protecting society and the environment also responds to the basic needs of external stakeholders while satisfying the needs of internal stakeholders by improving strong financial returns [15]. As a result, most firms promote clean and green strategies to accommodate various stakeholder groups due to corporate governance is viewed as one of the essential techniques for integrating all stakeholders' interests into harmony and directing businesses toward sustainability, and companies often strengthen their structures to encourage such behaviours [16]. It is clear that "Green Governance" refers to the coordination of human-nature conflicts by means of creating a variety of institutional mechanisms or arrangements enabling the scientific application of global green governance decisions and, eventually, safe-guarding continuity and stability of all economic-social environmental systems across the world[17].

The concept of CE is of significant interest to both practitioners and scholars because it is seen as a fulfilling action for enterprises to execute the popular notion of global sustainable development carefully [18]. Furthermore, the circular economy seeks to eliminate waste, which lowers the demand for additional resources. It presents a com-prehensive counterpoint to our "take-make-dispose" economy. This economy assumes that there will always be raw materials to manufacture products out of and a place to dump the refuse. It is becoming increasingly evident that the assumptions of the linear economy are flawed or, at the very least, unsustainable as the world's population continues to expand. Since the First Industrial Revolution, the dominating model of

industrialization has been in jeopardy. The Earth's population was under 1 billion at the time, with an expanding global middle class of consumers, up to 8 billion people living on Earth [19]. Despite all these red flags, we use the same resources and discard them at a startlingly swift pace. According to a United Nations analysis, global resource extraction has surged more than three times since 1970.

Moreover, more than 90% of raw materials are not recycled. Nevertheless, the European Commission approved the amended circular economy action plan (CEAP) in March 2020. It is an essential part of the European Green Deal, the new strategy for sustainable development on the continent. By adopting a circular economy, the EU will reduce the stress on its natural resources, create jobs, and promote sustainable growth. Stopping biodiversity loss and achieving the EU's 2050 goal of climate neutrality is equally crucial. Announcing initiatives throughout the entire product life cycle is the new action plan. It emphasizes product design, encourages sustainable consumption, encourages the circular economy, tries to prevent waste, and aims to keep materials used in the EU economy for as long as possible [19].

Since the research on circular economy is still in its early stages, it is suggested to experimentally validate the paradigm in order to find additional moderating elements that can hasten the connection between circular economy and green governance. For instance, to achieve sustainability, the green board committee should ensure that management operations align with the company's goal, strategy, vision, and challenges related to environmental, societal, and financial performance[20, 21]. Although it may seem complicated, the Circular Economy is based on three fundamental principles: reducing waste and pollution, using resources and goods until they are exhausted, and re-creating natural systems. Forge better ties with Africa and make sure that Free Trade Agreements take the enlarged circular economy goals into account to maximize the benefits of the green transition and the circular economy and support a global shift to it. Traditional research cannot adequately address the extensions and implications of green governance, nor can it provide a suitable theoretical and conceptual framework from the perspective of the development of research paradigms as a successful example of efficient use and resource reintegration [22]

2. Problem statement

There is a lack of knowledge about the options available to be recognized in the various circular alternatives to current business models that companies may innovate. The Global Circular Economy seeks to identify knowledge and governance gaps in

advancing a global circular economy and take forward partnership initiatives, including with significant economies. Therefore, Businesses must pave the way for others to follow by transforming their circular ideology into company policy and demonstrating to others how it can be done to get to this condition where contributing to a circular economy is simple, cost-effective, and the only rational alternative. According to a recent study, implementing the principles of a circular economy throughout the economy of the European Union may increase GDP by 0.5% more by 2030, creating close to 700 000 new employments. Additionally, each company has a strong commercial rationale: manufacturing enterprises in the EU spend 40% of their budgets on materials. According to MacArthur [23], the estimated cost of converting to a circular economy is 108 billion euros. This is due to the more significant expenditures needed to manufacture more robust, long-lasting items and the logistical expenses of recycling garbage and revamping the supply chain.

Additionally, by 2030, India might produce an annual value of Rupees. Based on the current growth projection, there will be 40 trillion dollars in the circular economy sector by 2050. Recently, Indian government entities, corporate associations, and non-profit organizations connected their projects to circular economy ideas [24]. Recycled materials are more likely to be more expensive and of lower quality than virgin materials because of the underdeveloped and ineffective recycling infrastructure in many developing nations.

According to [14], the lack of clarity in assigning duties to diverse subjects and the demand for money, businesses, and individuals frequently impede the development of green governance. Because of this, current green governance practices are commonly restricted in Nigeria to the haphazard green supply chain, green management, green administration, and green manufacturing. Therefore, it is essential to forge a closer connection with Africa, particularly in Nigeria, to maximize the gains of the circular economy revolution and green transition. Additionally, it is crucial to make sure that free trade agreements take the enlarged circular economy goals into account to address a few of the adverse effects that come along with the problems of green governance, such as Low return on assets, slow sales growth, low return on equity, high asset costs, unmaintainable packaging, high energy use, non-ecological products or services, high water use, periodic environmental audits, contamination, and high waste disposal [25]. Establishing a structure for green governance, however, is difficult because it calls for the application of pertinent concepts to the field, the identification of all subjects that have an impact on and are impacted by the design, the field of a governance mechanism, and the choice of a governance mode. But the shift to a circular economy will be substantial,

systemic, and transformative. Because it demands the alignment and collaboration of all stakeholders at all levels of the economy, it will occasionally be disruptive. It is essential to urge developed and developing nations to embrace or update their national circular economy ideas, plans, strategies, and initiatives, considering their aspirations. And add the circular economy to their list of future priorities.

Recently, many companies have realized that the linear method leaves them more open to dangers, particularly the rising cost of resources and supply disruptions. As resource markets increase and prices become less predictable, more and more businesses feel squeezed. Conversely, there is severe rivalry and stagnant demand for certain industries. Because resource scarcity is a key issue for any corporation, there is a need for a notion for a possible future business model adopting the solid guidelines of the circular economy. As a result, governments and businesses are increasingly focused on finding ways to transition to circular economic models.

3. Significance of the study

One of the implications of this study is using green governance techniques to help decrease resource dependence and boost system resilience since circularity establishes a strict distinction between consumable and durable components of a product. Waste does not exist because products are made to be disassembled and reused repeatedly. Therefore, the energy required to run this cycle should be renewable according to nature.

Companies will benefit greatly from the contribution of this study even without the effects of cutting-edge reverse technologies and yet-to-be-developed circular materials, as well as through component recovery and resale. Companies can significantly reduce material costs and warranty risks by implementing green practices. Additionally, “designed to last” contributes to cheaper warranty costs. Switching from inefficient linear material consumption patterns to manufacturing could prove to be a significant innovation engine [26], much like the renewable energy industry is now[27, 28]. This study’s Circular Economy Governance model is essential for the environment’s sustainable management and green competitive advantage. A new customer connection is necessary to have things returned to the manufacturer after the cycle of usage: “consumers” become “users.” More customer insights are obtained for better personalization, customization, and retention with leasing or “performance” contracts in place.

4. Literature review

Green governance is a new idea that includes the concept of sustainability and makes companies responsible for the long-term social, economic, and environmental repercussions [15]. Over the last ten years, academics and businesses have given green governance much attention as it is still a relatively new concept. However, little data exists on how green governance may impact a firm's overall performance [16]. Therefore, most businesses support clean and green practices to appease various stakeholder groups. Because it is seen as one of the key methods for aligning all stakeholders' interests and propelling businesses toward sustainability, companies frequently strengthen their corporate governance structures to promote such behaviours[29] [16]. To assess the consistency and institutional architecture of CSR at the highest level, looking at the green governance structure [14]. However, green governance as a concept for advancing a circular economy has received relatively little attention up to this point.

According to Organization for Economic Cooperation and Development, OECD (2018), the world will be consuming as if there were three planets by 2050, even though there is only one Earth. The world's consumption of resources like fossil fuels, biomass, minerals and metals in the next forty years is projected to double. By 2050, the World Bank (2018) predicts that there will be a 70% increase in yearly trash production [30]. As a result, there is a necessity to speed up the switch to a regenerative growth model that replenishes the planet more than it depletes because resource extraction and processing are to blame for more than 90% of water stress, biodiversity loss, and a large amount of global greenhouse gas (GHG) emissions[31]. This gives developing nations the idea to come up with the Circular Economy Action Plan outlined by the future-focused strategy for obtaining a more competitive and cleaner advantage through co-creation with economic consumers, actors, civil society groups and citizens. Practical communication efforts are required to achieve this, perhaps through the European Green Deal diplomacy of 2020 and the Circular Economy. Missions are created to better coordinate and work together on a global circular economy. Nevertheless, the circular economy (CE) approach, based on the accounts of the World Economic Forum, can safeguard roughly half a trillion dollars of India's GDP value while saving over one trillion dollars annually due to fewer greenhouse gases, cheaper costs, and reduced supply chain risk [24]. The idea of circularity encompasses broad historical and philosophical roots. Hence it cannot be traced to a specific individual or location, a remarkable collection of academic thought leaders. Enterprises have progressively created and refined the circular economy. With his 2002 book "Cradle to Cradle: Remaking the Way We Make Things," which

envisioned products being made to replenish ecosystems instead of harming them, American architect William McDonough (commonly referred to as the “father of circular economy”) propelled the idea from academic theory to mainstream movement.

As guardians of boards of directors (BODs), shareholders’ interests actively participate in the operational and strategic process of decision-making and impact organizations’ policies, strategic directions and plans. [32]. Long-term social, economic, and environmental sustainability are among the characteristics of “green governance” that BODs respect and see favourably [33]; It may be crucial to the success or failure of an organization. Corporate board features, which serve as the underlying framework for green governance procedures, can significantly impact the adoption and effectiveness of organizational reporting systems, especially sustainability reporting practices [34].

However, in a circular economy, resources that were initially taken from the environment are preserved for as long as possible within the economy, switching from linear to circular material flows [35]. In addition to lowering the environmental impact of resource consumption, the conditions for continuing economic growth are created by the transition from linear value chains of finite resources to circular value chains of boundless resources [36]. Conversely, the circular economy is described by [23] as an economic framework with a restorative goal that exclusively strives to rely on renewable energy, minimizes, tracks, and prevents the use of toxic chemicals, and removes waste through careful design.

By fostering business prospects that incorporate the reuse and repair techniques that have historically been used in the public industrial sector, in homes, or among friends, a circular economy is intended to be developed [37]. Alternatively, implementing the circular economy frequently relies on generating revenue from caretaking activities typically carried out at home or locally, including repair and reuse [37]. However, the author believes a system that reduces resource input, emissions, and waste production is known as a circular economy. The Earth is treated under our current economy’s linear model as though it has endless resources and storage space for our garbage. On the other hand, the circular economy acknowledges that these resources are limited and aims to reduce the number of resources used. The amount of trash disposed of by altering how we consume and dispose of it directly contributes to the sustainable development goals [38-40]

According to MacArthur [23], The circular economy makes a clear distinction between the use and consumption of materials: A functional service paradigm is encouraged by the circular economy, in which producers or merchants increasingly retain ownership of their goods and, whenever practical, functioning as a service provider, selling the

use of things rather than their linear consumption. In a circular economy, we reuse our resources and re-inject them into the economy rather than disposing of them. Our consumption of resources and commodities is circular rather than linear. According to Lurie, et al. [19], a significant structural shift and effort from people, companies, and governments are necessary to realize a truly circular economy.

An industrial system with a circular economy aims to be restorative or regenerative from the outset. According to Sikdar [41], it reduces waste by using better products, resources, processes, and business models. This is accomplished by eschewing the idea of "end-of-life" in favour of "restoration," a switch to renewable energy, eliminating hazardous chemicals that prohibit reuse and ceasing to utilize deadly compounds. According to this report, the circular economy gives both consumers and the environment a number of benefits. Because recycling materials fights against planned obsolescence strategies, your products will last longer. To improve disposable income, people are encouraged to engage in more economical habits such as leasing or renting rather than buying things, buying used items, and other examples.

According to the European Environment Agency, up to two-thirds of GHG emissions are caused by manufacturing, disposal, and other facets of material management. It will help decrease that because the circular economy's entire business model is founded on the sustainable management of materials. Materials are managed more effectively through a circular economy by reusing goods and materials, promoting renewable resources, upholding sustainable practices, and other methods [19].

A key element of a circular economy is a zero-waste model [42], which is produced by reusing resources and products. In order to achieve zero waste, landfills, ocean-bound plastics, and the amount of trash in our oceans must all be reduced [43]. Additionally, it implies that we won't have to dig for resources. In contrast to a series of models describing an environment that demands the achievement of zero waste, the circular economy model encourages growth. CE is the optimum goal for organizations, individuals, and governments to pursue while achieving important ecological objectives [19].

A green governance structure can help achieve a good transition to a circular economy through three areas: cooperation with consumers, collaboration between organizations, and cooperation within the organization. In the manufacturing stage of product development, collaboration within an organization is necessary, for instance, between designers, waste processors, and producers, when designing for the product's disassembly. Resource recovery and circular suppliers are essential for organizational

collaboration. Cooperation with customers is required during product use and end-of-life disposal to maximize product usage, encourage recycling, and reduce waste leakage. The first step in shifting a company's processes toward circularity is starting a partnership, but the connections need to be in place before the wheels can start to move.

Several studies have concluded that a green governance structure can help achieve a good transition to a circular economy through three areas: cooperation with consumers, collaboration between organizations, and cooperation within the organization [44]. For example, in the manufacturing stage of product development, collaboration within an organization is necessary between designers, waste processors, and producers when designing for the product's disassembly. Thus, resource recovery and circular suppliers are essential for organizational collaboration. Besides, customer cooperation is required during product use and end-of-life disposal to maximize product usage, encourage recycling, and reduce waste leakage. Therefore, based on the above argument, there is a need to develop a conceptual framework to address the relationship between GG and CE in Nigeria's oil and gas sector, as shown in Figure 1.

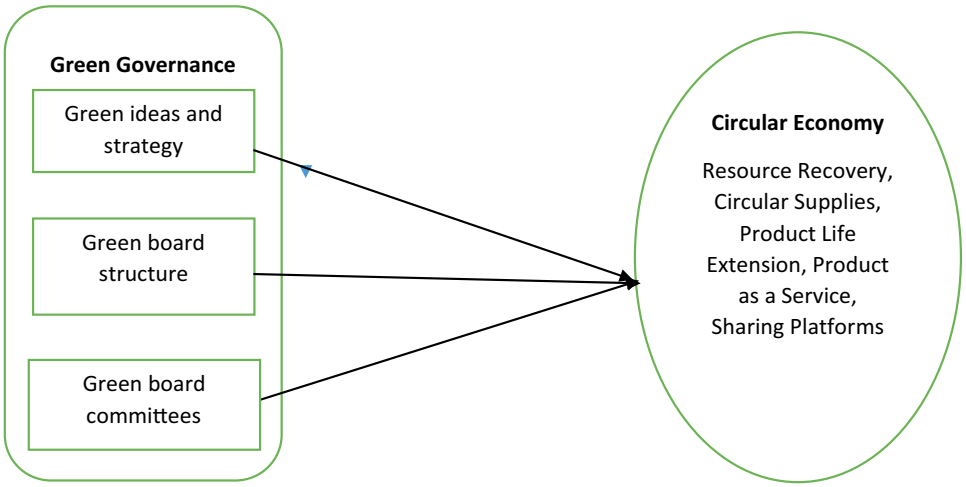

Figure 1: Green Governance Circular Economy Framework.

The study's main goal is to provide a conceptual framework that will help assess how green governance would affect the circular economy in Nigeria's oil and gas industry. Additionally, by implementing CE techniques, the study will highlight the benefits of raising output while changing consumer behaviour. Moreover, demonstrate how and to what extent GG approaches may positively contribute to reducing climate change.

4.1. Relationship Between Green Governance Circular Economy

4.1.1. Green governance ideas and Strategy and the Circular Economy

The circular economy promises green growth and, as a result, a decoupling of economic expansion from its effects on the environment [27]. Green governance concepts and tactics fully represent businesses' focus on CSR continuity over the long run [45]. On the other hand, a circular economy is considered an industrial system that is regenerative or restorative by design and intention. Waste is minimized in a circular economy since everything generated is continuously transported and used elsewhere. In order words, corporate environmental governance is the responsibility of all corporations and organizations to protect the environment. A corporation is supposedly more sustainable, competitive, valuable, and profitable when environmental risk and impact are reduced.

According to the corporate green theory, organizational strategy refers to the internal tactics expressing a firm's moral standards, values, commitment to ecological sustainability, and organizational direction toward environmental sustainability. This strategy is typically reflected in mission statements [46]. Given its goals, developing countries should be pushed to update or adopt their national circular economy ideas, plans, strategies, and KPIs and include the concept in their long-term plans.

Health and living quality depend on environmental quality. The maintenance of environmental quality is aided by green governance. It also maintains biodiversity and the idea of optimum sustainable exploitation in the usage of natural resources by restoring, maintaining, and improving the ecological processes required for the biosphere to function [47]. The circular economy is based on simply three fundamental principles, similar to how the World Economic Forum sees it: minimizing pollution and waste, preserving resources and products, and reviving ecological systems.

4.1.2. Green board Structure and the Circular Economy

The firm's active efforts to raise CSR awareness are by setting up green governance organizations and introducing staff or human resources who have received training in sustainability and environmental issues [48]. In this sense, a circular economy creates jobs because it will necessitate the emergence of numerous new industry kinds and the creation of numerous new occupations. The possibility that some employment prospects, such as those in coal mining or other industries reliant on nonrenewable resources, may be eliminated due to numerous environmental practices significantly causes concerns globally. As we shift to a circular economy, this employment will not only be replaced by other opportunities, but additional occupations may also emerge

[19]. The Board members play a crucial role in creating sustainability policies and goals; thus, seeing a company eager to include sustainability in its governance structure is encouraging. The issue of the energy transition to a low-carbon future and the pursuit of sustainable success is a central theme in which the Board of Directors plays a significant role ([49]

The circular economy model promotes growth in contrast to other environmental models that call for a reduction to attain zero waste. This implies that the circular economy is the perfect objective for businesses, customers, and governments, while also meeting crucial environmental objectives [19]. For all the reasons mentioned above, I predict that firms with a higher percentage of outside directors will show more concern for and attention to ECSR and the circular economy than firms with a lower percentage of outside directors; as a result, more outside directors should be appointed.

4.1.3. Green board committees

Board composition should be developed and included in a framework for green governance to offer firms a diverse method of value creation. Organizations need a green board committee to look at environmental, societal, and financial performance issues to achieve sustainability [50]. However, the existence and contribution of the green board committee will make the circular economy offer excellent, practical, and secure items, as well as efficient and reasonably priced, durable, and built for repair, high-quality recycling and reuse. Sustainable services, digital solutions, and product-as-a-service models have led to better living circumstances, innovative career opportunities, and increased knowledge and skills [51]. Additionally, the committee might reduce the cost of materials through a well-organized structure of a circular economy, allowing firms to run more efficiently. Also, the method may boost customer loyalty. People, corporations, and governments will need a global effort to develop a circular economy, which is not easy [51].

The existence of the green board committees will make organizations come up with the idea of “Giving back to society”, which means engaging in corporate social responsibility (CSR). Most businesses want a good influence on the community in which they are making money [52]. In addition, because current businesses may employ resources they already have rather than limited resources, the circular economy can help them enjoy a more reliable supply of resources.

5. Methodology

The study's cross-sectional survey design will be used to ascertain how the GG has affected CE among Nigerian oil and gas workers. This study is focused on Nigerian industry due to the climate change and air quality challenges [53]. A representative sample for the study would be gathered from Nigerian-registered oil and labour-based enterprises. Both primary and secondary data will be collected for the study, and descriptive statistics, such as mean, percentage distribution, and frequency counts, will be used to examine the quantitative data produced. Structure equation modelling, including the structure and measurement models, will be used to explain the relationship between the dependent and independent variables.

6. Practical Implication

The above proposed Green governance model is to achieve circular economic practices applicable in heavily polluting sectors, such as, pharmaceutical, chemical and oil and gas [54]. Greener solvents such as ionic liquids are utilized in the pharma industry[55], green emulsion liquid membranes [56] are employed to separate the separation of biologically active drug molecules from wastewater [57-60], and biofuel is generated from waste vegetable oil to eliminate unnecessary pollution and spillages [61].

7. Conclusion

Green governance is advocated to improve how people interact with the natural world and to support the idea of creating a human community with a shared destiny[62]. Even though there has been a lot of interest in research on green governance, the study and application of green governance theory have been constrained by a lack of a theoretical foundation and logical scientific representation. It is becoming increasingly important for corporate decision-makers, especially the green board committees, to consider the environment when making decisions, particularly for businesses that produce significant amounts of carbon emissions. Even though not every product may be refurbished, it appears likely that nearly all major corporations will have product lines that can benefit from circular business strategies. With minor adjustments to the "status quo" regarding design, technology, and reverse cycle capabilities, circular business models could generate attractive financial returns at the level of specific products. In order to maximize the benefits of the circular economy and the green transition and to support

a global shift to it, they should forge closer ties with Africa and make sure that the expanded circular economy objectives are reflected in free trade agreements.

Regions, countries, and organizations with different degrees of green governance and circular economy, including those with strong green governance foundations and others with little or no experience with these principles, can adopt the suggested framework. As a result, this article will assist policymakers in comprehending the scope of the effects of GG and CE measures. Additionally, it will serve as a baseline for organizations and other researchers conducting similar studies to identify possible hotspots for action in the fight against climate change. This paper offers legislative, regulatory, and standard-setting bodies, businesses, and researchers' policy, practice, and research implications for developing green business techniques, principles of green governance, and standards for the disclosure of green information that will support the development of their circular businesses. According to the study, future researchers should take gender diversity into account as a moderating variable. For example, women's participation on green board committees will bring ideas on the circular economy and green practices, which can assist academics and practitioners in creating policies and practices that will help address the complex socio-ecological challenges of the 21st century.

References

[1] Khan PA, Johl SK, Akhtar S. Firm sustainable development goals and firm financial performance through the lens of green innovation practices and reporting: A proactive approach. Journal of Risk and Financial Management. 2021;14(12):605.

[2] Khan PA, Johl SK, Johl SK. Does adoption of ISO 56002□2019 and green innovation reporting enhance the firm sustainable development goal performance? An emerging paradigm. Business Strategy and the Environment. 2021;30(7):2922–2936.

[3] Lamidi WA, Oluwatuyi AO, Masunda T, Olagunju A. An assessment of the determinants of environmental costs of listed deposit money banks in Nigeria. International Journal of Business and Management Future. 2020;4(1):12–20.

[4] Atang G, Eyisi S. Determinants of environmental disclosures of listed manufacturing firms in Nigeria. International Journal of Management Studies and Social Science Research. 2020;2(1):143–150.

[5] Jan AM, Marimuthu M, Hassan R, Mehreen. "Sustainable business practices and firm's financial performance in Islamic banking: Under the moderating role of Islamic

corporate governance," (in English), sustainability. 2019 Dec;11(23). doi: ARTN 660610.3390/su11236606

[6] Toha MA, Johl SK. Panel dataset to assess proactive eco-innovation in the paradigm of firm financial progression. Data (Basel). 2021;6(12):131.

[7] Wang XX, Javaid MU, Bano S, Younas H, Jan A, Salameh AA. "Interplay among institutional actors for sustainable economic development-Role of green policies, ecoprenuership, and green technological innovation," (in English), Frontiers in Environmental Science. 2022 Sep 7;10. https://doi.org/10.3389/fenvs.2022.956824.

[8] Khan PA, Johl SK. Firm Performance from the Lens of Comprehensive Green Innovation and Environmental Management System ISO. Processes (Basel). 2020;8(9):1152.

[9] Khan PA, Johl SK, Akhtar S. Vinculum of Sustainable Development Goal Practices and Firms' Financial Performance: A Moderation Role of Green Innovation. Journal of Risk and Financial Management. 2022;15(3):96.

[10] Li WA, Xu J, Zheng MN. "Green governance: New perspective from open innovation," (in English), Sustainability. 2018 Nov;10(11):3845. https://doi.org/10.3390/su10113845

[11] Toha M, Johl SK, Khan PA. Firm's sustainability and societal development from the lens of fishbone eco-innovation: A moderating role of ISO 14001-2015 Environmental Management System. Processes (Basel). 2020;8(9):1152.

[12] Khan PA, Johl SK. Nexus of Comprehensive Green Innovation, Environmental Management System-14001-2015 and Firm Performance [in English]. Cogent Business & Management. 2019 Jan;6(1):1691833.

[13] Khan PA, Johl SK, Kumar A, Luthra S. Hope-hype of green innovation, corporate governance index, and impact on firm financial performance: a comparative study of Southeast Asian countries. Environmental Science and Pollution Research. 2023 Apr;30(19):55237–55254.

[14] Lin R, Gui Y, Xie Z, Liu L. Green governance and international business strategies of emerging economies' multinational enterprises: A multiple-case study of chinese firms in pollution-intensive industries. Sustainability (Basel). 2019;11(4):1013.

[15] Shah SQ, Lai FW, Shad MK, Jan AA. Developing a Green Governance Framework for the Performance Enhancement of the Oil and Gas Industry. Sustainability (Basel). 2022;14(7):3735.

[16] Jan AA, Lai FW, Tahir M. Developing an Islamic Corporate Governance framework to examine sustainability performance in Islamic Banks and Financial Institutions. Journal of Cleaner Production. 2021;315:128099.

[17] Zahid M, Naqvi SU, Jan A, Rahman HU, Wali S. The nexus of environmental, social, and governance practices with the financial performance of banks: A comparative analysis for the pre and COVID-19 periods. Cogent Economics & Finance. 2023;11(1):2183654.

[18] Akamabe UB, Kpae G. A critique on Nigeria national policy on environment: reasons for policy review. IIARD International Journal of Geography and Environmental Management. 2017;3(3):22–36.

[19] Lurie F, Passman M, Meisner M, Dalsing M, Masuda E, Welch H, et al. The 2020 update of the CEAP classification system and reporting standards. Journal of Vascular Surgery: Venous and Lymphatic Disorders. 2020 May;8(3):342–352.

[20] Khan PA, et al. "Injecting Green Innovation Reporting into Sustainability Reporting," SHS Web of Conferences. vol. 124, 2021. https://doi.org/10.1051/shsconf/202112405003.

[21] Khan PA, Johl SK, Ntim CG. Nexus of Comprehensive Green Innovation, Environmental Management System-14001-2015 and Firm Performance. Cogent Business & Management. 2019;6(1):1691833.

[22] Chesbrough HW. Open innovation: The new imperative for creating and profiting from technology. Harvard Business Press; 2003.

[23] MacArthur E. Towards the circular economy. Journal of Industrial Ecology. 2013;2(1):23–44.

[24] Fiksel J, Sanjay P, Raman K. Steps toward a resilient circular economy in India. Clean Technologies and Environmental Policy. 2021;23(1):203–218.

[25] Amare A. Corporate environmental responsibility in Ethiopia: a case study of the Akaki River Basin. Ecosystem Health and Sustainability. 2019;5(1):57–66.

[26] Toha MA, Johl SK. "Does Proactive Eco Eco-Innovation Matter in the Energy Sector?" in European Conference on Management, Leadership & Governance, 2021: Academic Conferences International Limited, pp. 420-XIV.

[27] Johl SK, Toha AM. "The nexus between proactive eco-innovation and firm financial performance: a circular economy perspective," sustainability. 2021;13(11):6253. https://doi.org/10.3390/su13116253.

[28] M. A. TOHA. Eco-innovation, board of directors and firms financial performance: A study on Malaysian energy listed companies. Universiti Teknologi Petronas; 2021.

[29] 29. Jan A et al. "Islamic corporate sustainability practices index aligned with SDGs towards better financial performance: Evidence from the Malaysian and Indonesian Islamic banking industry," Journal of Cleaner Production. 2023; 405. https://doi.org/10.1016/j.jclepro.2023.136860

[30] Bank W. “Poverty and shared prosperity 2018: Piecing together the poverty puzzle,” ed: The World Bank, 2018.

[31] Munodawafa RT, Johl SK. “A systematic review of eco-innovation and performance from the resource-based and stakeholder perspectives,” sustainability. 2019;11(21):6067. https://doi.org/10.3390/su11216067.

[32] Amran A, Lee SP, Devi SS. The influence of governance structure and strategic corporate social responsibility toward sustainability reporting quality. Business Strategy and the Environment. 2014;23(4):217–235.

[33] Post C, Rahman N, Rubow E. Green governance: boards of directors’ composition and environmental corporate social responsibility. Business & Society. 2011;50(1):189–223.

[34] Formentini M, Taticchi P. Corporate sustainability approaches and governance mechanisms in sustainable supply chain management. Journal of Cleaner Production. 2016;112:1920–1933.

[35] Hird MJ, Lougheed S, Rowe RK, Kuyvenhoven C. Making waste management public (or falling back to sleep). Social Studies of Science. 2014 Jun;44(3):441–465.

[36] Gregson N, Crang M, Fuller S, Holmes H. Interrogating the circular economy: the moral economy of resource recovery in the EU. Economy and Society. 2015;44(2):218–243.

[37] Isenhour C, Reno J. On materiality and meaning: ethnographic engagements with reuse, repair & care. Worldwide Waste: Journal of Interdisciplinary Studies. 2019;2(1):1.

[38] Jan AA, Lai FW, Asif M, Akhtar S, Ullah S. Embedding sustainability into bank strategy: implications for sustainable development goals reporting. International Journal of Sustainable Development & World Ecology. 2023;30(3):229–243.

[39] Jan AA, Lai FW, Siddique J, Zahid M, Ali SE. A walk of corporate sustainability towards sustainable development: a bibliometric analysis of literature from 2005 to 2021. Environ Sci Pollut Res Int. 2023 Mar;30(13):36521–36532.

[40] Jan AA, et al. Integrating sustainability practices into islamic corporate governance for sustainable firm performance: from the lens of agency and stakeholder theories. Qual Quant. 2021:1–24.

[41] Sikdar S. “Circular economy: Is there anything new in this concept?” vol. 21, ed: Springer, 2019, pp. 1173-1175. https://doi.org/10.1007/s10098-019-01722-z.

[42] Toha MA, Akter R, Uddin MS. Paradigm of sustainable process safety management for industrial revolution 4.0: A circular economy and sustainability perspective. Process Safety Progress. 2022;41 S1:S17–26.

[43] Khan PA, et al. “Injecting Green Innovation Reporting into Sustainability Reporting,” in SHS Web of Conferences, 2021, vol. 124: EDP Sciences, p. 05003. https://doi.org/10.1051/shsconf/202112405003.

[44] Liu J, Feng Y, Zhu Q, Sarkis J. Green supply chain management and the circular economy: reviewing theory for advancement of both fields. International Journal of Physical Distribution & Logistics Management. 2018;48(8):794–817.

[45] Alam SS, Islam KZ. Examining the role of environmental corporate social responsibility in building green corporate image and green competitive advantage. International Journal of Corporate Social Responsibility. 2021;6(1):1–16.

[46] Mehrajunnisa M, Jabeen F, Faisal MN, Mehmood K. Prioritizing green HRM practices from policymaker’s perspective. International Journal of Organizational Analysis. 2021;30(3):652–678.

[47] Ogunkan DV. “Achieving sustainable environmental governance in nigeria: a review for policy consideration,” Urban Governance, 2022. https://doi.org/10.1016/j.ugj.2022.04.004.

[48] Li W, Zheng M, Zhang Y, Cui G. Green governance structure, ownership characteristics, and corporate financing constraints. Journal of Cleaner Production. 2020;260:121008.

[49] Li M, Trencher G, Asuka J. The clean energy claims of BP, Chevron, ExxonMobil and Shell: A mismatch between discourse, actions and investments. PLoS One. 2022 Feb;17(2):e0263596.

[50] García-Sánchez IM, Gomez-Miranda ME, David F, Rodríguez-Ariza L. The explanatory effect of CSR committee and assurance services on the adoption of the IFC performance standards, as a means of enhancing corporate transparency. Sustainability Accounting, Management and Policy Journal; 2019. https://doi.org/10.1108/SAMPJ-09-2018-0261.

[51] Johansson N. Does the EU’s Action Plan for a Circular Economy Challenge the Linear Economy? Environ Sci Technol. 2021 Nov;55(22):15001–15003.

[52] Onwuegbuchi C. “Telecom operators as socially responsible organisations,” Communications week media Ltd. Nigeria communications week. Com, 2009.

[53] Yusuf M, Khan HW, Beg M, Ekeoma BC, Nishat A, Al-Othman AL. Effect of Climate Change on Air Quality: A Nigerian Perspective. Climate Change Impacts on Nigeria: Environment and Sustainable Development. Springer; 2023. pp. 19–38.

[54] Khan HW, Elgharbawy AA, Bustam A, Moniruzzaman M. Design and Selection of Ionic Liquids Via COSMO for Pharmaceuticals and Medicine. Application of Ionic Liquids in Drug Delivery. Springer; 2021. pp. 137–164.

[55] Khan HW, Reddy AV, Bustam MA, Goto M, Moniruzzaman M. Development and optimization of ionic liquid-based emulsion liquid membrane process for efficient recovery of lactic acid from aqueous streams. Biochemical Engineering Journal. 2021;176:108216.

[56] Khan HW, Elgharbawy AA, Bustam MA, Goto M, Moniruzzaman M. Vegetable Oil-Ionic Liquid-Based Emulsion Liquid Membrane for the Removal of Lactic Acid from Aqueous Streams: Emulsion Size, Membrane Breakage, and Stability Study. ACS Omega. 2022 Aug;7(36):32176–32183.

[57] Khan HW, Reddy AV, Nasef MM, Bustam MA, Goto M, Moniruzzaman M. Screening of ionic liquids for the extraction of biologically active compounds using emulsion liquid membrane: COSMO-RS prediction and experiments. Journal of Molecular Liquids. 2020;309:113122.

[58] Ting HC, Khan HW, Reddy AV, Goto M, Moniruzzaman M. Extraction of salicylic acid from wastewater using ionic liquid-based green emulsion liquid membrane: COSMO-RS prediction and experimental verification. Journal of Molecular Liquids. 2021:118280.

[59] Malik H, Khan HW, Hassan Shah MU, Ahmad MI, Khan I, Al-Kahtani AA, et al. Screening of ionic liquids as green entrainers for ethanol water separation by extractive distillation: COSMO-RS prediction and aspen plus simulation. Chemosphere. 2022 Oct;311(Pt 2):136901.

[60] Warsi Khan H, Kaif Khan M, Moniruzzaman M, Al Mesfer MK, Danish M, Irshad K, et al. Evaluating ionic liquids for its potential as eco-friendly solvents for naproxen removal from water sources using COSMO-RS: computational and experimental validation. Environmental Research. 2023 Aug;231(Pt 1):116058.

[61] Khan HW, Moniruzzaman M, Nasef MM, Bustam MA. Ionic liquid assisted cellulose aerogels for cleaning an oil spill. Materials Today: Proceedings. 2020;31:217–220.

[62] Zhang Y, Guo X. The Dilemma and Path of Rural Environmental Governance in China: From the Perspective of a Community with a Shared Future. International Journal of Environmental Research and Public Health. 2023 Jan;20(2):1446.