CHAPTER: 13

SUSTAINABLE MANAGEMENT PRACTICES: RESEARCH PATHWAYS FOR A GREEN ECONOMY

Dr. MANOJ PATEL
Institute of Advanced Research, Gandhinagar, Executive Registrar (Fin, Infra & Legal)

Dr. M SAMIR GOPALAN
Dean & Director, Silver Oak College of Liberal studies,
Silver Oak University, Silver Oak College of Business Management

Prof. CHANDER RAJPUROHIT
Asst Prof. Silver Oak College of Liberal studies, Silver Oak University,
Silver Oak College of Business Management

Ch.Id:-NSP/EB/AARDAMGP/2025/Ch-13

ABSTRACT

The focus of this chapter's examination of sustainable management practices and research directions for a green economy is on the incorporation of green technologies, the usage of renewable energy, ESG ratings, and life cycle assessments. It examines frameworks, policy procedures, and significant implementation barriers such as financial constraints, inconsistent policies, and concerns about greenwashing at the national and international levels. The importance of public-private partnerships and digital transformation in advancing sustainability is emphasized, along with real-world case studies demonstrating effective corporate initiatives. The chapter concludes with suggestions for future research objectives to advance global sustainability goals.
Keywords: *Sustainable management, Green economy, corporate sustainability, Environmental governance, ESG, Circular economy, Green innovation.*

1. INTRODUCTION

1.1 Contextualizing Sustainability in the 21st-Century Global Economy

1.1.1 Evolution of sustainability in business and policy

In business sustainability refers to practices, strategies and generating new thoughts to reduce the negative impact of the environmental and social factors that happens due to the operating the business. Metrics like environmental factor, social factor, and governance controls the sustainability practices for environment sustainability in business. Because of the increasing business, industries,

and other infrastructures the earth get affected and climate changes are also happening. Due to this reason the earth is getting weaker and weaker this suffers the business and troubles the sustainability practices.

The 1987 Brundtland Report, also known as Our Common Future, by the World Commission on Environment and Development, contains the traditional definition of sustainable economic development. "Meets the needs of current generations without compromising the ability of future generations to meet their own needs" is the definition of sustainable economic development.6. Despite its breadth, the traditional definition of sustainability includes two fundamental tenets that provide normative direction: In addition to protecting the natural resource base and advancing social welfare, economic activity should also consider the effects on future generations and manage the natural resource base to ensure its productivity for future uses.

Different parts of the world will have different definitions of sustainable development. Africa differs from Asia, for example, in its natural resources, demographic issues, cultural standards, and governmental structures. Consequently, different regions will have varied definitions of what it means to "meet the needs of the present."

Additionally, because different businesses can have such diverse social, economic, and environmental repercussions, the notion of sustainable development will have different implications for each industry. The garment business faces different sustainability challenges than coal mining. Notwithstanding the wide range of regional and industry-specific variance, all firms can benefit from two universal sustainable development principles.

The idea of sustainability is to balance social, economic, and environmental considerations while making company decisions. It entails managing resources over generations, generating opportunities and long-term value for coming generations. In this situation, the values of stewardship and balance are crucial. The goal of sustainable economic development is to satisfy present demands without sacrificing the capacity of future generations to satisfy their own. Managing company success in terms of social, economic, and environmental performance is central to the sustainable business concept. It covers a range of ethical business concerns, including water scarcity, deforestation, climate change, community effects, and labor standards.

John Elkington developed the "balancing needs" idea in the 1990s, and it highlights the significance of three different performance metrics: the organization's impact on people, pollution and resource depletion, and revenues and losses. For sustainable company, this idea acts as an organizing concept. By using appropriate harvesting techniques and recycling old products, supply chain and

operations management can implement the stewarding resources principle, which lowers waste and the need for new materials.[1]

1.1.2 Global Shifting from CSR to ESG-driven management strategies

The Cleveland Foundation was established in 1914 by Frederick Goff, a prominent Cleveland banker and trustee of the Cleveland Trust Company. Its goal was to empower the community by allowing donations from several sources rather of just one, allowing them to evaluate needs and respond to the community as a whole. This was the first foundation for a community.

Another way to pool resources and centralize the solicitation of the wealthy was through the establishment of "community chests," which were the forerunners of the United Way, during this period and into World War I. Payroll deductions for charitable contributions made through the workplace into "community chests" started in the 1920s. It wasn't widely recognized as a conventional method of donating, though, until World War II. One of the first mutual funds to implement socially responsible investing (SRI) criteria was the Pioneer Fund, which was founded in 1928 and avoided businesses in the gaming, alcohol, and tobacco sectors.

But enterprises, not their owners or shareholders, were only allowed to donate to charities after 1935.

The "father of CSR" is frequently credited to American economist Howard Bowen, who also served as president of Grinnell College. His 1953 book, Social Responsibilities of the Businessman, promoted business ethics and responsiveness to societal stakeholders by tying firms' responsibilities to society.

After the Committee for Economic Development established the idea of the "social contract" between business and society in 1971, corporate social responsibility (CSR) really took off in the United States in the 1970s. The social contract is predicated on the notion that since businesses operate with the "consent" of the public, they have a duty to actively address societal demands. Today, this is frequently referred to as a "license to operate," meaning that they are able to do more for society than just sell goods.

In order to determine how choices about which causes to support were made, Professor Sandra L. Holmes carried out a survey on corporate social responsibility in 1976. Her findings about how executives view corporate social responsibility might be summed up as follows:

Making use of a company's capacity to assist with a particular need:

- The degree of societal need

[1]*Full text available on : https://catalogimages.wiley.com/images/db/pdf/9781118441046.excerpt.pdf*

- Interest of executives
- PR obtained through action
- influence of the government

Carroll's description of CSR was interpreted as a three-pronged strategy using The Evolution of the Corporate Social Performance Model, which was introduced in 1985:

Businesses formed policies (handling particular concerns), established and implemented formal processes (how they would respond), and adopted principles (or ethics).

Early adopters of corporate social responsibility (CSR), such as Johnson & Johnson and Hershey Company, prioritized helping their communities and customers. Over time, CSR has undergone tremendous change. After the Companies Act of 2013 required corporate social responsibility (CSR) for businesses operating in India, the term "sustainability" gained popularity in the middle of the decade. The significance of sustainability and climate action was further underscored by the Paris Climate Agreement and the Sustainable Development Goals of the United Nations.

Delivering value to consumers, investing in employees, treating suppliers fairly, supporting communities, and creating long-term value for shareholders are all part of the Business Roundtable's 2019 Statement on the Purpose of a Corporation. Leaders are assisting businesses in defining their competence-based, culture-based, or cause-based purposes, which has elevated the discussion of corporate mission.

A popular management theory in the 1950s and 1960s, stakeholder capitalism is now a topic that corporate executives are talking about more and more. By obtaining the B Corp Certification and Public Benefit Corporation status, some businesses are even starting to formalize their dedication to social and environmental impact. The first publicly traded firm to become a public benefit corporation was Veeva Systems in 2021.

The CSR field faced challenges such as the economic crisis, COVID-19 pandemic, and racial justice movement in 2020. The driving theme in CSR is interconnectivity, connecting business and consumers, corporations and employees, employees and communities, racial justice and environmental justice, climate change and the economy, and more. As we enter 2024, CSR and ESG practitioners face questions about the Supreme Court's ruling on Affirmative Action and upcoming regulations. As new professionals join the field, it is crucial to understand its origins, evolution, and future trends2.

[2] https://accp.org/resources/csr-resources/accp-insights-blog/corporate-social-responsibility-brief-history/.

1.1.3 Global economic interdependencies shaping sustainability discourse

The globalized economy is essential to the sustainability of the planet and has had a profound impact on daily living. The globalized world's operating framework is made up of the economy, monetary systems, and financial markets. A key component of economic sustainability is the unequal distribution of income, and the growing accumulation of riches puts the sustainability of the world in jeopardy. Social and environmental sustainability provide issues for economically distressed countries. Rich countries' increased consumption footprint is made possible by wealth, while impoverished countries are prevented from making the necessary investments and consumer choices. Rich nations maximize profits through illicit labor and manufacturing methods by outsourcing unsustainable industrial activity to developing nations with laxer laws [1].

When sustainability is approached with consideration for interregional connections, it becomes clear that: (1) society in almost every region has an interest in maintaining the health of ecosystems in other regions; (2) production, consumption, and policy decisions in any given location have the potential to create invisible, unsustainable burdens on connected productive ecosystems in distant locations; (3) ecological change in one region has the potential to jeopardize the sustainability of other regions; and (4) almost every significant human population or nation depends, in part, on energy/material flows to and from distant places elsewhere in the world [2].

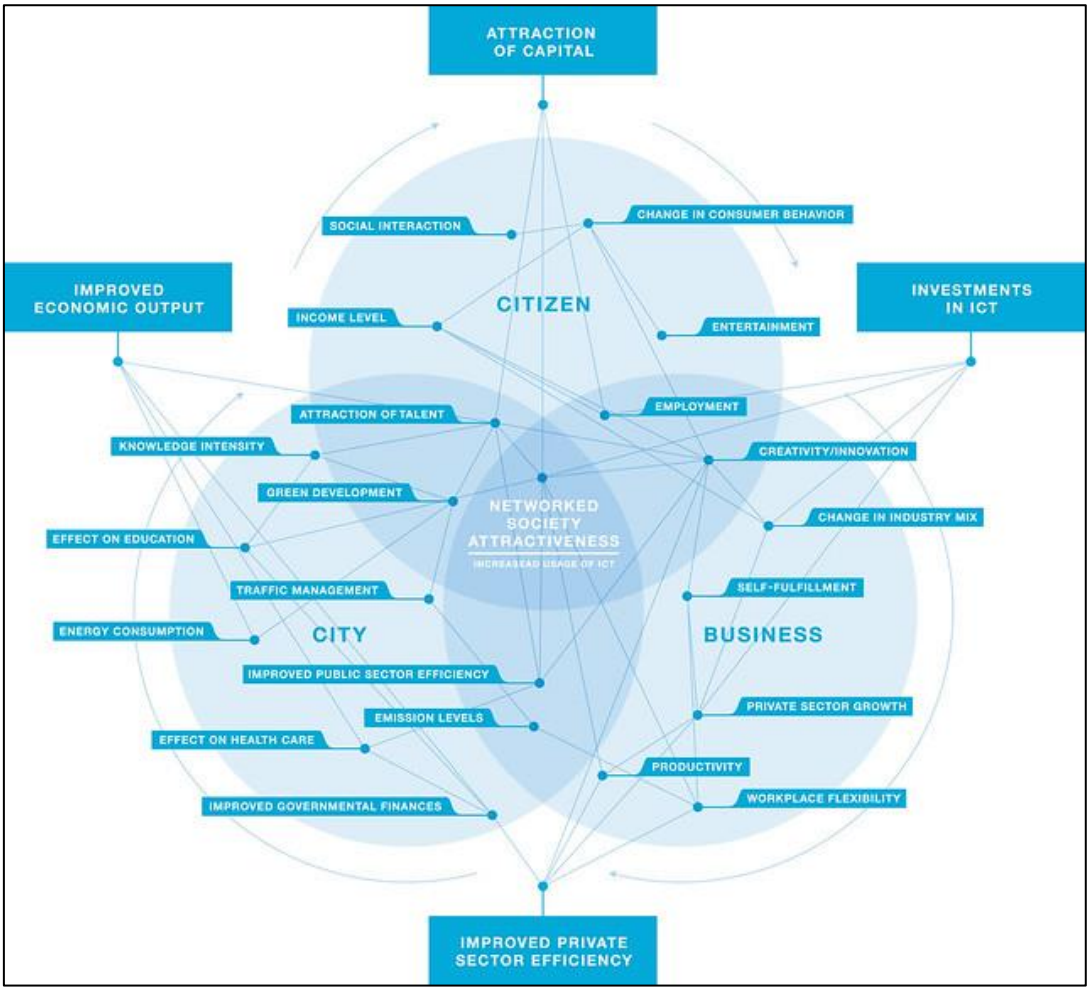

Figure 11.1 Global economic interdependencies shaping

1.2 The Urgency for Sustainable Transformation

1.2.1 Climate Change as a Strategic Management Concern

Corporate social responsibility (CSR) and environmental stewardship are essential components of moral and sustainable management techniques. They highlight a company's dedication to social welfare, resource conservation, and environmental preservation. Environmental stewardship includes encouraging eco-friendly technologies, cutting waste, lowering energy use, and limiting the ecological impact of an organization's operations. However, CSR broadens the scope to include social welfare and community development in addition to environmental issues. It encompasses community development initiatives, employee volunteerism, philanthropy, and assistance for underprivileged

populations. CSR programs frequently entail making investments in nearby areas and cultivating a good rapport with stakeholders and governmental organizations.

CSR and stewardship are both seen as essential elements of a business's image and reputation. Growing public knowledge of social injustices, environmental challenges, and ethical dilemmas has helped them gain traction. These practices are being promoted by governments and regulatory agencies; in certain areas, businesses are required to reveal their social and environmental effects, and incentives are provided for using sustainable practices. Organizations may become change agents and help create a more sustainable and just world by adopting these strategies [3]

The principles that guide a company's operations—profit-making capacity, risk-taking behavior, and entrepreneurship—describe the essence of the business [4]. Innovativeness, efficacy, development, and value generation are the attributes of a company's operations that serve as its goals. A business's environment and the internal procedures it intentionally develops—that is, how it handles them—have an impact on how it accomplishes these goals [5].

There is a lot of debate about whether a company's operations are purposeful and how to define corporate objectives [6]. Although a company's goals unquestionably influence planning, set development trends, serve as motivators, and provide the foundation for corporate operations, they don't necessarily result in a cohesive system [7].

1.2.2 Resource Scarcity and the Circular Economy Imperative

The circular economy is a regenerative system that aims to maximize the value of resources. By extending the lifespan of goods, materials, and components, it does this. This challenges the conventional linear approach, which is heavily reliant on the extraction of resources, mass production, and short product lifespans, all of which generally leads to wasteful disposal practices.

The circular economy, which seeks to reduce waste and increase resource efficiency, is a crucial component of sustainable management. It balances economic success with environmental aims by incorporating ideas into business sustainability initiatives. Successful strategies for lowering resource use, prolonging product lifecycles, and encouraging innovation are demonstrated by case studies. Complex issues including supply chain reorganization, stakeholder involvement, and regulatory compliance are necessary, nevertheless [8].

Productivity and resource efficiency guarantee that resources are used effectively throughout the supply chain and at every step of their lifecycle, including extraction, transportation, manufacture, consumption, recovery, and disposal. From the standpoints of supply security and the environment, it

is imperative to transition to a resource-efficient and circular economy, which lays the groundwork for a competitive and sustainable economy[3].

Benefits of Circular economy

The conventional linear economic model is facing difficulties from waste, resource shortages, and climate change. By severing the connection between growth and consumption, a circular economy provides a sustainable alternative as the world's population and resource demand rise. This model emphasizes regenerating natural systems, reducing waste, and using resources continuously. The circular economy offers a comprehensive approach to sustainable development by reassessing end-of-life plans, supply chains, consumer trends, and product design.[4]

1.2.3 ESG Mandates and Stakeholder Expectations

Corporate reporting has changed as a result of the growing focus on Environmental, Social, and Governance (ESG) considerations, especially in relation to how these concerns affect financial performance. This study examines how sustainability policies affect profitability, risk management, and investor behavior in order to better understand the relationship between ESG reporting and corporate financial performance. Businesses are increasingly incorporating ESG measures into their reporting systems in response to stakeholder and regulatory demands for increased transparency. The degree to which ESG compliance results in observable financial gains is still up for discussion, though. This study uses a mixed-methods approach, analyzing both qualitative information from interviews with industry experts and quantitative financial data from companies that use ESG reporting [9].

The Environmental, Social, and Governance (ESG) framework helps stakeholders understand how a company is managing opportunities and risks related to these criteria. Sustainability encompasses more than only environmental concerns, according to the comprehensive perspective of ESG.

[3] https://www.oecd.org/en/topics/policy-issues/resource-efficiency-and-circular-economy.
[4] https://www.rts.com/blog/benefits-of-circular-economy.

Figure 11.2 ESG System

Customers, suppliers, and employees are all stakeholders, and while the term ESG is frequently used in relation to investing, the sustainability of an organization's operations is becoming more and more important to all of these groups.

Environmental aspects encompass an organization's risk management and environmental impact, including stewardship of natural resources and greenhouse gas emissions. Social aspects encompass an organization's interactions with stakeholders, including its influence on communities and metrics related to human capital management. ESG standards go beyond the business and its supply chain partners, particularly in developing nations. Understanding how internal controls foster accountability and transparency, shareholder rights are respected, and leadership incentives match stakeholder expectations is all part of corporate governance. ESG analysts seek to comprehend these elements in order to better comprehend and oversee a firm.[5]

1.3 Research Problem and Objectives

1.3.1 Research Problem

The theoretical underpinnings of sustainable management and their actual application in various economic contexts continue to diverge significantly despite the growing global conversation on sustainability. Rather than incorporating sustainability initiatives into their core business strategies, many organizations adopt them primarily to comply with regulatory requirements or improve their corporate image. This frequently leads to disjointed initiatives, greenwashing, and a small, intangible impact on social and environmental outcomes. The widespread use of sustainable management

[5] https://corporatefinanceinstitute.com/resources/esg/esg-environmental-social-governance/.

practices is further hampered by differences in developed and developing economies' resource availability, adoption of new technologies, and legislative frameworks.

Insufficient empirical research that combines management strategies, innovation pathways, and policy interventions into a workable framework is a critical issue, even though the green economy has emerged as a guiding paradigm for balancing ecological stewardship with economic growth. Without this kind of integration, companies run the risk of missing out on chances to create long-term value and be resilient to changing stakeholder expectations, resource scarcity, and climate change.

1.3.2 Objectives

The main objectives for this studies are-

- To examine the conceptual foundation and changing trends of sustainable management practices in the field of green economy.
- To identify the key drivers, barriers and enablers those can affect the sustainable oriented strategies across the industries.
- To analyse the role of technological innovation, governance mechanisms, and stakeholder engagement in advancing the goals of sustainability.
- Exploring the empirical insights and case studies that can demonstrate effective integration of sustainability concept into organizational decision making.

1.4 Significance of Integrating Sustainable Practices in Management Research

1.4.1 Relevance for academia, industry, and policymakers

Understanding the intricate and ever-changing relationships between human and ecological systems is the goal of sustainability science, which seeks to create and alter these systems in a sustainable way [10]. Since sustainability issues span several academic fields, including the social sciences, humanities, and natural sciences, interdisciplinary has emerged as a key concept in the field of sustainability science. However, interdisciplinary in and of itself is insufficient for tackling complex, real-world sustainability issues. Transdisciplinary, or active cooperation with different stakeholders across society, must be another essential element of sustainable science. The issues of institutionalization must be addressed by higher education institutions in addition to putting interdisciplinary and transdisciplinary into practice [10]. University research on corporate sustainability management has advanced our knowledge of sustainability, but in its current state, it is not very effective in influencing society outside of academia. Previous study has concentrated on insufficient ideas and been motivated by a system that ignores solutions for real-world issues when it comes to the structures and concepts that form the foundation of corporate sustainability management

research [11]. More and more, academics are expected to come up with tangible, immediately applicable answers to challenging "real-world problems" like poverty, development, and environmental degradation. However, the various impacts of this kind of problem-centered research have not yet been sufficiently captured by traditional evaluations of science's influence on society. This paper illustrates the breadth, intricacy, and potential long-term nature of effect in interdisciplinary sustainability research with a case study of a large-scale initiative on (un)sustainable consumption. As a result, it backs claims for alternative methods of evaluating impact that challenge accepted notions of putting scientific knowledge into practice, appreciate the multifaceted nature of relationships between science and society, and acknowledge the various ways in which scientists and non-scientific actors interact through non-academic channels and products [12].

1.4.2 Impact on competitiveness, resilience, and innovation

With a greater understanding of the social and economic effects of sustainability practices, businesses are now focusing on them globally. Organizations, however, frequently find it difficult to maximize the advantages of these practices, concentrating on Environmental, Social, and Governance (ESG) rankings. Businesses require special, adaptable capabilities that can change with the market and take advantage of new opportunities in order to obtain a competitive edge. In order to provide a framework for businesses to transform existing sustainability practices into dynamic capabilities for long-term competitive advantage, a study looks into the factors that influence corporate sustainability and dynamic capabilities. Based on the Dynamic Capabilities (DC) hypothesis, the framework claims that corporate sustainability creates sustainable dynamic capabilities, which in turn create prolonged competitive advantage, and that corporate sustainability mediates the relationship between the two [13]. According to a report, new technologies like big data analytics, blockchain, IoT, and AI turn conventional supply chains into dynamic ecosystems. According to the study, supply chain dynamism, regulatory uncertainty, and the incorporation of cutting-edge technology all attenuate the positive effects of digital transformation on resilience and sustainability outcomes. The benefits of digital technology on resilience are enhanced by high supply chain dynamism, yet implementation obstacles may arise due to regulatory uncertainty. Transforming digital activities into real sustainability gains requires the successful integration of cutting-edge technologies [14]. A study examined the application of sustainable development goals as a corporate strategy by multinational manufacturing companies based in Sweden. It makes use of theories and frameworks such as the Triple Bottom Line, Resource-Based View, Natural Resource-Based View, and the Sustainable Development Goals Framework. Three case companies were used in the study, which revealed that these businesses strategically include sustainable development goals including decarburization, circular product design, green logistics, and sustainable innovations into their business plans. These tactics improve corporate development, employee motivation, operational effectiveness, and stakeholder trust. They must, however, contend with issues including foreignness responsibility,

exorbitant expenses, complicated regulations, and striking a balance between sustainability and profitability. For legislators and company executives attempting to promote sustainable development in the manufacturing industry, the report offers insightful information [15].

The best interests of all stakeholders—including staff members, customers, and the community—are given top priority under responsible leadership (RL). This study looks into how RL affects workers' well-being and resilience in the face of uncertainty. The study, which focuses on 74 empirical papers released between 2015 and 2023, shows that RL is still in its infancy. Additionally, by analyzing the mediating function of leader group prototypicality and employee psychological empowerment, the study investigates the relationship between RL and employee resilience. The study also looks into the moderating effect of open communication and the mediating impact of organizational fairness and leader trust [16].

1.5 Linkage to the United Nations Sustainable Development Goals (SDGs)

1.5.1 Direct and indirect contributions to selected SDGs

In discussions about sustainable development, real estate and construction have played a major role. However, the environmental aspect continues to be the primary focus of the prevalent definition of sustainability in the real estate and construction industries. The building industry has new opportunity to broaden its emphasis thanks to the 2030 Agenda and its Sustainable Development Goals (SDGs). Existing green ratings, sustainability evaluation instruments, and standards are used in the literature to explore how buildings and construction might support the 2030 Agenda for Sustainable Development. Exploring the wide confluence between the building industry and the SDGs and their goals, on the one hand, received less attention [17].

The Sustainable Development Goals (SDGs) and their effects on sustainability are examined in this research along with how organizations are tackling them. 294 people responded to a poll that was performed. The findings demonstrated that, with three exceptions (SDGs 4, 5, and 16), the effects of organizations on the SDGs are applicable to all kinds of organizations. The study demonstrated that organizations use a compartmentalized strategy to addressing the SDGs and created an SDG effect category. With an emphasis on how organizations contribute to sustainability, the "impacts of organizations on the SDGs framework" was proposed. According to the research, some SDGs can be directly contributed to by organizations, while others cannot. Consequently, the conversation needs to change from integrating SDGs on organizations to concentrating on their role [18].

1.5.2 Corporate Contribution

According to the report, multinational corporations can use their regular investments to support the Sustainable Development Goals of the UN. Depending on whether the objective reduces negative externalities like excessive consumption or resource use or increases positive ones like

wealth, education, or health, it is divided into six categories. According to the study, while external investments create externalities related to competition, multinational corporations' internal investments in their host-country subsidiaries can mitigate externalities in host-country communities [19].

1.5.3 Alignment with global sustainability agendas

Alignment Mechanisms for Governing the SDGs

Although the Sustainable Development Goals (SDGs) are supposed to be implemented in an indivisible fashion, countries run the risk of selectively implementing the SDGs that suit their own policy interests due to the complexity of their relationships. Ten governance mechanisms have been identified to help development players coordinate their activities across various sectors, jurisdictions, and levels in order to progress integrated development processes. Interdepartmental, public-private, donor-recipient, and donor-donor alignment can be achieved through these approaches. The authors note a trend toward more integrated forest and landscape restoration efforts through 20 interviews with public and private actors in Ethiopia; however, crucial mechanisms to establish synergies and negotiate trade-offs between various objectives remain absent or are not operating as intended [20].

1.5.4 Aligning Corporate Strategies with the Sustainable Development Goals

By incorporating sustainability concepts into their business strategy, the private sector may help achieve the Sustainable Development Goals (SDGs), according to the UN 2030 Agenda. However, successful sustainable green development and knowledge creation are necessary for incorporating SDGs into business strategy. The function of corporate strategies in achieving the SDGs in Asian and Eastern European nations is examined in this special issue. The study emphasize the need for more research on cross-country analysis, the role of additional strategies including integrated reporting and long-term value, and the contribution of corporate strategies to SDG attainment [21].

2. LITERATURE REVIEW

2.1 Evolution of Sustainable Management Concepts

Meeting the needs of current and future generations without sacrificing their capacity to fulfill their own needs is the main goal of sustainable development, which was first described in 1972. Since the release of "Our Common Future" in 1987, it has gained widespread recognition as a vision for the twenty-first century. The idea came forth in response to growing disparities, poverty, resource depletion, and pollution. It is currently chosen over expansion, which is perceived as a quantitative rise in physical scale, without addressing qualitative factors like education, health, and equality. From being a means of preventing natural disasters, the concept of sustainable development has grown into a complicated economic and societal problem [22].

The theoretical definitions of sustainability and sustainable development are examined in this paper, with an emphasis on their advantages and disadvantages. Critics point to the concept's vague definition, its introduction into the discussion of the 1990s, and the rise of new alternatives like degrowth and buen vivir. The assessment does, however, also emphasize sustainability's potential as a growing paradigm for environmental management and scientific inquiry [23]. A research investigated the application of IoE, IoT, intelligent systems, and distributed energy generation through smart grids (SG) for the development of sustainable, low-carbon energy. It emphasizes how these technologies can be used together to optimize usage automatically and boost network performance. The writers also give a thorough rundown of how SG has developed, outline the key elements of IoE for decarbonization, and offer mathematical models to assess how well it reduces CO2 emissions [24].

2.2 Triple Bottom Line (TBL) Framework

Providing a triple bottom line (TBL) framework for sustainable retail location choices in developing countries is the goal of this study. The DEMATEL method examines 25 sub-factors with an emphasis on environmental, social, and economic aspects. The findings indicate that economic factors are the most important factor, influencing social and environmental factors to make sustainable choices. When choosing a retail location, the framework offers guidance on how to achieve sustainability and insights into the applicability of selection criteria [25].

The triple bottom line (TBL), which emphasizes balancing social, environmental, and economic aspects, has brought attention to the significance of sustainability since the 2008 financial crisis. Critics counter that TBL lacks innovation and is not grounded in the true idea. They contend that rather than offering a thorough grasp of the triple bottom line, it only describes the current notion of corporate social responsibility (CSR) and a sustainability measurement instrument [26].

To solve the triple-bottom-line (TBL) problem for a healthy ecosystem, society, and economy, mainstream civilizations can learn a lot from eco-champions in eco-communities. Eco-communities provide lead users and important informants for their environmentally revolutionary TBL solutions and are self-sufficient. Though mostly lacking in mainstream society, thirteen lifestyle-related alternatives pertaining to living space, food, recreation, and employment were found. The study suggests five ideas—understanding, awareness, greenwashing, trust, nature-based solutions, and fewer transportation needs—to start eco-innovation networks in mainstream societies [27].

The aspects of sustainability-oriented hospitality service innovation (SOHSI) in the food and beverage sector are examined in a study. It uses a fuzzy decision-making trial and evaluation laboratory (DEMATEL) to investigate the link between SOHSI dimensions and triple bottom line dimensions. According to the findings, F&B companies can get a competitive edge by concentrating on interior design, brand management, and environmental entrepreneurship [28]

2.3 Theoretical Foundations

Stakeholder theory

The idea of stakeholder theory describes how companies take into account the interests of stakeholders and how those interests affect a company's commercial goals. Real stakeholders, stakewatchers, and stakekeepers are the three categories into which it divides stakeholders. Stakewatchers serve as go-betweens to safeguard the interests of actual stakeholders, whereas true stakeholders have a rightful claim, authority, and influence. Governments, courts, regulatory bodies, the media, and other independent regulators are examples of stakeholders. They impose external controls and rules on the company. They serve as gatekeepers, subtly enforcing obligations.

According to stakeholder theory, stakeholder connections are essential because, especially in sustainability projects and activities, society would support a business if it provides value. Coordinating value creation with and for stakeholders in accordance with the shared goal is the focal business's responsibility. By incorporating sustainability features into products, stakeholders' contributions to product development are acknowledged. If a business exhibits a dedication to tackling environmental, social, and governance (ESG) concerns, customers are more inclined to buy its goods or services. Stakeholder theory, institutional theory, resource-based view, ecological modernization theory[6].

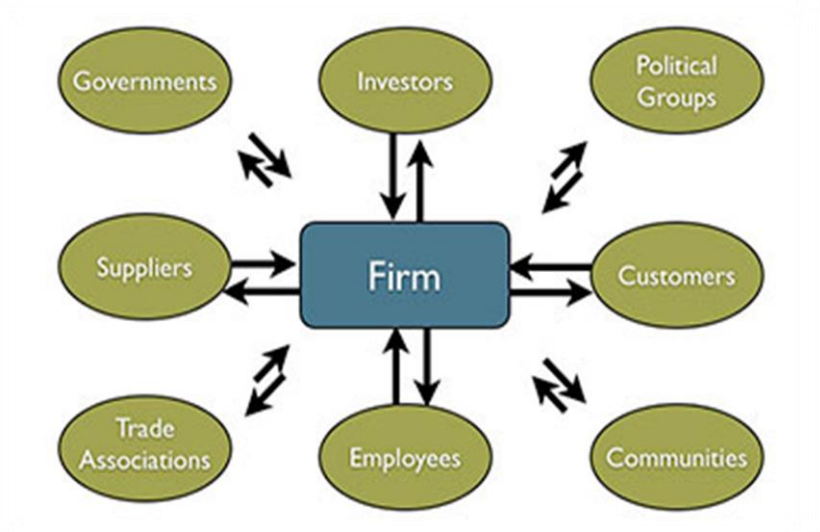

Figure 11.3 Stakeholders

[6] https://www.sciencedirect.com/topics/social-sciences/stakeholder-theory.

Institutional Theory

The study of institutional theory looks at how the institutional context influences, mediates, and channels social choices. The fundamental ideas of institutional theory, the socially created character of the Anthropocene, and institutional change in the Anthropocene are among its key tenets as they relate to the Anthropocene in the areas of organization and the natural environment.[7]

Resource-Based View (RBV)[8]

According to the Resource-Based Theory (RBT), businesses can use a variety of resources and develop new applications to satisfy consumer demand in order to maintain a competitive edge. It implies that in order for businesses to prosper and gain a sustained competitive edge, they must change their focus. Why and how certain businesses obtain a competitive edge in situations of unpredictability and rapid change are not covered in detail by the typical RBT.

In RBT, resources include assets, business processes, capabilities, qualities, knowledge, and information that a corporation controls to understand and carry out strategies meant to increase effectiveness and efficiency. Physical, human, and organizational capital resources are the three categories into which they can be divided. Company equipment, plant, raw material availability, location, and physical technology are all considered physical capital resources. Experience, intelligence, training, judgment, connections, and employee insights are all considered human capital resources. The formal structure, planning, management, and coordination mechanisms of an organization are referred to as its organizational capital resources.

Capabilities are a subset of company-specific, non-transferable resources that are intended to increase productivity through the acquisition of more resources. They can take many different forms, but they usually include information and processes, whether material or intangible, that aid in increasing a company's production and efficiency. To examine how capabilities vary in response to quick changes in an organization's surroundings, dynamic capabilities have been created. Product development procedures, big data deployment, and alliance capabilities are a few instances of dynamic capabilities.

2.4 Trends in Green Economy Research

An analysis found 859 publications that met the specified criteria, role, and subject matter. The results indicate a 17.98% annual growth rate, with 2022 seeing the greatest number of articles in environmental science. When it comes to publications affiliated with the Chinese Academy of

[7] https://www.sciencedirect.com/topics/social-sciences/institutional-theory.
[8] https://open.ncl.ac.uk/theories/4/resource-based-theory/

Sciences, China has the most scholarly output. The report makes recommendations for next research projects and offers a succinct overview of the literature on the green economy [29].

Condition of Health Ferrer Carbonell and van Praag used survey data for Germany to perform a monetary evaluation of disease types. Charnes et al. (1978) created data envelopment analysis (DEA), which is frequently used in conjunction with the stochastic frontier method for productivity analysis and firm- and industry-level efficiency analysis. Aigner et al. (1977) created stochastic frontier regression, which is frequently used in analysis at the business and industry levels. The Life Satisfaction Approach (LSA) measures life satisfaction by analyzing several facets of daily living. Monetary values expressed as the equal of their yearly household income. The Better Life Index (BLI), developed by the Organization for Economic Co-operation and Development (OECD), compares well-being among nations based on 11 factors pertaining to material living conditions and quality of life [30].

The dearth of specialist research on the development of green economy modes, namely their future trends, was the subject of one study. It identifies and categorizes different green economic modes, examines their evolutionary histories, and develops theoretical frameworks for each mode. It came to the conclusion that there are three stages of evolution for green economy modes: start-up (GE-I), growth (GE-II), and mature (GE-III). The circular economy idea serves as the foundation for GE-II, which is progressively integrated with the sharing economy, low-carbon economy, and greener production. The 3R theoretical model, which comprises the subsystems of reduction, recycling, and reuse, explains its working concept. From the resources-chain primary hypercycle to the eco-chain secondary hypercycle and the value-chain tertiary hypercycle, GE-III is developing through a particular three-chain stage process. It encompasses enlarged industries and society as well as industries based on renewable resources [31].

A study looked at the expanding importance of environmental issues and the economic consequences of ecology control. It examines environmental safety and makes recommendations for enhancements to the regulatory framework and environmental law system. The results emphasize the necessity of sustainable development by demonstrating the connection between environmental safety and economic growth. Environmental technologies promote new business-government economic partnerships by ensuring safe operations in transportation and industrial sectors [32].

In intricate global supply chains, the incorporation of Blockchain (BC), Internet of Things (IoT), and Artificial Intelligence (AI) technology into traceability systems is essential. Key trends and approaches for incorporating BC IoT and AI into traceability systems are identified by a survey of the literature. Real-time IoT data collecting, AI-driven analytics, and safe, unchangeable data via BC are some of the major developments. However, adoption is hampered by issues like standardization, scalability, and interoperability. In order to overcome current constraints, a study that suggested a

four-layer framework to increase efficiency, security, and transparency highlights the need for additional empirical research, industry-specific frameworks, and standardization [33].

In order to increase operations performance limits, promote sustainable development, and generate revenue, a study examined the collaborative application of blockchain technology (BCT) and artificial intelligence (AI) in supply chains. In order to comprehend material, data, and information flows, the study maps business processes and system-level interactions with a focus on Thailand's tuna fish supply chain. The findings demonstrate the pivotal significance of AI and BCT in digital supply chain management, with the influence of sustainability and data monetization contingent on the parameters of system stakeholders. In order to facilitate decision-making while researching and implementing digital interventions for sustainability and data monetization, a unified framework is suggested to gather essential data aspects for food supply chains enabled by AI and BCT [34].

Applications for smart cities have been transformed by the combination of blockchain technology and artificial intelligence, with machine learning and deep learning being key components. The benefits of blockchain technology in advancing environmentally friendly Internet of Things applications are examined in this article. It presents a conceptual framework for processing and obtaining the required data using artificial intelligence, cloud computing, and Internet of Things devices. A sustainable incentive system is made possible by the layer-based architecture, which may help secure smart city applications. In addition to reviewing improved solutions, the study addresses unresolved problems and future research objectives for sustainable IoT applications [35].

3. RESEARCH PATHWAYS FOR A GREEN ECONOMY

Rethinking how value is produced, delivered, and maintained across industries is essential to the shift to a green economy. This field of study looks for workable, scalable, and creative ways to balance social well-being, environmental conservation, and economic growth. Its main goal is to close the gap between theoretical frameworks for sustainability and the realities of consumer behavior, technological advancement, and market competition.

These pathways, which aim to direct the public and private sectors toward long-term resilience, frequently encompass organizational change, market transformation, technological innovation, and policy design.

3.1 Strategic Integration of Sustainability in Business Models

Due to global imperatives like the Paris Agreement, the UN 2030 Agenda for Sustainable Development, and the Net Zero commitments, research on corporate sustainability (CS) integration strategies has received unprecedented attention in recent years [36]. In order to guarantee long-term value creation for present and future stakeholders, incorporating sustainability into business models is

now a strategic requirement rather than an optional corporate initiative [37]. Companies must logically incorporate environmental, social, and economic factors into their operations, governance frameworks, and strategic planning in order to achieve this integration [38].

The fragmentation present in earlier literature is addressed by a recent systematic review of 126 peer-reviewed publications published between 2016 and 2022, which offers a thorough seven-dimensional integrated framework for CS strategies.

According to the review, successful sustainability integration needs to function at three interrelated levels:

- **Normative:** Creating a corporate culture, vision, and governance that are in line with sustainability principles.
- Setting long-term goals and coordinating them with stakeholder expectations is known as strategic management.
- **Operational:** Integrating sustainability into routine procedures and choices [39].

An important gap is filled by this integrated approach: prior research frequently concentrated on specific sustainability issues without taking into account interdependencies across organizational dimensions (Burritt et al., 2020; Weiser et al., 2020). The review provides theoretical and managerial insights by mapping these interrelationships, emphasizing the need for context-specific, measurable, and adaptable sustainability in business models. Additionally, empirical frameworks that offer practical ways to integrate CS into fundamental business strategies include the multidimensional responsible leadership model (Agarwal & Bhal, 2020) and strategic decision-making models for social and environmental integration [40].

Strategic sustainability integration necessitates more than just compliance for companies looking to make the shift to a green economy; it also calls for innovation, stakeholder engagement, and dynamic capabilities that constantly align business models with changing global sustainability agendas.

3.2 Embedding Sustainability KPIs in Performance Management

Integrating sustainability KPIs into organizational performance management is necessary to align business strategies with the UN Sustainable Development Goals. Sustainability performance can be tracked, assessed, and improved with the help of a Sustainable Development Balanced Scorecard (SDBSC). This approach promotes innovation, social responsibility, and alignment of sustainability objectives with business strategies. The proposed SDBSC focuses on four subsystems—Results, Stakeholders, Processes, and Enablers—and using multidimensional factor analysis to discover KPIs. By striking a balance between economic, social, and environmental objectives, it supports sustainable

development across commodities, services, and operations and makes well-informed decision-making easier [4s1]. Through macro–micro institutional dynamics, this study explores how sustainability KPIs are incorporated into public sector performance measurement, influencing political choices, encouraging transparency, and supporting sustainable urban development [42].

3.3 Sustainable Supply Chain Strategies

The triple bottom line—economic, environmental, and social objectives—and profitability are the goals of sustainable supply strategies. Researchers classified 789 practices across industries into 38 minor and 11 major practice areas after evaluating 86 empirical and review studies. These tactics offer a framework for changing supply chains into more robust, accountable, and forward-thinking systems, providing useful advice for businesses and academic institutions alike [43].

Effective green supply chain management (GSCM) techniques are necessary for sustainability in the textile and apparel industry. Three strategic orientations—green entrepreneurial (GEO), market (MO), and knowledge management (KMO)—were investigated in this study, which was based on 266 textile manufacturers in Bangladesh and was analyzed using structural equation modeling.

The results demonstrate that GEO and MO greatly improve GSCM practices, which in turn boost the performance of sustainable firms. KMO had no discernible beneficial impact. The relationship between GEO and sustainability outcomes is partially mediated by GSCM.

To boost GSCM, increase competitiveness, and lessen environmental effects, managers are urged to implement GEO and MO. This study is one of the first to connect GSCM and strategic orientation in upstream textile operations [44].

3.4 Innovation and Technology for Sustainability

A study in Bangladesh analyzed the impact of three strategic orientations on green supply chain management (GSCM) practices and sustainable company performance. The results showed that GEO and MO significantly improved GSCM practices, leading to improved sustainability outcomes. The study also found that GEO and GSCM practices partially mediated the relationship between GEO and sustainable performance, highlighting the importance of integrating sustainability-focused KPIs into performance management systems. This can help textile companies increase competitiveness and reduce their ecological impact by coordinating their strategic orientation with quantifiable environmental outcomes [45].

3.5 Green Tech Adoption, Renewable Energy Integration

The global problem of switching to renewable energy sources calls for improvements in systems, technologies, and materials. Machine learning (ML) approaches are being used by researchers to speed up the gathering, storing, converting, and managing of renewable energy. ML technologies provide models for process optimization, candidate structure development, and material property prediction by utilizing statistical trends in data. Recent developments in energy research driven by machine learning include smart grids, batteries, photovoltaics, and electrocatalysis. The advantages of various ML-accelerated workflows can be compared with the aid of key performance indicators. The use of machine learning may also be advantageous for future energy-related research areas [46].

By employing digital communication technologies, smart grids are sophisticated energy infrastructures that improve operational performance, sustainability, and energy efficiency. They enhance energy resource management by combining cutting-edge methods and technology. Recent studies have concentrated on the advantages of smart grids, technological advancements, incorporating renewable energy sources, employing data analytics and artificial intelligence, cybersecurity, and privacy. Cyberattacks, erratic and intermittent renewable energy sources, and integrating electric vehicles without overloading the grid are some of the issues the study tackles. It suggests utilizing AI and data analytics to enhance grid dependability, energy management, and performance [47].

A move to sustainable methods is required since the building industry is a significant contributor to pollution, climate change, and energy shortages. It is becoming more and more common to use renewable energy sources into building, such as solar, wind, geothermal, and biomass fuels. According to case studies conducted in Bahrain and Seattle, solar energy can provide 83% of a building's energy requirements, while wind energy can only provide 15%. These inventions are further encouraged by financial incentives such as 30% subsidies [48].

3.6 Policy, Governance and Regulations

To integrate renewable energy sources into the power industry and accelerate the adoption of green technologies, effective policy frameworks, well-designed market mechanisms, and strict regulations are necessary. Several policy tools have emerged as powerful worldwide catalysts for this change.

One of the most often used tools is the Renewable Portfolio Standard (RPS), which mandates that electricity suppliers generate a specific percentage of their power from renewable sources (Wikipedia, 2024a). These requirements not only create a legal need but also stimulate investment in renewable infrastructure by guaranteeing a steady demand for green energy.

Likewise, Feed-in Tariffs (FITs) provide renewable energy producers with fixed pricing and long-term contracts, reducing investment risks and ensuring financial stability for green technology projects (Wikipedia, 2024b). This method has played a pivotal role in augmenting solar and wind capacities in several European and Asian markets.

Comprehensive green technology and environmental policies also involve a range of economic and regulatory tools, such as carbon pricing, emissions trading schemes, and tax incentives. Together, these resources support the advancement and use of sustainable technology (Number Analytics, 303).

Furthermore, the integration of renewable energy can be greatly improved by technological advancements in conjunction with supportive policy frameworks. Smart grids, advanced metering infrastructure, and Internet of Things (IoT) solutions, for instance, can support distributed energy generation models, enhance demand-supply balancing, and enable real-time energy monitoring.

3.6.1 National and international fsrameworks

International Frameworks[9]

The International Solar Alliance (ISA), a coalition of over 80 countries led by France and India, aims to reduce prices for underserved and rural areas while advancing the global deployment of solar energy. The ISA has committed to facilitating more than USD 1 trillion in investments by 2030 because to the World Bank's substantial support for project finance.

3.6.2 Green Grids Initiative – One Sun, One World, One Grid (GGI–OSOWOG)[9]

This ambitious platform combines the UK's Green Grids Initiative with the vision of ISA. It was started in 2021 with the goal of establishing a trans-regional clean energy grid that would initially connect the Middle East, South Asia, and Southeast Asia before extending to Africa and beyond. By 2050, a global renewable grid system with a projected capacity of 2,600 GW is the goal.

3.6.3 Ministerial Clean Energy (CEM)[9]

CEM, a high-level international forum that was founded in 2010, brings together energy ministers and other stakeholders from nations that account for 90% of clean power and 80% of clean energy investments. It promotes clean energy transitions in line with the Paris Agreement and the UN Sustainable Development Goals, facilitates technical cooperation, and stimulates policy discussion.

[9] https://en.wikipedia.org/wiki/Green_Grids_Initiative_%E2%80%94_One_Sun%2C_One_World%2C_One_Grid.

3.6.4 The Renewable Energy Directive (2018/2001) of the European Union[9]

By 2030, at least 42.5% of the energy consumed by the bloc must originate from renewable sources, according to this legally binding EU law. The 2030 target is applied collectively across member states, whereas previous targets (such as 20% by 2020) were national in nature.

National Level Frameworks (India) Jawaharlal Nehru National Solar Mission, also known as the National Solar Mission

Its first launch in 2010 set a target of 20 GW of solar capacity by 2022. This goal was later raised to 100 GW in 2015. By 2018, four years ahead of schedule, India exceeded the initial 20 GW objective, demonstrating rapid solar deployment. The Mission has been a key component of India's green energy policy.

3.6.5 ESG reporting and compliance mechanisms.

India's Policy Landscape and Energy Planning[10]

Under the Nepal Electricity Plan and other sectoral policies, India uses a range of policies, from solar parks and a Green Energy Corridor project to tariffs, Renewable Purchase Obligations (RPOs), and production-linked incentives (PLIs). These initiatives seek to support manufacturing, promote renewable energy, and update grid infrastructure.

4. METRICS AND MEASUREMENT

4.1 ESG ratings, Life Cycle Assessment (LCA), Carbon Footprint Audits

Overview and difficulties[11]:

Corporate transparency and sustainable investing now depend heavily on ESG ratings, which evaluate businesses based on their environmental, social, and governance performance. However, because of their inconsistent methods and potential for greenwashing, their reliability is frequently called into question. In an effort to improve transparency and dependability, international regulators have recently begun to unify ESG rating procedures.

4.2 Getting Started with ESG Investing[12]

ESG investing is the process of using ESG scores to guide investment decisions. These scores are typically gathered from a range of sources, including corporate disclosures and government

[10] https://climateactiontracker.org/countries/india/2023-07-06/policies-action/.
[11] https://www.ft.com/content/9349f55c-86f5-419a-ab68-e2b887885790.
[12] https://www.investopedia.com/how-to-invest-in-esg-7499371.

statistics. People commonly use platforms like Morningstar, Sustainalytics, and MSCI to obtain ESG ratings[13].

4.3 Methodology for Life Cycle Assessment (LCA) and ISO Standards

Life Cycle Assessment (LCA), sometimes referred to as Life Cycle Analysis, is a comprehensive approach that assesses how a process, product, or service affects the environment from birth to death. ISO 14040 (principles and framework) and ISO 14044 (requirements and guidelines) are important standards.

4.4 A summary of the Extensions and Standards[14]

The GHG Protocol Product Standard, PAS 2050 (carbon footprint quantification), ISO 14067 (product carbon footprinting), and EU-specific methods like Product Environmental Footprint (PEF) and Organization Environmental Footprint (OEF) are important frameworks in addition to the core ISO standards. These uphold environmental evaluations' comparability and rigor.

4.5 Carbon Footprint and Carbon Accounting Audits

Carbon footprint regulations and labelling:

In collaboration with Defra and BSI, the Carbon Trust developed PAS 2050, a methodology for estimating product carbon footprints. The Carbon Reduction Label discloses embodied emissions at the product level, whereas the Carbon Trust Standard certifies organizations that demonstrate annual carbon reduction.

4.6 Comprehensive Carbon Accounting Frameworks[14]

Guidelines for measuring, tracking, reporting, and confirming greenhouse gas emissions at the organizational and project levels are provided by standards such as ISO 14064 (parts 1, 2, and 3). The GHG Protocol Product Standard, PAS 2050, and ISO 14067 are additional popular frameworks for product-level carbon footprints.

5. CRITICAL CHALLENGES AND BARRIERS

1.1 Financial Constraints and ROI Perceptions

A study looked into the challenges Ghanaian SMCFs (small and medium-sized construction firms) have while trying to get financing from banks. Key issues include policy regulation, a lack of institutional capacity, strict collateral security requirements, and inadequate financial infrastructure were identified by a cross-sectional survey of 50 businesses in Kumasi and Accra Metropolis. Lack of

[13] https://en.wikipedia.org/wiki/Life-cycle_assessment?
[14] https://carbonbright.co/lca-standards?.

managerial skills and informational hurdles were also noted as obstacles. The report emphasizes the necessity of creative strategies to increase SMCFs' access to financing in Ghana [49].

The circular economy (CE) model, which emphasizes recycling and remanufacturing goods, is becoming more popular in South Asian economies because of its advantages for sustainable production. However, there are obstacles to its acceptance. In order to create a model for the adoption of the circular economy (CE) in developing countries' industrial sectors, this study will examine the connection between sustained circular success (SCS) and removing adoption obstacles to the circular economy (CEABs). 310 Pakistani industry professionals answered a questionnaire, and partial least square structural equation modeling (PLS-SEM) was applied. With addressing CEABs accounting for 66.1% of the industrial sector's SCS, the results demonstrate a strong association between CEABs and SCS. The paper can be used as a guide by policymakers to investigate obstacles to the adoption of CE and attain SCS in industrial projects [50].

1.2 Lack of Skilled Workforce

A study investigates how human capital (HC) investments in three domains—corporate, public health, and international development—are measured and assessed using financial criteria such as return on investment (ROI). Understanding and monitoring human performance domains is essential for assessing the impact of HC investments, and it indicates that interpretations of ROI can cause misunderstanding during implementation. Furthermore, many methods quantify the behavioral shift of intervention participants, giving practitioners clarity when implementing ROI [51].

According to the report, corruption, payment delays, procurement procedures, planning, monitoring, bureaucracy, communication, and supervision are the main reasons why public projects in Ghana fail. Revenue loss, deterred investment, joblessness, higher upfront expenses, inadequate infrastructure, and service relocation are some of the alleged consequences. The government ought to implement measures to address these problems and work with interested parties to enhance planning, management, monitoring, supervision, and procurement procedures. This will assist in overcoming the complex elements that lead to project failure [52].

1.3 Greenwashing and Superficial Compliance

The practice of portraying a company, item, or policy as environmentally friendly when, in fact, the efforts are flimsy, deceptive, or have little real impact is known as "greenwashing." This dishonest approach damages stakeholder credibility and trust in addition to undermining sincere sustainability initiatives.

Key Facets of Greenwashing

False or ambiguous environmental claims: Companies commonly use catchphrases like "sustainable" or "eco-friendly" to give the impression that they are being environmentally stewards, but they never provide any definitions or supporting data. [15]

Selective disclosure or symbolic gestures:

This strategy, sometimes referred to as "symbolic action," is when businesses highlight small environmental improvements, such as using recycled paper, while downplaying more significant environmental problems. Such acts frequently result in more publicity than real change.[16]

By presenting nominal compliance as substantive and hiding deeper environmental liabilities, companies are able to take advantage of regulatory gaps caused by a lack of standardized definitions or strict regulatory oversight.

Risks to legitimacy and reputation

Greenwashing can backfire as stakeholder awareness and regulatory scrutiny increase, harming a company's reputation, attracting legal challenges, and igniting crises of legitimacy [53].

Present Market and Regulatory Reactions

Demands more precise regulations: Leaders in the renewable energy industry, including Iberdrola of Spain, have underlined the necessity of clear standards that differentiate genuinely green claims from flimsy ones. "A drop of green stuff in a bucket full of black stuff does not make it green," as one person put it[17].

1.4 Policy Inconsistencies across Nations

The global energy transition is severely hampered by disparities in national laws and regulations, which frequently impede progress toward sustainability objectives.

1. **Market ineffsiciencies and regulatory fragmentation**

When countries, even those in the same region, implement different renewable energy strategies, policy fragmentation results. For instance, ASEAN nations may establish challenging renewable goals, but due to political and economic priorities, implementation varies greatly, leading to fragmented progress and low investor confidence (Wikipedia).

[15] *https://www.investopedia.com/terms/g/greenwashing.asp?*
[16] *https://pollution.sustainability-directory.com/term/corporate-greenwashing-critique/?*
[17] *https://www.voguebusiness.com/sustainability/the-big-global-greenwashing-crackdown?*

Deterring cross-border investment and impeding economies of scale in the deployment of renewable technologies, these fragmented approaches can result in fragmented markets and unpredictable regulatory environments[18].

2. Legal instability and inconsistent incentives

Project cancellations and investor losses may result from sudden policy reversals, such as sudden reductions in solar tax credits or carbon pricing mechanisms. This kind of uncertainty damages confidence and delays the uptake of renewable energy projects[18].

When governments alter regulations in the middle of a project, it can lead to legal disputes and further discourage investment and delay project completion dates[18].

3. Trade Regulations and Conflicts over Domestic Content

Policies at the national level, such as local content requirements, which are intended to safeguard domestic industry, may clash with international trade agreements, leading to difficulties in compliance and even WTO disputes. This was particularly evident in Ontario's Green Energy Act, which mandated local manufacturing quotas for wind and solar projects but was eventually repealed due to legal challenges under WTO regulations. (Wikipedia)

6. OPPORTUNITIES AND FUTURE DIRECTIONS

6.1 Sustainable Finance and Green Bonds

To offer guidance to researchers, regulators, and policymakers, a study looked at the evolution and importance of sustainable finance products, especially sustainable bonds. Four research questions are addressed in this study, which follows the Scientific Procedures and Rationales for Systematic Literature Reviews procedure. Results show that sustainable bond research is receiving more attention, as seen by rising publication and citation trends. Pricing and risk assessment, market dynamics, growth potential, regulatory and policy contexts, and international viewpoints are some of the future directions [54].

In light of climate change, green bonds are an essential financial instrument for funding ecologically friendly projects. This essay examines their place in the world financial market, their influence on sustainable development, their difficulties, and their potential for future expansion. It draws attention to the market dynamics, governmental frameworks, and trends that affect their efficacy and issuance [55].

The study analyzes the role of sustainable and green finance in furthering UN sustainable development goals (SDGs). It examines how goals are related to one another using machine learning-

[18] https://energy.sustainability-directory.com/term/regulatory-inconsistencies.

based BERTopic modeling and quantitative bibliometric techniques. According to the findings, technologies such as risk models, social impact bonds, and green fintech are essential for investing in renewable energy sources and reducing environmental effects. However, the adoption of green finance techniques is hampered in underdeveloped nations by obstacles such high transaction costs and inadequate institutional frameworks. Future studies should concentrate on estimating investment requirements, customizing financial products, and investigating the social aspects of sustainable finance [56].

6.2 Public–Private Partnerships for Climate Action

By combining the advantages of the public and private sectors, public-private partnerships (PPPs) have become a strategic way to share risks, mobilize resources, and speed up climate action. While private organizations provide technological innovation, operational efficiency, and capital investment, governments frequently supply policy frameworks, regulatory certainty, and partial funding[19] (World Bank, 2020).

In order to mitigate and adapt to climate change, PPPs have helped in the development of large-scale renewable energy projects, climate-resilient urban planning, and sustainable infrastructure. For example, the C40 Cities Finance Facility, a partnership between the UK Government, the German Federal Ministry for Economic Cooperation and Development (BMZ), and C40, assists cities in developing bankable initiatives to reduce greenhouse gas emissions.[20]

International organizations such as the Green Climate Fund (GCF) are also actively promoting PPP models to help bridge the financial gap for climate initiatives, especially in developing countries where green cash is still hard to come by[21] .

6.3 Digital Transformation as a Catalyst for Sustainability

By improving operational efficiency, enabling data-driven decision-making, and supporting creative business models that lessen environmental impact, digital transformation is becoming more widely acknowledged as a critical enabler of sustainability. Artificial Intelligence (AI), the Internet of Things (IoT), blockchain, and big data analytics are some of the technologies being used to monitor emissions in real time, optimize resource use, and advance circular economy principles [57].

For example, demand forecasting driven by AI and IoT-based smart grids help cut down on energy waste and better incorporate renewable energy sources into power systems (IEA, 2022).

[19] *World Bank. (2020). Public–Private Partnerships for climate-resilient infrastructure. Retrieved from https://ppp.worldbank.org/public-private-partnership/climate.*
[20] *C40 Cities. (2023). C40 Cities Finance Facility. Retrieved from https://www.c40cff.org/*
[21] *Green Climate Fund. (2022). Engaging the private sector for climate-resilient development. Retrieved from https://www.greenclimate.fund/what-we-do/private-sector.*

Blockchain technology is being used to track supply chains transparently, guaranteeing adherence to ethical sourcing and environmental regulations [58]. By simulating and optimizing processes prior to implementation, digital twins—virtual copies of physical systems—allow industries to drastically cut costs and waste.

Additionally, digital platforms improve public trust and corporate accountability by facilitating increased stakeholder engagement through online dashboards, mobile applications, and sustainability reporting tools. To guarantee net-positive sustainability results, green IT solutions must be used to manage the environmental impact of digital infrastructure itself, including data center energy consumption [59].

6.4 Recommendations for Future Research Agendas

There is great potential for digital transformation to advance sustainability in ecosystems, societies, and industries. Organizations can improve environmental performance, optimize resource use, and facilitate systemic sustainability outcomes by utilizing technologies like artificial intelligence (AI), the Internet of Things (IoT), blockchain, and big data.

The current status of research

By combining IoT, AI, blockchain, and big data throughout the four Life Cycle Assessment (LCA) phases (goal & scope, inventory, impact, and interpretation), a 2025 study provides a framework for utilizing digital tools in environmental assessments [60]

An opinion paper on AI for digital sustainability listed six key dimensions: green innovation, measurements, strategies, sensemaking, supply-chain interactions, and tool enhancement. An agenda for how AI may support the sustainability agenda is also proposed in the paper [61]

A comprehensive meta-analysis of the literature on digital transformation indicates that sustainability and smart cities are understudied areas of present research, suggesting possible directions for multidisciplinary study [62].

Suggestions for Future Research Paths

Creating Frameworks for Integrated Digital-LCA

The suggested framework from the 2025 LCA review should be empirically tested and improved in subsequent research, evaluating the ways in which digital tools (IoT, AI, blockchain, and big data) can improve environmental assessments' precision, speed, and transparency. Comparative sectoral studies and field-case implementations would be beneficial.

Expand research on AI's influence through the six dimensions that have been identified: creating models that facilitate supply chain cooperation, green innovation, strategic planning, and strong sustainability metrics.

Integrating Sustainability beyond the Hype of Technology

Examine how businesses can incorporate sustainability into digital transformation by going beyond digital novelty and taking ethical AI, data stewardship, governance, and transparency into account. This gap is highlighted by the meta-review, particularly in relation to smart cities and sustainability [64].

Examining Synergies in the Digital Circular Economy

Strategies for the circular economy heavily rely on digital technologies, especially when it comes to facilitating transparency, resource traceability, and system-level resource efficiency. Research can look at how these technologies open up new lifecycle insights and circular business models.[22]

7. CASE STUDIES

7.1 Real-World Examples of Companies Successfully Implementing Sustainable Management

1. **UPS – Route Optimization with ORION**

   UPS used a complex algorithm called ORION (On-Road Integrated Optimization and Navigation) to maximize delivery routes. UPS saved over USD 400 million a year by reducing CO2 emissions by about 100,000 metric tons and fuel consumption by about 10 million gallons by reducing left turns, idle time, and total miles driven.[23]

2. **IKEA – Renewable Energy & Sustainable Sourcing**

   IKEA has made a commitment to becoming climate-positive by 2030, making it a leader in sustainable operations. The company has invested in wind farms around the world and installed more than 935,000 solar panels in its stores and warehouses. Additionally, it places a high priority on sustainable sourcing, making sure that materials like cotton and wood come from approved, ethical sources[24].

3. **Coca-Cola – World without Waste**

   Coca-Cola wants to make all packaging recyclable by 2025, use at least 50% recycled content by 2030, and collect and recycle one bottle or can for every one sold by 2030 as part of its "World Without Waste" campaign. PlantBottle technology and investments in recycling infrastructure

[22] https://en.wikipedia.org/wiki/Circular_economy?.
[23] https://expertbeacon.com/sustainability-case-studies.
[24] https://allmeld.com/article/2790-20-case-studies-of-companies-that-excelled-in-sustainability.

and community education are examples of innovations that have already produced 88% recyclable packaging and high collection rates[25].

4. **H&M – Circular Fashion and Garment Recycling**

   Through a program that encourages customers to return unwanted clothing for recycling or reuse, H&M has embraced circularity. Clothes are recycled into new materials or sold used. To turn used textiles into yarns for new products, the company works with recycling partners[25].

5. **Starbucks: Ethical Coffee Sourcing and Strawless Lids**

   Starbucks significantly reduced plastic waste by gradually replacing plastic straws with paper alternatives and recyclable strawless lids. With 99% of coffee sourced ethically, its C.A.F.E. (Coffee and Farmer Equity) Practices guarantee sustainable and ethical sourcing at the same time[25].

6. **Science-Based Nature Targets Verified by GSK, Holcim, and Kering**

   GSK, Holcim, and Kering were the first businesses to have verified corporate nature targets under the Science Based Targets Network (SBTN):

   GSK: Practices water stewardship in India and wants to cut water use by 20% by 2030.Holcim: Aims to reduce freshwater use in the Moctezuma basin of Mexico by 39%.

   Kering: Aims to reduce Tuscany's water consumption by 21% and its land footprint by 3%.

   Instead of focusing on general promises, these place-based targets highlight tailored, quantifiable action.[26]

8. CONCLUSION

Sustainable management practices are now crucial to addressing the pressing environmental, social, and economic problems of the twenty-first century. This chapter has discussed the various aspects of developing a green economy, from deploying green technologies and integrating renewable energy to using regulatory frameworks, policy instruments, and ESG-based performance evaluations. It has also underlined the necessity of comprehensive evaluation tools like life cycle assessments and carbon footprint audits to ensure accountability and transparency. The examination of significant barriers like financial constraints, contradictory policies, and greenwashing highlights the complexity of making the transition to sustainability. However, strategies like public-private partnerships, international collaboration, and digital transformation provide practical means of overcoming these

[25] https://allmeld.com/article/5371-30-case-studies-of-companies-that-built-sustainable-businesses

[26] *https://www.reuters.com/sustainability/sustainable-finance-reporting/brand-watch-three-companies-put-their-impacts-nature-under-microscope-heres-what-2025-01-15.*

challenges. Case examples from the real world demonstrate that when organizational commitment is paired with innovation and stakeholder interaction, significant sustainability gains are achievable.

Success in the future will depend on incorporating sustainability into important corporate plans, promoting cross-sectoral cooperation, and synchronizing technology advancements with robust legislative backing. The research suggestions in this chapter are intended to assist scholars and practitioners in enhancing best practices, addressing information gaps, and scaling sustainable solutions. By implementing their vision, stakeholders at all levels can promote a robust and inclusive green economy.

REFERENCES

1 *Imppola, J. J. (2020). Global economy and its sustainability in the globalized world. SHS Web of Conferences, 74, 04008. EDP Sciences. https://doi.org/10.1051/shsconf/20207404008.*

2 *Kissinger, M., Rees, W. E., & Timmer, V. (2011). Interregional sustainability: governance and policy in an ecologically interdependent world. Environmental science & policy, 14(8), 965-976. https://doi.org/10.1016/j.envsci.2011.05.007.*

3 *Sharma, R. (2024). Sustainable and ethical management practices. In Futuristic trends in management (Vol. 3, Book 20, Part 9, Ch. 3, p. 338). IIP Series.*

4 *Penc-Pietrzak, I. (2003). Analiza strategiczna w zarządzaniu firmą: Koncepcja i stosowanie [Strategic analysis in company management: Concept and application]. C.H. Beck.*

5 *Olsen, E. (2003). Rethinking value–based management. Handbook of Business Strategy, 4, 286–301. https://doi.org/10.1108/10775730310495967*

6 *Cyfert, S. Z. (2004). Kreowanie wartości przez organizację w perspektywie teorii firmy [Creation of value by the organization from the perspective of the company's theory]. Akademia Ekonomiczna we Wrocławiu.*

7 *Cyert, R. M., & March, J. G. (2001). A behavioral theory of the firm. Blackwell Publishers.*

8 *Shiva, V. (2024, September). Sustainable management practices in the circular economy: Balancing environmental and economic goals. Universal Research Reports, 11(4), 170–174. https://doi.org/10.36676/urr.v11.i4.1346.*

9 *Agbakwuru, V., Onyenahazi, O. B., Antwi, B. O., & Oyewale, K. (2024, September). The impact of environmental, social, and governance (ESG) reporting on corporate financial performance. International Journal of Research Publication and Reviews, 5(9), 3629–3644. https://doi.org/10.55248/gengpi.5.0924.2710.*

10 Yarime, M., Trencher, G., Mino, T. et al. Establishing sustainability science in higher education institutions: towards an integration of academic development, institutionalization, and stakeholder collaborations. Sustain Sci 7 (Suppl 1), 101–113 (2012). https://doi.org/10.1007/s11625-012-0157-5.

11 Breitbarth, T., & Herold, D. M. (2018). Closing the academia-practice gap in corporate sustainability management research: Challenges and bridges. Journal of Environmental Sustainability, 6(1), 54-71.

12 Rau, H., Goggins, G., & Fahy, F. (2018). From invisibility to impact: Recognising the scientific and societal relevance of interdisciplinary sustainability research. Research policy, 47(1), 266-276.

13 Bari, N. (2023). Investigating dynamic capabilities for sustainability-driven competitive advantage.

14 Alquraish, M. (2025). Digital Transformation, Supply Chain Resilience, and Sustainability: A Comprehensive Review with Implications for Saudi Arabian Manufacturing. Sustainability, 17(10), 4495. https://doi.org/10.3390/su17104495.

15 Dissanayaka, I. I. K., & Bandara, M. N. G. K. (2025). Strategic Integration of Sustainable Development Goals in Manufacturing Multinational Enterprises in Sweden. A Qualitative Case study on Swedish Multinational Enterprises.

16 Veesapen, N. (2024). Leading MSMEs through times of uncertainty: the impact of Responsible Leadership on employee resilience and well-being (Doctoral dissertation, University of Essex).

17 . Goubran, S. (2019). On the role of construction in achieving the SDGs. Journal of Sustainable Research, 1, e190020. https://doi.org/10.20900/jsr20190020.

18 Lozano, R., & Barreiro-Gen, M. (2022). Organisations' contributions to sustainability: An analysis of impacts on the Sustainable Development Goals. Sustainable Development, 30(6), 1525–1544. https://doi.org/10.1002/sd.2314.

19 Montiel I, Cuervo-Cazurra A, Park J, Antolín-López R, Husted BW. Implementing the United Nations' Sustainable Development Goals in international business. J Int Bus Stud. 2021;52(5):999-1030. doi: 10.1057/s41267-021-00445-y.

20 Messerli, P., & Kim, E. (2024). Alignment mechanisms to effectively govern the Sustainable Development Goals. World Development, 182, 106721. https://doi.org/10.1016/j.worlddev.2024.106721.

21 Pirzada, K., Ahmed, K., & Moens, G. (2023). Aligning Corporate Strategies with the Sustainable Development Goals. Foresight and STI Governance, 17(2), 5–7.

22 Hajian, M., & Kashani, S. J. (2021). Evolution of the concept of sustainability. From Brundtland Report to sustainable development goals. In Sustainable resource management (pp. 1-24). Elsevier.

23 *Ruggerio, C. A. (2021). Sustainability and sustainable development: A review of principles and definitions. Science of the total environment, 786, 147481.*

24 *Ghiasi, M., Wang, Z., Mehrandezh, M., Jalilian, S., & Ghadimi, N. (2023). Evolution of smart grids towards the Internet of energy: Concept and essential components for deep decarbonisation. IET Smart Grid, 6(1), 86-102.*

25 *Srivastava, A.K., Dixit, S. & Srivastava, A.A. Criticism of Triple Bottom Line: TBL (With Special Reference to Sustainability). Corp Reputation Rev 25, 50–61 (2022). https://doi.org/10.1057/s41299-021-00111-x.*

26 *van Bueren, B. J., Leenders, M. A., Iyer-Raniga, U., & Argus, K. (2023). How eco-champions solve the triple-bottom-line challenge. Journal of Cleaner Production, 427, 139068.*

27 *Yücel Ozturkoglu, Ferika Ozer Sari, Ebru Saygili; A new holistic conceptual framework for sustainability oriented hospitality innovation with triple bottom line perspective. Journal of Hospitality and Tourism Technology 8 April 2021; 12 (1): 39–57. https://doi.org/10.1108/JHTT-02-2019-0022.*

28 *Ozturkoglu, Y., Sari, F. O., & Saygili, E. (2021). A new holistic conceptual framework for sustainability oriented hospitality innovation with triple bottom line perspective. Journal of Hospitality and Tourism Technology, 12(1), 39-57.*

29 *Apriantoro, M. S., Widyastuti, H., El Ashfahany, A., & Murtadla, A. A. (2024). Sustainability and Green Economy in Developmental Paradigms: A Bibliometric Analysis of Scholarly Trends and Transformations. Indonesian Interdisciplinary Journal of Sharia Economics (IIJSE), 7(2), 4587-4610. https://doi.org/10.31538/iijse.v7i2.4786.*

30 *Aoki-Suzuki, C. (2015). Green Economy and Green Growth in international trends of sustainability indicators. In The Economics of Green Growth (pp. 23-46). Routledge.*

31 *Zhang, Z. (2022). Evolution paths of green economy modes and their trend of hypercycle economy. Chinese Journal of Population, Resources and Environment, 20(1), 1-11.*

32 *Kuznetsova, S.N., Kozlova, E.P., Kuznetsov, V.P., Tsymbalov, S.D. (2022). "Green" Economy as a Trend in the Socio-economic Development of Russia. In: Popkova, E.G. (eds) Business 4.0 as a Subject of the Digital Economy. Advances in Science, Technology & Innovation. Springer, Cham. https://doi.org/10.1007/978-3-030-90324-4_108.*

33 *Y. Saidu, S. M. Shuhidan, D. A. Aliyu, I. Abdul Aziz and S. Adamu, "Convergence of Blockchain, IoT, and AI for Enhanced Traceability Systems: A Comprehensive Review," in IEEE Access, vol. 13, pp. 16838-16865, 2025, doi: 10.1109/ACCESS.2025.3528035.*

34 Tsolakis, N., Schumacher, R., Dora, M. et al. Artificial intelligence and blockchain implementation in supply chains: a pathway to sustainability and data monetisation?. Ann Oper Res 327, 157–210 (2023). https://doi.org/10.1007/s10479-022-04785-2.

35 Ahmed, I., Zhang, Y., Jeon, G., Lin, W., Khosravi, M. R., & Qi, L. (2022). A blockchain-and artificial intelligence-enabled smart IoT framework for sustainable city. International Journal of Intelligent Systems, 37(9), 6493-6507.

36 Friede, G. (2019). Why don't we see more action? A metasynthesis of the investor impediments to integrate environmental, social, and governance factors. Business Strategy and the Environment, 28(6), 1260–1282. https://doi.org/10.1002/bse.2346

37 Dyllick, T., & Hockerts, K. (2002). Beyond the business case for corporate sustainability. Business Strategy and the Environment, 11(2), 130–141. https://doi.org/10.1002/bse.323

38 Baumgartner, R. J., & Ebner, D. (2010). Corporate sustainability strategies: Sustainability profiles and maturity levels. Sustainable Development, 18(2), 76–89. https://doi.org/10.1002/sd.447.

39 Engert, S., Rauter, R., & Baumgartner, R. J. (2016). Exploring the integration of corporate sustainability into strategic management: A literature review. Journal of Cleaner Production, 112, 2833–2850.

40 Winnard, J., Lee, J., & Skipp, D. (2018). Putting resilient sustainability into strategy decisions – Case studies. Management Decision, 56(7), 1598–1612. https://doi.org/10.1108/MD-11-2017-1124.

41 Chmutova I. Formulating Key Performance Indicators For An Integrated Enterprise Management System Using A Sustainable Development Balanced Scorecard / I. Chmutova, X. Guo, Q. Zhang and other // Development Service Industry Management. – 2024. - №(2). - P. 270–278.

42 Loai Ali Zeenalabden Ali Alsaid, Charles Anyeng Ambilichu; Performance measurement in urban development: unfolding a case of sustainability KPIs reporting. Journal of Accounting in Emerging Economies 9 February 2024; 14 (1): 48–74. https://doi.org/10.1108/JAEE-09-2021-0299.

43 Shekarian, E., Ijadi, B., Zare, A., & Majava, J. (2022). Sustainable Supply Chain Management: A Comprehensive Systematic Review of Industrial Practices. Sustainability, 14(13), 7892. https://doi.org/10.3390/su14137892.

44 Habib, M. A., Bao, Y., Nabi, N., Dulal, M., Asha, A. A., & Islam, M. (2021). Impact of strategic orientations on the implementation of green supply chain management practices and sustainable firm performance. Sustainability, 13(1), 340.

45 Habib, M. A., Bao, Y., Nabi, N., Dulal, M., Asha, A. A., & Islam, M. (2021). Impact of Strategic Orientations on the Implementation of Green Supply Chain Management Practices and Sustainable Firm Performance. Sustainability, 13(1), 340. https://doi.org/10.3390/su13010340.

46 Yao, Z. (2022). Machine learning for a sustainable energy future. arXiv. https://doi.org/10.48550/arXiv.2210.10391.

47 Biswas, P., Rashid, A., al Masum, A., Al Nasim, M. D. A., Ferdous, A. S. M. A., Gupta, K. D., & Biswas, A. (2025). An extensive and methodical review of smart grids for sustainable energy management-addressing challenges with AI, renewable energy integration and leading-edge technologies [Preprint]. arXiv. https://doi.org/10.48550/arXiv.2501.14143.

48 Chen, L., Hu, Y., Wang, R. et al. Green building practices to integrate renewable energy in the construction sector: a review. Environ Chem Lett 22, 751–784 (2024). https://doi.org/10.1007/s10311-023-01675-2.

49 Bondinuba, F. K. (2012). Exploring the challenges and barriers in accessing financial facilities by small and medium construction firms in Ghana. Civil and Environmental Research, 2(6), 25–35. International Institute for Science, Technology and Education (IISTE). http://www.iiste.org/Journals/index.php/CER/article/view/188.

50 Rasheed, K., Saad, S., Zaland, A., Khan, M. W., Ali, Z., Haris, M., Ammad, S., & Sadiq, T. (2024). Circular economy and critical barriers: Mapping the pathways and success metrics for sustainable circular success in industrialised South Asian developing nations. Results in Engineering, 24, 102995. https://doi.org/10.1016/j.rineng.2024.102995.

51 Deneise Dadd, Matthew Hinton; Performance measurement and evaluation: applying return on investment (ROI) to human capital investments. International Journal of Productivity and Performance Management 10 November 2023; 72 (9): 2736–2764. https://doi.org/10.1108/IJPPM-10-2021-0573.

52 Dick-Sagoe, C., Lee, K.Y., Odoom, D. et al. Stakeholder perceptions on causes and effects of public project failures in Ghana. Humanit Soc Sci Commun 10, 14 (2023). https://doi.org/10.1057/s41599-022-01497-7.

53 Gatti, L., Seele, P. & Rademacher, L. Grey zone in – greenwash out. A review of greenwashing research and implications for the voluntary-mandatory transition of CSR. Int J Corporate Soc Responsibility 4, 6 (2019). https://doi.org/10.1186/s40991-019-0044-9.

54 Negi P., Jaiswa lA.. Sustainable bonds as a sustainable financial instrument: thematic insights and future prospects. Qualitative Research in Financial Markets 2024; https://doi.org/10.1108/QRFM-01-2024-0018.

55 Bobojonova , M. . (2025). THE ROLE AND PROMISING DIRECTIONS OF GREEN BONDS IN FINANCING THE GREEN ECONOMY IN THE GLOBAL FINANCIAL MARKET. International Journal of Artificial Intelligence, 1(2), 1067–1071. Retrieved from https://inlibrary.uz/index.php/ijai/article/view/75671.

56 *Raman, R., Ray, S., Das, D., & Nedungadi, P. (2025). Innovations and barriers in sustainable and green finance for advancing sustainable development goals. Frontiers in Environmental Science, 12, 1513204.*

57 *George, G., Merrill, R.K., & Schillebeeckx, S.J.D. (2021). Digital sustainability and entrepreneurship: How digital innovations are helping tackle climate change and sustainable development. Business Strategy and the Environment, 30(1), 1-17. https://doi.org/10.1002/bse.2698*

58 *International Energy Agency (IEA). (2022). Digital demand-driven electricity systems. Retrieved from https://www.iea.org/reports/digital-demand-driven-electricity-systems.*

59 *Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. International Journal of Production Research, 57(7), 2117–2135. https://doi.org/10.1080/00207543.2018.1533261.*

60 *United Nations Conference on Trade and Development (UNCTAD). (2022). Digital economy report 2022: The rise of the data economy. Retrieved from https://unctad.org/digital-economy.*

61 *Popowicz, M., Katzer, N.J., Kettele, M. et al. Digital technologies for life cycle assessment: a review and integrated combination framework. Int J Life Cycle Assess 30, 405–428 (2025). https://doi.org/10.1007/s11367-024-02409-4.*

62 *Pan, S. L., & Nishant, R. (2023). Artificial intelligence for digital sustainability: An insight into domain-specific research and future directions. International Journal of Information Management, 72, Article 102668. https://doi.org/10.1016/j.ijinfomgt.2023.102668.*

63 *Reis J, Melão N. Digital transformation: A meta-review and guidelines for future research. Heliyon. 2023 Jan 7;9(1):e12834. doi: 10.1016/j.heliyon.2023.e12834. PMID: 36691547; PMCID: PMC9860428.*

64 *Reis J, Melão N. Digital transformation: A meta-review and guidelines for future research. Heliyon. 2023 Jan 7;9(1):e12834. doi: 10.1016/j.heliyon.2023.e12834. PMID: 36691547; PMCID: PMC9860428.*