Towards Sustainable Business Strategies for a Circular Economy: Environmental, Social and Governance (ESG) Performance and Evaluation

Rashmi Anoop Patil, Patrizia Ghisellini, and Seeram Ramakrishna

Abstract This chapter seeks to give a foundational overview of Environmental, Social, and Governance (ESG) metrics. The definition of individual ESG factors is first introduced to highlight sustainability considerations in businesses and how these can be considered and support circularity in business operations. The chapter further develops the concept that ESG reporting serves as an enabling tool with which the business operations can drive circularity and remedy the existing limitations of the linear economy in practice. The rise in ESG reporting from companies, and the ESG considerations of companies based on their disclosures are discussed. Incorporation of ESG factors into business operations is also evidenced through real-world case studies. The impact of ESG performance and the growing awareness of sustainability among businesses, consumers, and investors on the current investing trends and its contribution to embracing circularity is presented as the conclusion of the chapter.

Keywords ESG · Sustainability · Business · Circularity · Circular economy
Learning Objectives

- To understand ESG metrics, meant for business sustainability.
- To understand why businesses seek to enhance their ESG performance.
- To appreciate the link between ESG performance and circularity envisioned by the circular economy.
- To understand the concept of how an ESG score is calculated.
- To understand how companies enhance their ESG performance.

1 Circularity Assessment and the ESG Context

Companies across all industrial sectors represent a significant part of our economy. Majorly, the economic patterns have been linear—take-make-use-dispose—and have dominated the business operations for long [1, 2]. This linear approach has been agreeably unsustainable [1–4]. The rising concerns about the impacts of the linear economy on the environment and society have spurred the companies to firmly rethink the sustainability implications of their operations [1, 5]. During the previous decade, this sustainability consciousness has established a direct correlation with the circular economy (CE) principles. Many companies across the world, therefore, are moving towards circular business approaches and it is evidenced that the CE know-how is concentrated in large companies and less diffused across small medium businesses [6]. This transition to CE, however, needs a comprehensive assessment of the extent of circularity achieved and the potential economic benefits.

Circularity assessment is relatively new and is currently being explored by companies intending to transit towards circularity [7, 8]. Having an assessment tool for circularity that could be used as a yardstick with which companies can evaluate their circularity and understand the gaps for improvement is crucial. The CE scholarship has developed several methods and tools for assessing circularity. For example, Circulytics is a comprehensive tool developed by the Ellen MacArthur Foundation for circularity measurement of companies that also highlights the areas for improvement in circularity performance. Various organizations such as the Cradle to Cradle Products Innovation Institute, the alchemia-nova, and the ecopreneur provide assistance in assessing the materials circularity of the products, services and/or entire supply chains with their proprietary approaches and tools. Such tools enable companies to tap into new opportunities and stay relevant in the competition by adopting circular thinking into their core business strategy.

The concept of environmental, social, and governance (ESG) metrics for business assessment was in place much before the advent of circular economy principles.

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1 https://www.ellenmacarthurfoundation.org/our-work/activities/ce100.
2 https://www.ellenmacarthurfoundation.org/resources/apply/circulytics-measuring-circularity.
3 https://www.c2ccertified.org/get-certified/product-certification.
4 https://www.alchemia-nova.net/services/circular-business/.
5 https://ecopreneur.eu/circularity-check-landing-page/the-circularity-check-explanation/.
It can be considered as a measure of the overall sustainability of the business that depends on the environmental, social, and governance factors. However, achieving circularity is a winning approach to enhance ESG performance while becoming more sustainable [9].

From this point onwards, for ease of communication, the ESG factors are referred to as a single entity in some instances and the terminology ESG is used to represent this in the text. In the next sections, the individual ESG factors (E, S, and G) are briefly explained followed by a discussion on how CE principles influence the ESG pursuit of businesses evidenced by company case studies.

2 Understanding ESG

In general, a business needs material resources and energy to function and produces waste in some form or the other. In practice, such a business is dependant on labor, within a broader societal setup involving stakeholders such as investors and consumers. For the smooth functioning of the business, a set of practices, rules, and regulations, and operational procedures are followed, that decide how decisions are made in the company, mostly regarding governance and general operational management. Thus, the businesses we see around are fundamentally interwoven with various ESG factors in some capacity. Its imperative to first briefly understand the individual factors of ESG (Fig. 1) and their interdependencies.

1. The E in ESG, environmental aspect, encompasses the energy consumption of the company, the resources/raw materials consumed, the waste discharged, and the impact of these on the ecosystems. Carbon emissions and the contribution to climate change are the two most important and common criteria which represent the ecological footprint of the company.

2. The S in ESG, social criteria, includes the reputation and relationships that the company has earned with the employees, consumers, and institutions in the community where the business has been established and is being run. It mainly represents the inclusive culture and diversity in human capital of a company to suit the societal requirements.

3. The G in ESG, governance, is the in-house system of controls and protocols a company follows to govern itself, in order to make effective decisions, abide by the laws of the land, and meet the needs of the stakeholders. This is essential for every company to function smoothly in the long run.

These individual factors are also interconnected with each other and usually, work in combinations for business operations. For instance, when a company is trying to comply with the environmental law of the state in lowering the carbon emissions, such compliance requires the company’s governance factors to abide by the law, overlapping with the social factors that address the broader concerns about

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6https://www.investopedia.com/terms/h/humancapital.asp.
sustainability. From a CE perspective, our focus is mostly on the environmental and social factors, however, governance can never be hermetically separated from these two. Indeed, excelling in environmental and social criteria needs expertise in governance as exemplified by being aware of and taking measures to address the legal issues, and maintaining a transparent rapport with the concerned government bodies [10].

2.1 ESG Over the Years

Even though ESG is a millennial concept, it has evolved over the decades with a history that dates back to the post World War II period [11]. During the post-war period (1945—early 1970s), besides the economic expansion, a shortage of workers triggered the fight for employee rights by labor unions and as a result, such rights were included in the scope of business governance. Also, in the 1960s and 1970s, several public movements led to the social issues such as consumer and civil rights gaining traction, acquiring the attention of the businesses (Fig. 2).
Fig. 2 A timeline of major events leading to the development of ESG. It began with the struggle for labor rights just after World War II and continued with the social movements for consumer and civil rights. This was followed by a series of industrial disasters such as Bhopal gas tragedy, the Chernobyl nuclear disaster, and the Exxon Valdez oil spill that led to serious environmental concerns. Then came the financial scandals at the higher management levels of companies such as Enron and Tyco which made investors skeptical about transparency in business governance. All these collectively gave rise to the concept of ESG.

Later in the 1980s, a series of industrial disasters such as the Bhopal gas tragedy, the Chernobyl nuclear disaster, and the Exxon Valdez oil spill led to serious environmental concerns and an increasing consciousness regarding the need for a common evaluatory metric on the environmental integrity of business operations (Fig. 2). During the same time, the EIRIS (Ethical Investment Research Services) Foundation was established in England that systematically rated companies based on their social and environmental responsibilities which turned out to be an important criterion for investors [11].

Corporate governance has always been important to the executive boards and employees of a company, and investors. However, in the 1990s, the financial scandals at the higher management levels of companies such as Enron and Tyco made investors and employees more skeptical about the financial transparency of businesses in general (Fig. 2). Many a time, this has led to conflicts of interest between the investor community and company management. Even today, institutional investors engage in a detailed dialogue with the company boards regarding governance issues before making investment decisions.

3 Circular Economy Enhances ESG Performance

In recent years, there has been a rise in sustainability and circularity consciousness to address the scarcity of raw materials, resources, rising commodity prices and environmental pollution threatening our ecosystems and economies. Currently, many countries are transiting from a traditional linear economy to a CE, one that is regenerative and waste-free by design. To facilitate such a transition and steer towards circularity, governments are enframing relevant legislation and policies for
circular manufacturing and business operations [12, 13]. The objective of the transition is to absorb as much value as possible from resources, products, and services to create a system that promotes materials circularity and renewable energy. There is also a temporal dimension to this objective. In that, the goal of product design and manufacturing is keeping products, components, and materials at their highest utility for the longest possible times [1]. The introduction of CE-related legislation drive businesses to put the principles of CE in practice.

The CE can be perceived as a model to achieve a green economy, where the economic growth pattern is modified to take into account the limits of the natural environment. It emphasizes on the environmental responsibility of businesses and proposes that (i) recovery of materials be factored in from the initial stages of the manufacturing processes (such as ideation and design) and the outputs fed back as inputs into the manufacturing cycle [2, 14]; (ii) resource consumption be reduced [2, 14], and (iii) renewable energy be utilized in the manufacturing processes [2, 14]. Although adopting such practices in businesses is a meritorious path to achieving sustainability, it is not easy to implement the same in an established industrial ecosystem. It certainly inspires business owners to opt for deconstructing end-of-life products and reuse them as inputs for production, possible if each stage of the manufacturing process could be adapted to achieve such a result.

Besides the financial risks associated with the current linear economy [4], companies are also facing reputational challenges such as brand association with environmental degradation due to raw material extraction, resource depletion, and post-consumer pollution which eventually give rise to social challenges such as adverse effects on human and animal health. Companies should also anticipate regulatory challenges such as landfill closures, material bans, and extended producer responsibility (EPR) policies, springing up globally. By applying the principles of the CE, companies can maximize resource productivity, minimize pollution and waste generation, decouple economic growth from virgin natural resource consumption at a macro level in the global economy, and complement it with the use of renewable energy consumption as shown in Fig. 3. This will reduce the companies’ environmental impact and avoid social and governance issues.

Demand for products and services is increasing in tandem with the increasing global population and consumer affordability. Commodity and raw material prices continue to increase and remain volatile. At the same time, the environmental and social capital costs related to the extraction of non-renewable resources and waste disposal are directly impacting the overall cost of business operations. As the CE is much more than just materials recycling and using renewable energy, companies stand to gain economically by following the CE principles in addition to reducing

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7 UNEP Green Economy https://www.unenvironment.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/green-economy.
8 The 5 Principles of Green Economy https://www.greeneconomycoalition.org/news-analysis/the-5-principles-of-green-economy.
9 Green Economy and Circular Economy: targets and prospects http://www.wiretechworld.com/green-economy-and-circular-economy-targets-and-prospects/.
ESG-related risks. Embracing circularity by companies not only optimizes operational costs through judicious utilization of resources but also avoids expenses on litigations and fine payments for violating CE related legislation. Therefore, adopting a circular mindset, practising circular business model, and complying with the laws of the land for a sustainable economic model and reducing business costs has gradually become a necessity for companies.

The ESG evaluation of companies assists in identifying and understanding the different aspects of the business with scope for adopting circular principles. This will directly aid in improving the environmental performance of the business, eventually leading to enhanced social credibility and better governance (Fig. 3). This progression towards sustainability not only improves the total ESG performance of businesses but also attracts investors, especially, institutional investors interested in sustainable businesses. Such financing is necessary for evolving businesses to become more circular through research and innovation. The gradual embracing of CE principles, therefore, will not only enable sustainability in the long run but may also improve the circularity of businesses.

For example, consider the fashion industry that uses virgin feedstock (nearly 97%) such as cotton, plastic, and other fibers along with resources such as water and energy. As a result of fast trends in this industry, nearly three-quarters of the used textiles have been landfilled or incinerated in the past decade. There is also a considerable loss of virgin materials during both the production and recycling of fashion products. The study conducted by the Ellen MacArthur Foundation estimates that $500 billion worth of raw material is lost every year due to clothing being barely used and rarely recycled [15]. In addition to environmental pollution caused by these

**Fig. 3** Schematic illustration of the link between CE principles and ESG. The companies seek to adopt the principles of the CE mainly to enhance their environmental performance, that leads to better social credibility and governance. Design adapted from a template; Copyright PresentationGO.com
processes, the loss of materials and the resources used in the production add up to the total carbon footprint of the industry, thereby contributing to climate change. If this trend continues, a study by the Ellen MacArthur Foundation estimates [15] that by 2050, the fashion industry will be responsible for using a quarter of the world’s carbon budget! This has become a major concern for popular fashion brands as they are being associated with a growing negative environmental impact leading to social and governance concerns. Therefore, some brands are revisiting their designs to make them circular. One such approach involves using recycled feedstock and fibers from renewable resources such as natural fibers and recycled plastic. A few start-up fashion brands such as Rapanui have even come up with business models to collect back their products that have reached their end-of-life and upcycle them into new products. These initiatives make the business sustainable by reducing the negative impact on the environment locally and on a global scale [16]. Moreover, such circular business approaches also address governance issues such as adhering to a cap on carbon emission, landfill closures, and mandatory use of recycled feedstock. Though this transformation seems difficult initially, it is profitable in the long run.

4 ESG Performance and Evaluation

ESG was a niche concept until recent years. Incorporating the environmental, social, and governance factors into investing and lending is moving into the mainstream, transforming the operations and management dynamics of companies. According to the KPMG Survey of Corporate Responsibility Reporting (2017) [17], around 93% of the world’s largest 250 corporations (G250) report on their sustainability performance.10 Many companies are integrating non-financial aspects of business performance represented by ESG in their annual reports. In the context of global sustainability, such reporting by the companies is crucial as it demonstrates their strategic contributions and communicates their values and governance ethics to the stakeholders. This reduces the asymmetric information between the company and its stakeholders and provides the opportunity for stakeholders in choosing companies based on their ESG performance. In doing so, the stakeholders (such as investors, consumers, and suppliers) contribute indirectly to improve global sustainability. From a company’s perspective, non-financial reporting provides them an opportunity to reflect on their ESG performance, and recognize and seize new opportunities and manage changes towards sustainability [18, 19]. When viewed through a CE lens, the ESG reporting, provided it’s transparent, assists in selecting the better companies that are implementing the CE framework and the 6R framework11: reduce, reuse, recycle, recover, redesign, and remanufacturing. However, adoption of ESG practices in operations and management of a company is still voluntary (and there is general consensus that it should be made mandatory).

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10 https://www.globalreporting.org/information/about-gri/Pages/default.aspx.
11 https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic.
To report their ESG performance, currently, companies are following existing international standards and frameworks set by organizations such as the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and the Climate Disclosure Standards Board (CDSB). The most popular and widely adopted reporting standard is the GRI Sustainability Reporting Guidelines, a comprehensive framework that includes references to other widely recognized standards, such as the OECD Guidelines for Multinational Enterprises, the United Nations Global Compact Principles, and the International Organization for Standardization (ISO). Many companies are also following the ESG-related ISO standards (listed in Table 1) and are seeking the necessary certifications. Incorporating such standards makes the information disclosures by the companies more credible and makes it easier to compare with their peers following the same standards. Although ESG reporting is a remarkable development towards global sustainability, it has to be noted that the diversity in standards has resulted in nonuniform disclosures.

To support the allocation of capital to sustainable finance, market data providers such as Refinitiv (formerly the Thomson Reuters, Finance and Risk Business), Sustainalytics Inc., and MSCI are providing ESG information on companies. For example, Refinitiv offers one of the most comprehensive ESG data offerings in the industry, covering over 70% of global market cap, across more than 450 different ESG metrics, with a history going back to 2002. ESG metrics comprise of ESG scores, raw metrics, standardized and analytic data. The ESG space consists of 9,000 companies, covering 23 global and regional indices. The database and ratings are updated weekly, with a fully transparent and objective methodology. ESG news and controversies are updated continuously as and when such events occur and get picked up by global media. In addition to scores, analytics, and raw metrics for companies, Refinitiv houses one of the largest databases of green bonds. Refinitiv also provides hundreds of other data sets that can be integrated with ESG content, such as but not limited to Mergers and Acquisitions, Deals, Company Financials, Estimates, and Ownership. Such an extensive database serves as a good starting point for analysts to perform equity research, screening, and quantitative ESG analysis and identify risks and opportunities that are not detectable by conventional analytical methods. From the perspective of companies being evaluated, such raw datasets provide insights into the areas of operation and management where there is scope for improvement.

Different methodologies and weightings are often used by data providers to provide an ESG rating. These range 0–100 in the case of scores or AAA-CCC for ratings. Access to only a combined ESG risk score limits the exploration of the critical components of ESG performance impacting business sustainability. The ESG-scoring is rules-based and, mostly quantitative and less qualitative. Depending

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12 https://www.globalreporting.org.
13 https://www.sasb.org/.
14 https://www.cdsb.net/.
15 https://www.refinitiv.com/en.
16 https://www.sustainalytics.com/.
17 https://www.msci.com/.
| ISO standard      | Title/Focus                                      | Description                                                                                                                                                                                                 |
|-------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISO 14000 Series<sup>a</sup> | Environmental management systems                | Provides a framework for setting up an effective environmental management system in a company or organization                                                                                                       |
| ISO 50001<sup>b</sup>     | Energy management systems                        | Provides a practical framework for improving energy use within an organization                                                                                                                                 |
| ISO 45001<sup>c</sup>     | Management system for occupational health and safety | Provides occupational management standards for minimizing work-related accidents and diseases in an organization                                                                                                    |
| ISO 9000 Series<sup>d</sup> | Quality management systems                       | Provides a universal reference for organizations seeking to improve the quality of the products and services and be in sync with customers’ expectations                                                                 |
| ISO/IEC 27000 Series<sup>e</sup> | Information security management system          | Provides an enabling platform for organizations seeking to maintain/manage the security of their assets and critical information related to finance, intellectual property, employees, customers and/or a related third party |
| ISO 26000<sup>f</sup>     | Social responsibility Guidelines                 | Provides clarity on what social responsibility is and helps businesses to understand and put into action, translational practices towards social responsibility                                                                 |
| ISO 37001<sup>g</sup>     | Anti-bribery management system                   | Provides a regulatory guidance system for anti-bribery practices in an organization                                                                                                                                 |
| ISO/TC 322<sup>h</sup>    | Sustainable finance                              | Provides an enabling framework for standardization in the financing of business activities in general, based on sustainability considerations inclusive of E, S, and G practices                                                                 |

<sup>a</sup>https://www.iso.org/iso-14001-environmental-management.html  
<sup>b</sup>https://www.iso.org/iso-50001-energy-management.html  
<sup>c</sup>https://www.iso.org/iso-45001-occupational-health-and-safety.html  
<sup>d</sup>https://www.iso.org/iso-9001-quality-management.html  
<sup>e</sup>https://www.iso.org/isoiec-27001-information-security.html  
<sup>f</sup>https://www.iso.org/iso-26000-social-responsibility.html  
<sup>g</sup>https://www.iso.org/iso-37001-anti-bribery-management.html  
<sup>h</sup>https://www.iso.org/committee/7203746.html
on the industry sector in consideration, a set of relevant performance indicators for ESG parameters is chosen for assessment. The chosen indicators can apply to every ESG and CE other industry or be specific to a particular industry. For example, analysts do not evaluate the water usage and waste profile of financial institutions such as banks.

In this case, parameters such as board governance, community lending practices, work-life balance, and employee compensations are considered as key indicators. In contrast, for production industries such as electronics and personal care products, parameters such as water usage, waste generation and management, carbon and energy profiles, and impact on natural ecosystems and communities become important. These indicators are individually scored using publicly available data such as annual reports and corporate social responsibility (CSR) reports. The individual indicators are normalized relative to the industry peers and then combined to obtain a final ESG score.

4.1 ESG Scoring Procedure

A brief explanation of ESG scoring methodology used by Refinitiv [22] is given below as an example, for a basic understanding of how ESG scoring is performed for an industry group. The procedure used in practice by other data providers do vary based on the firm’s rules and methodologies in place. The ESG score guides published by Refinitiv and Sustainalytics Inc. can serve as representative examples for a detailed study of ESG evaluatory procedures [22, 23].

An Example of ESG Scoring Procedure: Refinitiv’s Methodology

Refinitiv provides a set of two overall scores on a scale of 0–100 comprising of:

1. **ESG score** which is a measure of the company’s ESG performance based on publicly reported verifiable data.
2. **ESG Combined (ESGC) score** which is the ESG score overlaid with the ESG controversies impacting the company materially.

To arrive at these scores, Refinitiv follows a 5-step process as shown in Fig. 4, which begins with considering 186 ESG-related data points (a subset of the 450 + data points calculated) based on comparability, impact, and data availability. Depending on the relevance to the industry group considered, data points used for calculation varies from 70 to 170. These data points are grouped into 10 categories (or parameters) that belong to the three pillars (or factors) E, S, and G as shown in Table 2. The categories are further divided into themes and based on the various indicators’ values, the themes are evaluated to calculate the category scores. Then, the E, S, and G pillar scores which are a relative sum of category scores are calculated. Finally, the overall ESG score is calculated as a sum of the pillar values. Furthermore, the ESGC score is

18The explanation provided here reflects Refinitiv’s ESG scoring methodology [22].
evaluated considering 23 categories of ESG controversies and combining it with the ESG score. For a detailed explanation of the calculation process and representative illustrations, please refer to the Refinitiv publication [22].

![Fig. 4 Schematic illustration of the Refinitiv ESG scoring methodology. The scoring procedure can be summarized and illustrated by means of a five-step process flow (marked by grey arrows). Reproduced from Refinitiv publication [22]. Copyright 2020, Refinitiv](image)

| Table 2 | List of various categories and themes for ESG scoring considered by Refinitiv [22] |
|---------|-----------------------------------------------------------------------------------|
| Pillar  | Categories | Themes                                                                 |
| Environmental | Emission | Emissions, waste, biodiversity, and environmental management systems        |
|         | Innovation | Product innovation, and Green revenues/R&D/capex                          |
|         | Resource use | Water, energy, sustainable packaging, and environmental supply chain       |
| Social | Community | Community engagement and responsibility                                      |
|         | Human rights | Human rights protection                                                    |
|         | Product responsibility | Responsible marketing, Product quality, and Data privacy                  |
|         | Workforce | Diversity and inclusion, Career development and training, Working conditions, and Health and safety |
| Governance | CSR strategy | CSR strategy, and ESG reporting and transparency                           |
|         | Management | Structure (independence, diversity, committees), and Compensation          |
|         | Shareholders | Shareholder rights and Takeover defenses                                   |
5 Case Studies

Many companies have positively modified their environmental and social impact and altered their internal governance to enhance their ESG scores. Such efforts by the Coca-Cola Company, the Intel Corporation and Apple Inc. are discussed as case studies in the following subsections. The case studies are discussed here to give an idea of how the leading companies from various industry sectors have modified and revamped their operations to enhance their ESG performance.

5.1 Case Study 1: The Coca-Cola Company’s ESG Performance

The Coca-Cola Company is a leading multinational corporation producing and marketing a variety of non-alcoholic beverages since 1886. It has a product portfolio of more than 3500 beverages that include soft drinks, dairy and plant-based drinks, energy and hydration drinks, tea, coffee, and bottled water marketed in more than 500 brands. With nearly 225 bottling partners (~900 bottling plants) in over 200 countries, it is critically dependent on resources such as water, raw materials such as agricultural produce, energy, and packaging materials.

On the other end, somewhere during its operations, the company’s processes are contributing to global warming, climate change, and packaging waste (that pollute the local ecosystems) and affecting the health of its consumers (causing obesity and/or diabetes). Therefore, to lower the company’s negative impact on the ecosystems and the society, and to have smooth and uniform governance across all its facilities, in 2015, the Coca-Cola Company board and administrative team prioritized several ESG issues to achieve a sustainable business [24]. These priority issues and strategies categorized into individual ESG factors appear in Fig. 5. This is followed by a brief explanation of the company’s strategies to mitigate its negative impact on the environment and consequently, enhance its ESG performance.

Many of the issues listed in Fig. 5 are interconnected and need immediate attention. To transform the total beverage company into a sustainable business globally, the company has set a long-term vision. The major actions undertaken by the Coca-Cola Company in enhancing its ESG performance mainly include the efforts to reduce the negative impact of the company, related to ecological and social factors [24]. And this pursuit focused on three critical E (environmental) issues: water, carbon, and waste [24].

1. Water Stewardship: The production of beverages is critically dependent on the availability of high-quality water. Also, communities living in the vicinity of the company’s business locations depend on the nearby freshwater resources. The growing threats to the quality and availability of freshwater across the globe due to various reasons such as overuse of water resources, industrial pollution, and unsustainable agricultural practices will further strain the beverage
Fig. 5 Illustration of the key ESG parameters as prioritized by the Coca-Cola company board and administrative team for an enhanced ESG performance. These parameters are categorized into environmental, social responsibility and governance factors, and are considered to lower the company’s negative impact on the environment and society and ensure a uniform governance across all its facilities.

business. To tackle this, the Coca-Cola Company is trying to ensure that the company’s operations contribute positively to maintaining freshwater resources and the natural water cycle, indirectly benefiting the communities around. The company’s strategy is to use water judiciously and improve water security in the local environment through Water Stewardship Programs. The company has set targets to replenish more than 100% of the water they consume annually and increase water usage efficiency by 25% by 2020 compared to that in 2010 [24].

2. Circular Approach for Lower Carbon Footprint: The increase in carbon emissions has resulted in climate change effects such as disruption in the weather patterns and more frequent and severe natural calamities. This directly impacts the business operations of the company along with the surrounding communities. In the coming years, such climate aberrations will continue to affect agricultural activities and create food security issues. Besides the environmental and social concerns, the local governments are also introducing policies that incentivize the reduction in carbon emissions. Such changes motivate and drive the company to assess carbon emissions regularly in their value chain and reorient their supply chain to the one having a lower carbon footprint. Therefore, the company is taking responsibility to reduce its carbon footprint and achieve the climate change goals of the Paris Agreement.19 This is being achieved by reducing emissions from

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19https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement.
manufacturing processes by improving energy efficiency and moving to renewable energy sources, and evaluating and making changes in operations throughout the Coca-Cola system value chain (manufacturing processes, packaging formats, delivery fleet, refrigeration equipment, and ingredient sourcing). The company’s target is to reduce carbon emissions by 25% by 2030 considering 2015 as the baseline [24].

3. **Circular Approach for Zero-waste**: Post-consumer packaging waste is a major global issue. Besides the pollution issues related to the oceans and coastal regions, plastic packaging has also become a major constituent of the landfills. Such packaging waste not only pollutes the environment but also increases the carbon footprint of the product. To address the waste issue resulting from plastic packaging, many governments are introducing EPR policies. Consumers are becoming aware of the cost of material inefficiencies in linear production models. Therefore, the Coca-Cola Company has made zero packaging waste as one of its core strategies. The company plans to achieve this by setting three major goals: 100% recyclable packaging by 2025, 100% recycling rate by 2030, and using 50% of recycled materials for packaging by 2030 [24]. They are trying to eliminate low-value multi-layered packaging and other non-recyclable materials, increase the collection rates of clear PET bottles and introduce innovative methods to recycle colored bottles and dirtier waste streams.

To enhance the S performance, the company focused on product innovation for a healthier diet [24]. People’s preferences and tastes keep evolving. As a consumer-centric business, the beverage company keeps altering and refashioning its product portfolio. Consuming less sugar as a part of the healthier diet has gained traction around the world. Hence, the company is making efforts to gradually reduce sugar (and calories) across its entire product portfolio. They have been aggressively reformulating the recipes to reduce sugar and promoting low/no sugar beverage options such as organic tea, coconut water, and natural fruit juices. The company has also introduced smaller packages to control sugar intake and new local favorites with nutritional and hydration benefits. Every product is provided with nutritional labels to assist consumers in making informed choices.

In addition to this, the company has set a goal of investing at least 1% of the annual operating income back into the local communities across the globe. It is also focused on increasing the number of women entrepreneurs across its global value chain as an effort to empower women. Since 2010, its target is to empower 5 million women by 2020 [24].

The internal governance or the G factor at the Coca-Cola company upholds principles and practices to promote an innovative and collaborative culture. The company’s various administrative and executive committees are committed to ethical and transparent governance. Human rights principles are imbibed into their business culture and it is evident in their interactions with employees, bottling partners, suppliers, customers, consumers, and the communities. The principles start with employee safety and health at the workplace through minimizing the risk of accidents, injury,
and exposure to health hazards across all of its business facilities. Stakeholder engagement is a priority for the company and hence, stakeholders are engaged in regular transparent communications and their different views and values are respected in decision making. As a global business, diversity and inclusion are critical for long-term sustainability. It encompasses diverse partners, gender and cultural diversity in the workforce and an inclusive environment to attract, recruit, develop, engage, and retain diverse talents.

It is also actively involved in its supply chain management. As the beverage industry is heavily dependent on agricultural products such as fruit juices, coffee, tea, herbs, sugar, and soy, the company has promoted procurement of ingredients from sustainable agriculture. During 2013–2018, there has been an increase from 8% to 44% in ingredients certified to a sustainability standard [24].

With all the aforementioned efforts from the Coca-Cola Company to enhance its ESG performance, its ESG risk score provided by Sustainalytics is 26 on a scale of 0–100 (at 40th percentile) as of January 2020. This means that the financial risk factor is medium for the shareholders. The individual scores of E, S and G are 9.2, 11.5 and 5.4 respectively. The company is also facing a significant number of controversies with a controversy score of 3 on a scale of 0–5.20

5.2 Case Study 2: Intel Corporation’s ESG Performance

The Intel Corporation, popularly known as ‘Intel’ is a multinational company that manufactures semiconductor electronic components and devices since 1968. Today, the company has evolved from being PC-centric to a data-centric business. This evolution was driven by the rapid growth of cloud data usage, artificial intelligence (AI), internet-of-things (IoT), data analytics and more recently the transition to 5G. With this, Intel is also reinventing itself on various crucial fronts such as environmental sustainability, responsible supply chain management, positive social impact, and key governance measures such as transparency, employee welfare, diversity and inclusion to achieve a sustainable business [25]. A summary of how Intel is prioritizing ESG in its business operations (Fig. 6) is presented below.

Intel’s commitment to enhance its E performance is visible through its company-wide set targets related to reducing greenhouse gas emissions, green energy portfolio, restoration of water resources, and waste management [25]. The company is working aggressively towards treating and restoring 100% of water consumed for its manufacturing processes by 2025. It is also expanding green power consumption in its global operations and its efforts in increasing energy efficiency have been duly recognized and awarded [25]. All the new buildings since 2015 are designed to

20The Coca-Cola Company (KO) ESG Risk Ratings by Sustainalytics Inc. (Last updated on 1/2020) https://sg.finance.yahoo.com/quote/KO/sustainability/.
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Fig. 6 Illustration of the key ESG parameters as prioritized by the Intel corporation’s board and administrative team for an enhanced ESG performance. These parameters are categorized into environmental, social responsibility and governance factors, and are considered to lower the company’s negative impact on the environment and society and ensure an uniform governance across all its facilities.

be greener and energy-efficient (LEED\textsuperscript{21}-certified).\textsuperscript{22} The company has committed to CE principles in recycling manufacturing waste, especially hazardous waste, to achieve a ‘zero hazardous waste to landfill’ status quo by 2020. It has also implemented several programs to reduce, reuse and recycle office furniture and other non-hazardous waste to achieve a 90\% non-hazardous waste recycling rate by 2020 \cite{25}. Intel has also demonstrated the implementation of CE principles in its product design by eliminating harmful materials such as lead and halogenated flame retardants.

Besides such efforts, Intel has also made significant investments in reducing its ecological footprint, thereby playing its role in achieving the United Nations Sustainable Development Goals \cite{25}. Intel technologies are supporting other leading companies in reducing their respective environmental footprints and driving sustainable consumption and production, as well as assisting several governments and non-profit organizations (working on environmental conservation projects) in protecting the natural ecosystems. For example, Intel’s new AI technology developed with support from the Leonardo DiCaprio Foundation, RESOLVE (non-profit) and the National Geographic Society is helping fight illegal poaching of wildlife in Africa \cite{25}.

\textsuperscript{21}What is LEED? https://www.usgbc.org/help/what-leed.
\textsuperscript{22}Intel Building Certifications http://www.gbig.org/collections/14125/activities.
Driven largely by its vision of addressing global challenges and enhancing its sustainability, Intel has been investing in technologies and innovations that empower individuals and society in general [25]. Some of the examples of such technological innovations of Intel are listed below.

1. Wheelchairs equipped with Intel’s AI technology is maximizing mobility and independence of physically challenged people with spinal-cord injuries.
2. Intel is collaborating with start-ups to develop an advanced breast cancer diagnosis system based on AI, using data analytics and machine learning.
3. With its drone technology and AI, Intel is helping to renovate the Great Wall of China and preserve its cultural legacy.
4. Intel is also working on improving the safety aspects of autonomous vehicles using its AI technology.

Intel also takes care of its employees’ health, safety, and wellness by providing onsite health centers, fitness classes, and facilities. Intel is also committed to creating social impact through three different programs [25] as listed below.

1. It encourages the employees to volunteer in engaging the local communities (inclusive of schools, non-profit and non-government organizations) for solving local societal and environmental issues.
2. The company is also empowering communities by providing exposure to technologies and learning opportunities, thereby inspiring young minds and the potential next-generation innovators.
3. The Intel Foundation invests in Science, Technology, Engineering, and Management (STEM) education programs, and organizations providing humanitarian relief to survivors of natural calamities.

Intel has been striving to perform well in governance (G factor) and believes in the inclusion of diversity in its workforce as diverse perspectives can often lead to creative and innovative outcomes [25]. Such efforts include employee hiring and retention, encouraging women and underrepresented minorities to pursue their careers in high technology, doing business with diverse suppliers, and diversifying its venture portfolio.

The company follows a strict supply chain policy to eliminate forced and bonded labor, engage its suppliers to develop their corporate responsibility strategies, set high ethical standards, and be transparent about their performance. As a founding member of the Responsible Business Alliance (RBA), Intel collaborates extensively with supply chain-related organizations to help set electronics industry-wide business standards and expects its suppliers to comply with the Intel Code of Conduct and the RBA Code of Conduct (such as employee working hours, safety standards, and minimal environmental impact). Through communication, assessments, and capability-building programs, Intel has developed a supply chain that is resilient, responsible, and respectful of human rights [25].

Intel is trying to reduce its environmental and social footprint with effective governance strategies. This has been reflected in the company’s ESG risk score.
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Sustainalytics rates Intel ESG performance as 17 (at 11th percentile) on a scale of 0–100 as of January 2020, which implies quite low financial risks. The individual scores of E, S and G are 4.9, 5.2 and 6.9 respectively. It also has a controversy score of 3 on a scale of 0–5. This shows that the company is encountering quite a significant number of controversies although it is lesser than the peer average.23

5.3 Case Study 3: Apple’s ESG Performance

Apple Inc. being the largest IT company in the world in terms of the total assets and revenue is a designer, manufacturer, and retailer of mobile communication and media devices, personal computers, and portable digital music players. The company also has a business portfolio of its products related software, services, accessories, networking solutions, and third-party digital content and applications.

Apart from expanding its business and product portfolios, the company has also been making a conscious effort to reduce its carbon footprint and improve its E performance (Fig. 7), for over a decade now [26]. To meet this environmental objective, the company has set strict goals, focusing on three key priority areas listed below.

1. Climate change: Mitigating the impact of the company on climate change by using renewable energy resources and enhancing the energy efficiency of products, production facilities, and supply chain.
2. Resource Conservation: Minimizing the environmental impact by using recycled materials in manufacturing and reducing the consumption of virgin materials from nature.
3. Safer materials: Designing in such a way that safer materials are used in the product design and manufacturing processes.

To reduce its total carbon footprint (contributed by manufacturing, transportation, materials suppliers, and millions of customers), the company is using clean energy in its supply chain and at its facilities, increasing the energy efficiency of its business operations in the form of green buildings and consumption of recycled aluminium during manufacturing [26]. The company has already reached its target of 100% renewable (in 2018) and clean energy consumption in all its facilities worldwide inclusive of its offices, retail stores, and data centers [26]. As Apple consumes a significant quantity of aluminium in manufacturing, it has prioritized the use of aluminium smelted using hydroelectricity rather than fossil fuels and reengineered the manufacturing process to reincorporate scrap aluminium. It has also taken initiatives to reduce the packaging material by making it smaller and lighter, and collecting end-of-life products for recycling. Such efforts since 2011 have reduced Apple’s carbon emissions by 54% even though its energy consumption tripled during this

23Intel Corporation (INTC) ESG Risk Ratings by Sustainalytics Inc. (Last updated on 1/2020) https://finance.yahoo.com/quote/INTC/sustainability/.
Fig. 7 Illustration of the key ESG parameters as prioritized by the Apple’s board and administrative team for an enhanced ESG performance. These parameters are categorized into environmental, social responsibility and governance factors, and are considered to lower the company’s negative impact on the environment and society and ensure an uniform governance across all its facilities period, thereby preventing nearly 2.1 million metric tons of CO$_2$e from entering the atmosphere [26]. In the process of transiting to renewable energy, Apple has also invested significantly in new renewable energy projects and approximately 66% of the renewable energy Apple procures comes from such projects [26]. Also, worthy of mention is the fact that the company encourages its employees to avoid using single-occupancy vehicles and instead increase the use of electrically charged vehicles and bicycles to get to work.

Apple is also taking initiatives to save water, rare minerals and other natural resources that are consumed directly or indirectly. As a part of its water-saving program, besides reducing the usage of water, the company is supporting the use of alternatives to freshwater such as recycled water, reclaimed water, and harvested rainwater. To reduce the electronic waste generated and reuse the material resources, Apple offers recycling in almost all the countries it operates and has diverted more than 500 million pounds of electronic waste from landfills to the manufacturing lines since 2008 [26].

Apple has been actively implementing CSR programs for enhancing its S performance since 2011 [26]. The “Global Volunteer Program” encourages the company’s employees to volunteer in philanthropy projects of their choice and contribute to local communities. The company also helps the victims of natural disasters through fundraising and donations. In addition, Apple has educational and training programs
for its employees and suppliers in order to improve their efficiency at work. The company has also expanded its employee benefits program by allowing its female employees to take a total of 18 weeks of leave during childbirth and post-pregnancy, and father/non-birth parents are also allowed 6 weeks of parental leave. Apple has strict labor and human rights policies and insists on its suppliers to comply with the same. It includes a maximum work week of 60 h (higher compared to the average maximum workweek of 48 h in the European Union), employee health and safety training, employee compensation, and ergonomic research to better design the workstations. The company’s workforce is diverse and inclusive, with women involved at all levels of technical and administrative work. It also made a historic move in 2018 by hiring 50% of its new employees from underrepresented ethnic groups for technical jobs.24

Setting high corporate governance standards for a strong G performance is what makes Apple a reliable company for all its stakeholders. That is why the executive and non-executive committees at the top levels of management are committed to transparent and fair governance. They take into consideration the interests of all the stakeholders including investors, suppliers, consumers, and the community before making operational decisions. They follow rigorous audits, evaluations for employee compensation, anti-corruption and business conduct policies, guidelines to address conflicts of interest, stock ownership, and many bylaws for managing organizational operations.25

Apple is taking numerous measures to better its ESG risk rating, especially in the past decade. However, its ESG risk score provided by Sustainalytics Inc. is 24 (32nd percentile) on a scale of 0–100 as of January 2020.26 The individual scores of E, S and G are 0.6, 13.0 and 10.3 respectively. This implies that the company is doing very well in environmental sustainability, however, it has to take steps to improve its social responsibility and better the governance aspect too. Apple also has a controversy level 3 (on 0–5 scale) similar to that of The Coca-Cola Company and Intel.

6 Current Outlook

Practicing CE principles in business operations and management aids companies to improve their overall ESG ranking. Adopting CE also helps companies in reducing operational costs and therefore, ESG practice has evolved gradually as a cost-anchored approach for the companies. The main value of the CE from an operational perspective for businesses is that it aids to reduce the costs of the supply chain or

24Apple Corporate Social Responsibility (CSR) by John Dudovskiy https://research-methodology.net/apple-corporate-social-responsibility-csr/.
25Leadership and Governance https://investor.apple.com/leadership-and-governance/.
26Apple Inc. (AAPL) ESG Risk Ratings by Sustainalytics Inc. (Last updated on 1/2020) https://sg.finance.yahoo.com/quote/AAPL/sustainability/.
generate value from byproducts, consequently making the business more competitive in addition to decreasing the negative environmental impact of companies. Implementing circularity could improve companies’ environmental performance while creating value and increasing revenue. Most companies incorporate CE-based ESG practices to enhance their overall “green” image to attract sustainability investors. Therefore, ESG scoring is far from being an absolute truth in determining how sustainable companies are. It is when ESG concepts get embedded into the core business of a company, ESG practice will become more engaged with the idea of a CE. Besides, for systemic change towards a CE, ESG should not be limited to publicly traded companies. Government institutions and NGOs must also embrace, measure, and perform well under ESG.

Reporting on environmental sustainable goals, social responsibility, and governance factors is an important practice for communicating the efforts of a company in achieving the ESG goals other than their conventional economic goals (e.g. profits). Consequently, embracing ESG as a part of the mainstream business has lately gained traction and ESG-oriented investing has experienced a meteoric rise. According to McKinsey 2014 estimates, globally, more than $13 trillion were invested in the businesses that incorporated ESG criteria in their operations [10]. In 2019 alone, the global sustainable investment topped $30 trillion—a 68% increase since 2014 and tenfold since 2004 [27]. This increase in the investments on sustainable businesses is a consequence of heightened social and governmental attention on the broader impact of companies on the environment and society, as well as the foresight of investors and financial advisors who are realizing that a strong ESG proposition can safeguard and promote a company’s long-term success. There is empirical evidence of better returns resulting from investments based on ESG scores [11]. In particular, portfolios with high ratings for ESG criteria such as eco-efficiency, employee relations, and transparency in corporate governance have set new milestones in the stock markets and investing in general, with comparatively lesser downside risks. A good ESG performance by companies can also result in institutional investors such as banks investing in such companies through green bonds.27 Also, companies with better ESG scores have benefited with higher credit ratings and lower costs of debts, translating to better profits.

With the commercial relevance stated above, ESG related knowledge is still abstract and is not being imparted as a part of the curriculum in mainstream business management studies. This has resulted in an inadequate appreciation of ESG metric and their significance in the current corporate set up, and scant consideration of ESG datasets by average analysts and investors. Such a situation may put companies and investors in significant financial risks in this fast-paced market. It, therefore, becomes imperative to introduce ESG in mainstream engineering and business education, as a result of which business management (inclusive of operations and risks) and financial investments are focused on enabling sustainable businesses.

Questions

27https://www.investopedia.com/terms/g/green-bond.asp.
1. Bring out the interconnection of E, S, and G factors (as explained in the first section) through an example.
2. Explain with an example, how adopting CE principles can improve the ESG performance of a company.
3. List the existing international standards for sustainability reporting.
4. Explain why non-financial sustainability reporting became important for companies in recent years.
5. Write an ESG case study of a G250 company.
6. Listed below are a few top ESG-rated companies from various industry sectors. Find out the ESG ratings of these companies as given by MSCI.

| Company                        | Industry sector               |
|--------------------------------|-------------------------------|
| Edwards lifesciences           | Medical products              |
| Cadence design systems         | Computer software-design     |
| Microsoft                      | Computer software-design     |
| Texas instruments              | Electronics-semiconductor Mfg.|
| Applied materials              | Electronics-semiconductor equipment |
| Procter and gamble             | Cosmetics/personal care       |
| ResMed                         | Medical products              |
| Agilent technologies           | Medical-research equipment/services |
| Alphabet                       | Internet content              |
| Adobe                          | Computer software-desktop    |
| PepsiCo                        | Food and beverage            |
| Methode electronics            | Electronics-parts            |

7. List the relevant indicators belonging to the resource use parameter for the fashion industry.
8. Explain the role of corporate governing bodies in enhancing E and S performance.
9. Calculate the percentile scores for the given values of an indicator for a set of companies.

| Company | Indicator value     |
|---------|---------------------|
| A       | 0.00016684373      |
| B       | 0.00017996645      |
| C       | 0.00027148692      |
| D       | 0.00029749855      |

10. List the E, S, and G risk ratings of the Coca-Cola Co and Intel. Suggest three measures these companies can take to improve their E performance.
11. How can Apple improve its corporate social responsibility to enhance its S performance? Suggest up to three measures.
12. Explain the underlying reasons for Apple’s superior E performance.
13. State the differences between a company’s ESG score and ESG risk rating.
14. What is the green-washing phenomenon? Has the ESG scoring methodology contributed to this issue? Explain briefly.
15. Define green economy. Conceptually, how does a circular economy differ from a green economy?
16. What is a green bond? Briefly describe its connection to ESG performance.

Suggested Reading

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Rashmi Anoop is a circular economy enthusiast and an engineer by profession with a Bachelors in Electronic Engineering from Visveswaraih Technological University, India. As a member of the Circular Economy Task Force at the National University of Singapore (NUS) (led by Prof. Seeram Ramakrishna, Chair, Circular Economy Task Force, NUS), she is currently researching on circular economy concepts. She is passionate about sustainability and ecofriendly businesses.

Patrizia Ghisellini is a postdoctoral researcher in the research group headed by Prof. Sergio Ulgiati, affiliated to the Department of Science and Technology at the University of Naples, Parthenope. She graduated in Economics of Public Administrations and International Institutions and further specialized at academic level in the topics related to the sustainable development and management of environmental systems as well as in life cycle assessment method at the National Agency for the New Technologies, Energy and Environment. She received her PhD from the Alma Mater Studlorum—University of Bologna in Agricultural and Food Economics and Policy. She is currently involved at the University of Naples, Parthenope in a high relevance project “Italy-China” funded by the Italian Ministry of Foreign Affairs and International Cooperation and other projects funded by the EU and Local Italian Public Administrations. The main goal of these projects is evaluating the implementation of the circular economy at national and local level in priority economic sectors such as C&DW, waste electric and electronic equipment, municipal solid waste, agriculture and food industry, urban forestry. She has published several articles on circular economy. Besides the circular economy, her research interests include sustainable development, urban forestry, and life cycle sustainability methods.
Professor Seeram Ramakrishna FREng, Everest Chair (https://www.eng.nus.edu.sg/me/staff/ramakrishna-seeram/), is among the top three impactful authors at the National University of Singapore, NUS (https://academic.microsoft.com/institution/165932596). NUS is ranked among the top five best global universities for engineering in the world (https://www.usnews.com/education/best-global-universities/engineering). He is the Chair of Circular Economy Taskforce. He is a member of Enterprise Singapore’s and ISO’s Committees on ISO/TC323 Circular Economy and WG3 on Circularity. He also the Chair of Sustainable Manufacturing TC at the Institution of Engineers Singapore and a member of standards committee of Singapore Manufacturing Federation (http://www.smfederation.org.sg). He is an advisor to the Ministry of Sustainability & Environment—National Environmental Agency’s CESS events, (https://www.cleanenvirosummit.sg/programme/speakers/professor-seeram-ramakrishna; https://bit.ly/catalyst2019video; https://youtube.com/watch?v=ptSh_1Bg1lg). European Commission Director-General for Environment, Excellency Daniel Calleja Crespo, said, “Professor Seeram Ramakrishna should be praised for his personal engagement leading the reflections on how to develop a more sustainable future for all”, in his foreword for the Springer Nature book on Circular Economy (ISBN: 978-981-15-8509-8). He is a member of UNESCO’s Global Independent Expert Group on Universities and the 2030 Agenda (EGU2030). He is the Editor-in-Chief of the Springer NATURE Journal Materials Circular Economy—Sustainability (https://www.springer.com/journal/42824). He is an Associate Editor of eScience journal (http://www.keaipublishing.com/en/journals/escience/editorial-board/). He is an opinion contributor to the Springer Nature Sustainability Community (https://sustainabilitycommunity.springernature.com/users/98825-seeram-ramakrishna/posts/looking-through-covid-19-lens-for-a-sustainable-new-modern-society). He teaches ME6501 Materials and Sustainability course (https://www.europeanbusinessreview.com/circular-economy-sustainability-and-business-opportunities/). He also mentors Integrated Sustainable Design ISD5102 project students. Microsoft Academic ranked him among the top 25 authors out of three million materials researchers worldwide based on H-index (https://academic.microsoft.com/authors/192562407). He is named among the World’s Most Influential Minds (Thomson Reuters) and World’s Highly Cited Researchers (Clarivate Analytics). Listed among the top three scientists of the world as per the Stanford University researcher study on career-long impact of researchers or c-score (https://drive.google.com/file/d/1bUJrvurVVBbxSI9eFZRSHFi7tt30-5U/view). He is an Impact Speaker at the University of Toronto, Canada Low Carbon Renewable Materials Center (https://www.lcrmc.com/). He is a judge for the Mohammed Bin Rashid Initiative for the Global Prosperity (https://www.facebook.com/Make4Prosperity/videos/innovation-inclusive-trade/47950353939143/). He advises technology companies with sustainability vision such as TRIA (www.triabio24.com),
CeEntek (https://ceentek.com/), Green Li-Ion (www.Greenli-ion.com) and InfraPrime (https://www.infra-prime.com/vis ion-leadership). He is a Vice-President of Asian Polymer Association (https://www.asianpolymer.org/committee.html). He is a Founding Member of Plastics Recycling Association of Singapore (PRAS). His senior academic leadership roles include University Vice-President (Research Strategy), Dean of Faculty of Engineering; Director of NUS Enterprise and Founding Chairman of Solar Energy Institute of Singapore (http://www.seris.nus.edu.sg/). He is an elected Fellow of UK Royal Academy of Engineering (FREng), Singapore Academy of Engineering and Indian National Academy of Engineering. He received PhD from the University of Cambridge, UK, and The TGMP from the Harvard University, USA.