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"The Role of Sustainability Maturity Models in Enhancing the Competitiveness of Ecological Manufacturing: A Case Study of Unilever"

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Abstract

This research examines the effect of Sustainability Maturity Models (SMMs) regarding (Unilever's environmental and competitive performance). For the time period of the studies carried out from 2019 to 2023, it is assessed how Unilever has benefited from SMMs in terms of reducing carbon emissions, water usage, waste management and improving its competitive edge against Nestle and Procter and Gamble (P&G). Using secondary data from company report and other industry papers, the analysis of the usage of renewable energy has achieved 60% level and waste of plastic has been reduced by 50%. Unilever is presented as a pioneer in ethical business practices. Environmental sustainability capabilities that SMMs provided have helped Unilever to integrate corporate social responsibility within its business model and reap environmental and economic rewards, respectively. Strategies to enhance the sustainability performance still further include adopting new sustainability technologies and creating unified industry standards.

Keywords: *Sustainability Maturity Models (SMMs) - Unilever - Carbon Emissions Reduction - Waste Management - Competitive Advantage - Renewable Energy - Sustainable Sourcing - Water Conservation.*

introduction

As the commitment to sustainable development in the industrial and service sectors increases, businesses are working to establish social responsibilities, comply with environmental laws and standards, enhance resource efficiency, and integrate environmental practices into their management and operational processes (Heikkinen et al., 2019). This development requires managers, academics, and governments to address the challenges of setting goals that ensure environmental sustainability in industrial processes.

Corporate environmental sustainability is associated with sustainable development, which integrates immediate and long-term objectives while addressing social, economic, and environmental issues as interconnected aspects of human progress (Brundtland, 1987). Corporate environmental sustainability can thus be viewed as a reduction in waste and environmental impact, achieved by optimizing the use of economic, social, and environmental resources. Companies that implement environmental sustainability practices experience tangible benefits such as cost savings and new revenue sources, along with intangible benefits like brand enhancement,

employee morale, and innovation (Parker et al., 2017).

In spite of these merits, trying to integrate sustainable strategies into the management and industry operation processes is still quite difficult due to the absence of a comprehensively developed framework (Shi et al., 2019). In addition, Sustainability Maturity Models (SMMs) also offer some improvements towards product development and manufacturing processes as well as establish a benchmark for the maturity level of certified organizations (Watz & Hallstedt, 2020; Lopes et al., 2017). Nonetheless, there are also only a few studies that comprehensively cover the most crucial aspects of environmental sustainability in internal dimensions such as the employee's social aspect, internal curb environmental factors, and economic elements relevant to sustainability management (Plasencia Soler et al., 2018).

Research Gap: Recent studies about Sustainability Maturity Models (SMMs) significantly lack attempts to provide any analysis on how these models are applicable in the cases of competitive advantages for larger organizations like Unilever. While a number of studies have sought to address the environmental dimension of sustainability endeavors, not many studies have demonstrated the links between these practices and competition and economic benefits. The purpose of this research is to fill this gap and analyze SMMs at Unilever and their implications on its market position, operational costs, brand equity, and strategies of dominance in sustainability.

This study examines the role of Sustainability Maturity Models (SMMs) in enhancing the competitiveness of environmental manufacturing. directions.

Research Objectives:

1. The study seeks to understand the relative importance of Sustainability Maturity Models (SMMs) in the area of environmental concern and SMMs' role within operational performance of Unilever: The study addresses the issue of incorporation of SMMs into the strategies for sustainability which have been adopted within Unilever and how this has affected key performance indicators such as carbon footprints, water footprints and waste footprints.
2. The second objective deals with the understanding of the benefits that Unilever has achieved by being a sustainable company: This to enhance market share and brand value stems from, Unilever leadership in sustainability practices including sustainable sourcing and more recently, renewable energy in strategy-nimbra of the company.
3. Flavour is achieved by minimizing the greenhouse gas emissions and the energy used is understood towards the amount of water consumed and the waste created in the process: This objective intends to establish quantitative measures of advancement that Unilever sustainability performance has achieved with regard to specific environmental elements.
4. To propose projects for the improvement of Unilever's sustainability leadership with the use of new generation technologies and combination with other companies from the industry: The aim of the investigation is to indicate to Unilever how some practices should be changed and how the company should position itself to emerge from the adoption of new sustainability practices with an improved relative position in the industry.

Research Questions:

1. What impact has the Employment of Sustainability Maturity Models (SMMs) made on the sustainability strategy and performance of Unilever?
2. According to Unilever, what constructive edge over its competitors like Nestlé, Procter & Gamble has it obtained from its sustainability practices?
3. What achievements in cutting carbon footprint, energy, water, and waste, has Unilever made in the time frame 2019-2023?
4. What Internal practices does Unilever require to enhance the prospects of using such advanced sustainability technologies and industry standards in general?

Hypotheses:

H1: Such approaches, as the Sustainability Maturity Models (SMMs), are remarkably effective in their intentions towards the environmental behavior of Unilever, including its carbon emissions, energy and water use and waste mitigation activities.

H2: Since SMMs are effectively employed within Unilever, the company enjoys a distinct sustainable competitive advantage amongst its peers, such as Nestle and P&G.

H3: Thanks to Unilever's transition towards renewable energy sources and the use of circular economy, the company has been able to reduce its operational expenses.

H4: More so, Unilever's position as a market leader in sustainability can be reinforced through expansion into new sustainability technology investments and partnerships with competitors with the aim of setting global industry standards.

Literature Review:

1. Understanding Sustainability Maturity Models:

The Sustainability Maturity Models (SMMs) provide a gradual roadmap toward achieving operational excellence across the organization and optimization of OHS processes in line with the goals of the Integrated Performance Model. The practice is organized into levels starting from the lowest, where the company is only required to meet regulatory limits, to the highest level, where businesses adopt sustainable development as part of their strategic process to meet their goals. Through an assessment of levels, SMMs promote the optimal use of resources and aid in decision-making (Chardine-Baumann & Botta-Genoulaz, 2014). SA 8000, ISO 14000 Standards, and GRI guidelines are management tools that have helped in implementing these models, specially built upon TBL (Saeed & Kersten, 2020; Labuschagne et al., 2005). SMMs add a dimension of externality to sustainability evaluation by inviting external supply chains and populations into the evaluation, which is a rarity in other frameworks (Wendler, 2012; Pigosso et al., 2013). Research about SMMs is on the rise, which can be seen with diversity in; however, the application of these models remains a sub developed area (Correia et al., 2017; Santos et al., 2020; Pavan et al., 2022).

I. Maturity Models in Various Sectors:

Industries have their own criteria that the SMMs operate within; as such, research on the respective SMMs tends to be quite different. Different studies have been undertaken in isolation on only specific industry branches, such as IT, which has been focused on by Gomes et al. (2020), and remanufacturing (Golinska & Kuebler, 2014), while other studies focused on multiple industries. There is also a higher volume of research on SMM pertaining to manufacturing and sustainable supply chain management compared to the service-oriented field (Pavan et al., 2022). Comparative studies show that SMMs also differ in the scope of implementation as well as maturity, and only about 5 percent of studies conduct deep theoretical analyses of SMMs (Wendler, 2012). In Table 1 of the original review, SMM parts are described in terms of research comparing SMM, including the focus of models, units of analysis, and stages of ecology for agriculture industry correlates (Correia et al., 2017; Pavan et al., 2022).

Table 1 summarizes the findings of the review, which highlights the disparities among several MMSs.

Table 1. Main research on Maturity Models.

Scope - Sustainability Focus	Authors	Unit of Analysis	Scope Elements/Characteristics	Maturity Levels (Number/Descriptor)

Scope - Sustainability Focus	Authors	Unit of Analysis	Scope Elements/Characteristics	Maturity Levels (Number/Descriptor)
TBL (Triple Bottom Line) - Knowledge Management	Robinson et al. (2005)	Process	N/A	5 levels: Start-up, Take-off, Expansion, Progressive, Sustainability
TBL - Information Systems Management	Standing & Jackson (2007)	Process	N/A	6 levels: Non-existent, Initial/ad hoc, Repeatable, Defined, Managed, Optimized
Environmental Sustainability - IT Outsourcing	Babin & Nicholson (2011)	Company	Adoption of global standards, stakeholder responsiveness, and sustainability development	3 levels: Early-stage, Aspirants, Mature leaders
Environmental Sustainability - Eco-design	Pigosso et al. (2013)	Process	Eco-design practices with implementation paths, company-wide adoption, and knowledge levels	5 levels: 1, 2, 3, 4, 5
TBL - Supply Chain Management	Okongwu et al. (2013)	Network	Standards usage, management of performance, pollution, relationships, employees, profit, and value distribution	4 levels: Primeval, Initial, Intermediate, World Class
TBL - Sustainable Supply Network	Srai et al. (2013)	Network	Strategic design, network connectivity, process development, product/service enhancement	5 levels: N/A
TBL - Company-wide Sustainability	Edgeman & Eskildsen (2014)	Company	Strategy, governance, processes, financials, sustainability, innovation, human capital	5 levels: Very low, Moderate, High, very high maturity

Scope - Sustainability Focus	Authors	Unit of Analysis	Scope Elements/Characteristics	Maturity Levels (Number/Descriptor)
TBL - Remanufacturing	Golinska & Kuebler (2014)	Company	Economic, ecological, social dimensions	5 levels: Level 0, 1, 2, 3, 4
Environmental Sustainability - New Product Development	Hynds et al. (2014)	Process	Strategy, Design Tools	4 levels: Beginning, Improving, Succeeding, Leading
TBL - Data and Reporting	Kurnia et al. (2014)	Network	Data collection, reporting, benchmarking, risk analysis, governance	4 levels: Unawareness, Unpreparedness, Committed, Advanced
Environmental Sustainability - Production Process	Verrier et al. (2016)	Process	N/A	5 levels: Initial, Managed, Defined, Quantitatively Managed, Optimized

Source: Adapted from (Correia, et al. 2017).

II. Corporate Examples of SMM applications

Many organizations in the world have incorporated SMMs into their operations due to the existing global goals and the need to enhance their sustainability. A McKinsey & Company report announced that companies around the globe and across industries have begun choosing SMM in their presentations, while Siemens (2020) aimed toward increasing energy coherence and promoting organic supply acquisition (McKinsey & Company, 2020). Two more companies, called PWC and EY, also implement SOC as well as ESG activities, respectively, while KPMG and Cisco concentrate through SMM to use SC and decrease carbon emissions (PWC, 2019; EY, 2021; KPMG, 2020; Cisco, 2021).

III. Stages of Sustainability Maturity**:**

Most SMMs divide sustainability progression into levels as follows:

- **Initiation:** There is little to no knowledge or interest on the part of the organization in sustainability activities.
- **Basic:** statutory rules are respected.
- **Intermediate:** deliberate attempts are made to mitigate damage to sustainability.
- **Advanced:** Sustainability is pervasive in organizational functions and operations.
- **Optimized:** Innovation and sustainable agendas deliver consistent value creation and competitive advantages for the company.

IV. Summary:

SMMs, as explained in Finn and Domingues (2020), allow the organization to integrate sustainability into its core values, goals, and market orientation. Business ethics are considered to encompass the legal requirements that the UKME adheres to, as well as pursue other possibilities that can strengthen such development. For example, SMMs are necessary for Unilever to efficiently integrate sustainability across all functions of the business, which also facilitates their compliance and proactive stance toward the market.

2. Enhancing Competitive Advantage through Sustainability

According to Barney (1991), competitive advantage can be understood as the ability of a firm to create value from those

strategies that are likely to be poorly replicated by its rivals. Competitive advantage emerges from resources that are valuable, rare, and imperfectly mobile, which have a strong relation with financial performance (Porter & Van der Linde, 1995). Sustainability, especially in the context of ecological manufacturing, can also be viewed as a source of competitive advantage, as the enhancement of ecological performance helps businesses to find or sustain attractive positions in the market (Hollos et al., 2012; Vanalle et al., 2017). For companies involved in ecological manufacturing such as Unilever, there is the possibility of improving performance in terms of quality, cost, flexibility, and innovation while trying to maintain a balance between efficiency, innovation, and environmental concern (Abo elmaged, 2018) .

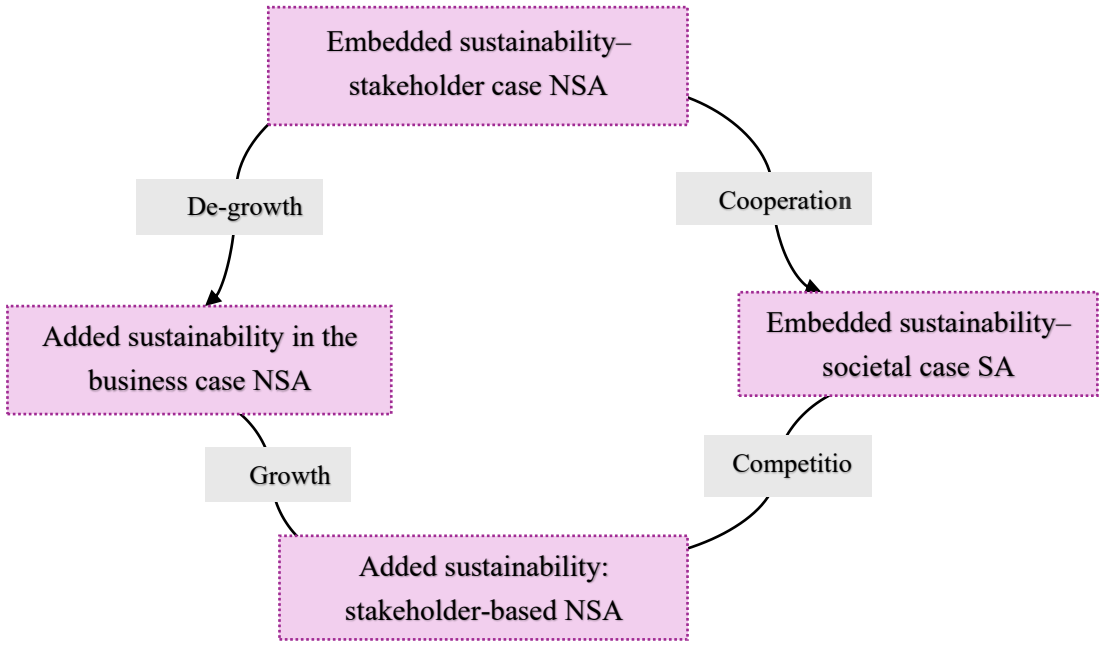
The Sustainability Maturity Model (SMM) developed by Unilever allows for the step-by-step institutionalization of sustainability in companies, from the most minimal approach to the deepest institutionalization. This model, as illustrated by Unilever, begins with basic knowledge and ends with a goal of making sustainability a commercial strategy. Taking into consideration the operational core spanning across the business, companies such as Unilever achieve competitive advantage through green processes that possess proprietary technologies and build eco-friendly socio-business networks (Barney et al., 1989). The strategic ability to respond quickly to changing sustainability requirements is another important factor of competitive advantage (Teece et al., 1997). The achievement of Unilever can be explained by the joint application of the TBL concept and the SMM that targets ecologically sustainable practices. Table 2 below summarizes the strategic pathways to sustainability, demonstrating how growth, regrowth, and embedded sustainability can generate competitive or cooperative advantages.

Table 2 Strategic Aspects of Sustainability Leading to Competitive/Cooperative Advantage.

Aspect	**Business-As-Usual**	**Sustainability through Growth**	**Sustainability through Degrowth**	**Embedded Sustainability**
Goals	**Shareholder value**	**Stakeholder and shareholder growth**	**Stakeholder value by differentiation**	**Sustainable value pursuit**
Scope of Transformation	**Marginal/symbolic**	**Partial (product and value chain)**	**Partial (product and value chain)**	**Core business processes**
Value Proposition	**Customer-focused**	**Key stakeholders-focused**	**Broad stakeholder alignment**	**Stakeholder and sustainability focus**
Stakeholders	**Transactions**	**Collaborative**	**Collaborative and transformational**	**Win–win model**
Sustainability	**Not a priority**	**Profit-driven social/environmental value**	**Profit-driven efficiency improvement**	**Social condition of profit**
Viability of Advantage	**Competitive**	**Cooperative but non-sustainable**	**Cooperative but limited**	**Sustainable cooperative**

Sustainability as a Source of Competitive Advantage

To sum up, Unilever's strategy demonstrates consistency with embedded sustainability, which involves a link between environmental and social objectives and its business objectives as a source of long-term cooperative and competitive advantage. With the SMM, Unilever shifts from basic practices of sustainability to more embracive practices that not only enhance profit levels but also promote stakeholder engagement for sustainable competitive leverage‹Figure 1 highlights how a firm moves from a temporary non-sustainable advantage (NSA) to a permanent sustainable advantage (SA) by employing growth, regrowth, and partnership strategies. **Figure 1**



In order for companies to attain lasting cooperative advantages, it is necessary to weaken the connection between economic aims and social as well as environmental objectives. Instead of trying to make profits the primary goal, businesses should develop products and services that stakeholders appreciate because of their sustainability and let profitability come as a byproduct of stakeholder appreciation (Tarnovskaya et al., 2022). The case of Unilever serves as an example of how sustainability maturity models (SMMs) help in integrating sustainability at the strategic level in the core operations of the business. By practicing sustainability, Unilever and companies of its kind better prepare to collaborate and compete as they expect the future marketplace to focus on sustainable practices. Such a model ensures that businesses remain resilient over the long term and also remain competitive in the sustainable business economy.

3. Understanding Environmental Manufacturing:

Environmental manufacturing focuses on the sustainable use of available resources. Unfortunately, the diminishing resources, coupled with pollution and waste generated in the processes, create an unfriendly green environment. Duflou et al. (2012) assert that given the current pattern of production and consumption of such resources, it is imperative to point out that these processes are bound to choke the prospects of development in the long run. The situation has led to the application of the Triple Bottom Line (3BL) concept, which aims to improve the ecological condition together with the socio-economic frameworks (Garetti & Taisch, 2012; Gopalakrishnan et al., 2012).

Table. 3 **Sustainability aspects relevant to manufacturing**

Environmental Domain	**Economic Domain**	**Social Domain**
— Environmental issues (climate	— Economic models (e.g.,	— Social needs and

Environmental Domain	Economic Domain	Social Domain
change, global warming, pollution, ozone depletion)	circular economy)	values, issues and trends, lifestyle and culture
— Ecosystem concerns (waste and emissions, landfills, species extinction)	— Social and economic trends	— Social interaction and collaboration, feedback, and perspectives
— Policies, regulations, and guidelines	— Production and consumption patterns	— Policies, regulations, and guidelines
— Environmental performance	— Economic growth and development	— Social organization and behavior
— Impact assessment (frameworks, e.g., LCA)	The—Economic and competitive advantages	— Social performance, responsibility, and reputation
— Design philosophies (DFE, biomimicry, cradle-to-cradle)	— Financial performance (value added, shareholder return, profit, potential benefits)	— Social value and benefits (local, national, global)
— Resource conservation (minerals, energy, water)	— Economic performance (products/processes/facilities)	— Social justice, standard of living, quality of life
— Material and energy flow tracking (frameworks, e.g., material flow analysis)	— Life cycle cost (frameworks, e.g., LCC)	— Health and safety, working conditions, job opportunities, education and training, community well-being
— Strategies (waste reduction, resource efficiency, energy efficiency)	— Economic impact (products, supply chain)	— Social impact (frameworks, e.g., SLCA)

I. Definitions:

Sustainable manufacturing represents a series of methods and techniques in production processes that minimize waste and enhance ecological well-being-Joung et al, 2014; Rivera et al, 2008. It assures that manufacturing processes are non-polluting while minimizing energy and resource consumption. Workers and consumers are safe, and poor climatic change is mitigated (Lönngren & Svanström, 2016). Ricoh encourages climate change awareness and sustainable living, living so far below the planetary cleaning capacity. Sustainable manufacturing can also embrace integration of product and process design, production planning, and control of outputs (Fisch & Neo, 2008).

II. The relationship between sustainability and manufacturing:

Manufacturing has a twofold purpose in sustainable development. While it does present threats in terms of extracting resources and ecological destruction, it also provides solutions for real problems and makes a positive economic impact. According to the UN (2015), the manufacturing sector is vital for accomplishing sustainable development, detailing its ability to promote the creation of green energy, infrastructure, and climate change action.

III. Key Principles of Environmental Manufacturing:

- Resource efficiency: This entails the optimization of materials as well as the energy

consumed with a view to conserving resources and minimizing waste.

- Emission reduction: It is the goal of limiting every release into the environment to the extent that is practicable, using emission control technologies and green alternatives.
- Waste management: Taking steps towards reducing waste, including the use of biodegradable materials and appropriate recycling.
- Lifecycle assessment: Assessment of the ecological footprint of the use of products starting from the design until final disposal.

IV. Companies Implementing Environmental Manufacturing:

Each of these companies is a leader in the introduction of environmental manufacturing technologies:

- **Interface, Inc.** The company undertakes to improve the situation with the environment and completely reduce its harmful impact on nature through its Mission Zero activities by the year 2020, concentrating on waste minimization, the use of renewable energy, and non-toxic materials.
- **Patagonia:** The brand has been recognized for its ecological responsibility due to its ability to source and recycle fabrics while promoting a reduce-waste ethos by encouraging customers to repair and reuse old products through a Worn Wear program.
- **Tesla:** Tesla advocates the use of green manufacturing through electric vehicle production and the utilization of renewable technologies such as solar energy.

V. Benefits and Challenges:

Benefits:

- Environmental Preservation: In this category, reduced consumption of resources, as well as waste and inefficiency alike.
- Customer Loyalty: Customers may stay attached to brands if they have a reputation for sustainability.

Challenges:

- High Upfront Investment: Because cleaner technologies need significant amounts of capital in order to be adopted.
- Regulatory Compliance: The complex environmental rules today are not easy to find one's way around.
- Market Limitations: Sustainable products come with limited sales. Maybe it is because consumers do not wish to pay so much.

VI. The summary:

Environmental Manufacturing Robust for this sustainable generation, it helps save this planet as much as it possibly can. This is exemplified by the Interface, Patagonia, and Tesla companies. Although there are problems such as expensive upfront costs and getting past regulatory rules, this list of long-term benefits, including environmental health, lower production costs, and loyal customers, means that today breaking the mold can be no less beneficial than visiting them in person.

Methodology:

As no primary interviews were conducted for this survey, the reports that form the basis of this survey came from secondary material using multiple credible sources:

- **organization Reports:** Unilever's detailed reports provide the organization with valuable information on aims, operations, and key performance indicators. Environmental measures include lowering greenhouse gas emissions, promoting socially responsible green business projects, and teaching farmers in sustainable agriculture practices.
- **CSR Documents:** Unilever’s Corporate Social Responsibility (CSR) documents express the company's priorities with regard to social and environmental matters. These documents specifically focus on embedding social responsibility within more long-term sustainability goals.
- **Previous Research:** By reviewing past studies pertaining to Unilever's sustainability practices, including social media marketing (SMM), it will be possible to understand how those practices can influence the company's performance.

- **Case Studies:** Industry publications, along with documents generated by GRI and ISO reporting agencies, will set up international standard benchmarks for Unilever's sustainability performance.
  - Unilever strategy and importance of SMMs
  - Environmentally friendly manufacturing and facility usage
  - Sustainability can help shape competitive advantages
  - Transparency and resilience of the supply chain.

Case Study: Unilever

I.Overview of Unilever Sustainability Journey

The sustainability journey took a big leap forward with the introduction of the Unilever Sustainable Living Plan in 2010, targeting three key areas:

(a) to reduce eco-footprint.

(b) to increase health and well-being for over a billion people; and

(c) to further sustainable farming through all of its supply chains.

In 2020, Unilever had achieved a level of sustainable sourcing for 62% of its agricultural raw materials; it was well on its way to becoming entirely dependent on renewable energy sources to meet its manufacturing needs. Though the firm had oftentimes fallen short of its targets, it maintains the launch of the cornerstone framework called Unilever Compass, in which net zero carbon emissions and a world free of waste would be set.

II. Application of Sustainability Maturity Models (SMMs)

A series of phases has characterized the evolution of Unilever's sustainability strategy:

- **Stage 1-the Arrest:** As a late arrival to the markets, Unilever focused mainly on minimal environmental compliance at the stage of arrest, viewing sustainability more as a burden than an opportunity.
- **Stage 2-Basic:** The emphasis was thereafter placed more on product design and packaging under sustainability, as sustainability had begun to reap operational positive incomes.
- **Stage 3-Intermediate:** Unilever, with the launch of the Unilever Sustainable Living Plan, reached the intermediate stage, setting thresholds for sustainability through waste and carbon emission reduction.
- **Stage 4-Advanced:** Unilever committed publicly to sourcing all raw materials sustainably by 2025, thereby positioning itself as one of the leaders in sustainable supply chain management.
- **Stage 5-Optimized:** At present, Unilever incorporates sustainability into its business model incorporating processes within a framework founded on green or social responsibility, making it one of the highest achievers within the sustainability realm.

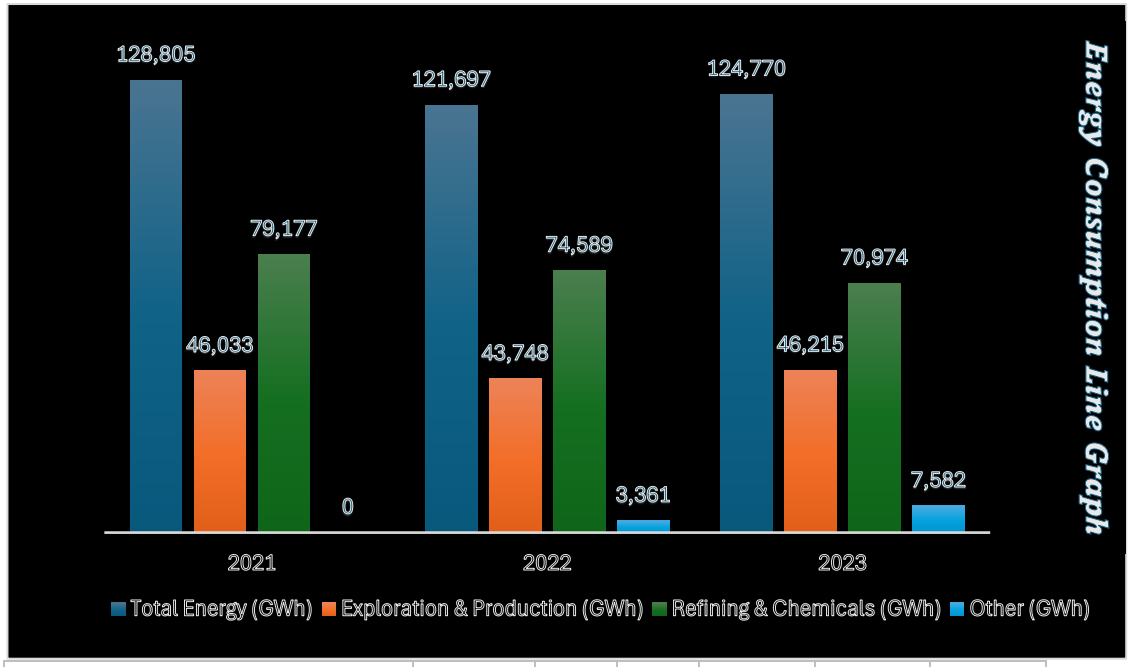
A whole host of tools shall be deployed to monitor progress and quantify sustainability efforts, including sustainability balance scorecards and lifecycle assessments.

Data Analysis:

1) **Sustainability Integration**: Across every operation of its business, Unilever integrates sustainability as a core component of its business strategy. Noticeable progress has been achieved in many related aspects, especially in energy efficiency and greenhouse gas emissions.
2) **Energy Efficiency and Greenhouse Gas Emissions:** The sustainability strategy applied by Unilever has led to the considerable stepping-up energy efficiency and the reduction of GHG emissions. In 2023, Unilever has witnessed a 60% rise in renewable energy consumption compared to 2020-which marks a significant landmark in the path to being carbon-neutral-that brings down fossil fuel consumption and aligns with worldwide policies for climate change mitigation. Flat illustration below covers GHG emissions and energy efficiency trends for Unilever from 2019 to 2023:

Table. 4

Metric	Unit	2019	2020	2021	2022	2023
GHG - Operational control						
Scope 1 (direct) GHG emissions	MtCO2e	49.2	41.7	33.2	30.4	31.1
- Exploration, production & LNG	MtCO2e	-	-	15.5	13.8	15.2
- Refining and chemicals	MtCO2e	-	-	16.9	15.9	15.1
- Other	MtCO2e	-	-	-	0.7	0.8



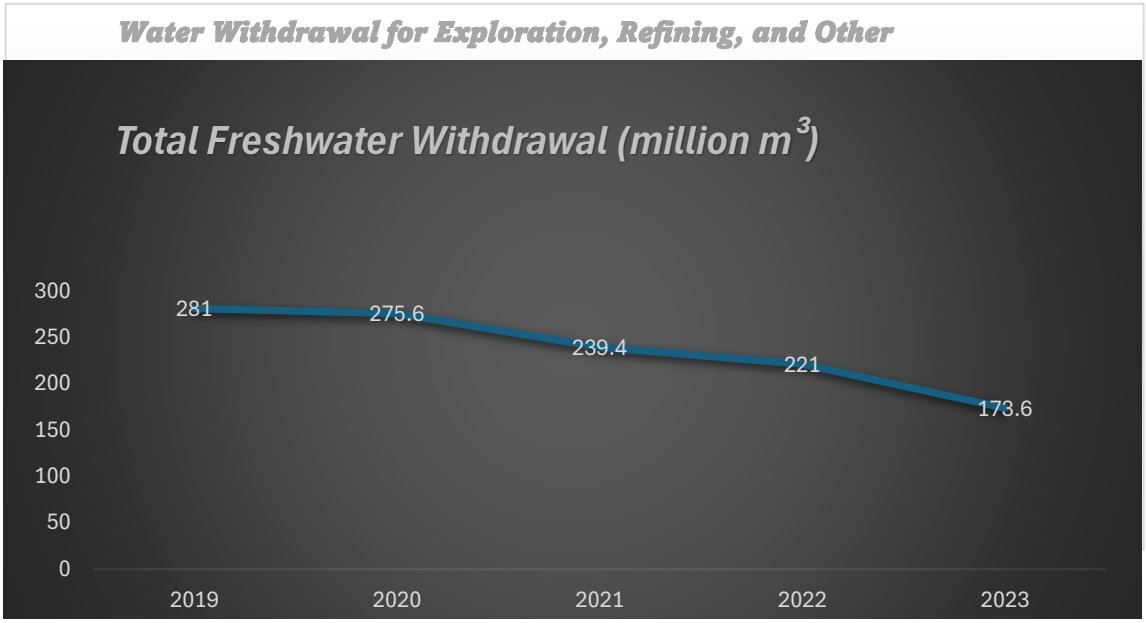
Scope 2 (indirect) emissions	MtCO2e	5.2	3.8	2.4	1.4	1.0
- Exploration, production & LNG	MtCO2e	-	-	0.0	0.1	0.1
- Refining and chemicals	MtCO2e	-	-	2.2	1.2	0.6
- Other	MtCO2e	-	-	-	0.2	0.4
GHG - Equity share						
Scope 1 (direct) methane emissions	Mt	0.12	0.09	0.07	0.05	0.05
Energy - Operational control						
Energy consumption	GWh	-	-	128,805	121,697	124,770
- Exploration, production & LNG	GWh	-	-	46,033	43,748	46,215
- Refining and chemicals	GWh	-	-	79,177	74,589	70,974
- Other	GWh	-	-	-	3,361	7,582

These outcomes indicate Unilever's commitment to sustainable development, directing efforts to a clean energy and emission reduction approach within the larger spectrum of environmental sustainability strategy .Water Conservation, Unilever has made good strides toward water

conservation, a prominent feature being the speed with which water consumed decreased in water-stressed areas: down by 25 percent.

Table. 5

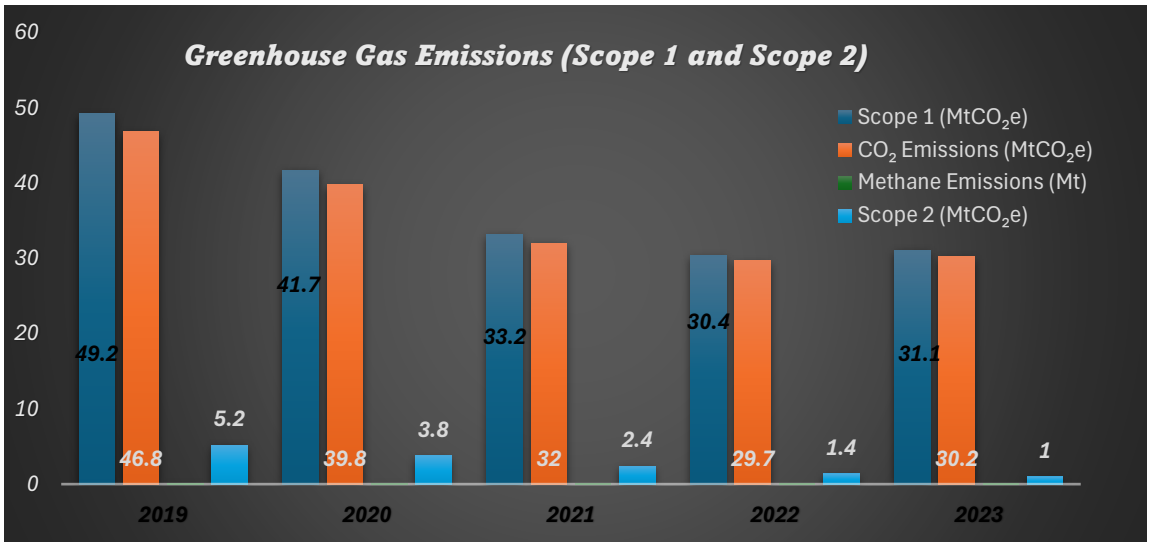
Metric	Unit	2019	2020	2021	2022	2023
Total Freshwater Withdrawal	million m^3	281.0	275.6	239.4	221.0	173.6
Exploration, Production, and LNG	million m^3	-	-	4.1	6.1	5.8
Refining and Chemicals	million m^3	-	-	231.9	211.1	164.3
Other	million m^3	-	-	-	3.7	3.5
Total Water Withdrawal	million m^3	281.0	275.6	239.4	221.0	173.6
Reclaimed and Recycled Water	million m^3	2.3	3.1	2.4	2.8	5.1
Freshwater Withdrawal in Water Stress or Scarcity Areas	%	7	7	1	0	77



Unilever's freshwater cloud went down from 281 million m3 in 2019 to only 173.6 million m3 in the year 2023. Being noted in the same time frame, water reuse increased from 2.3 million m3 to 5.1 million m3. In 2023, water withdrawal from stressed areas decreased costs for water and waste disposal. rose by a whopping 77%. Water use in manufacturing has been on the decline for some time now, thanks to the sustainability strategies of the company. Commending competitive advantages comprise cost savings through renewable energy and

Table6

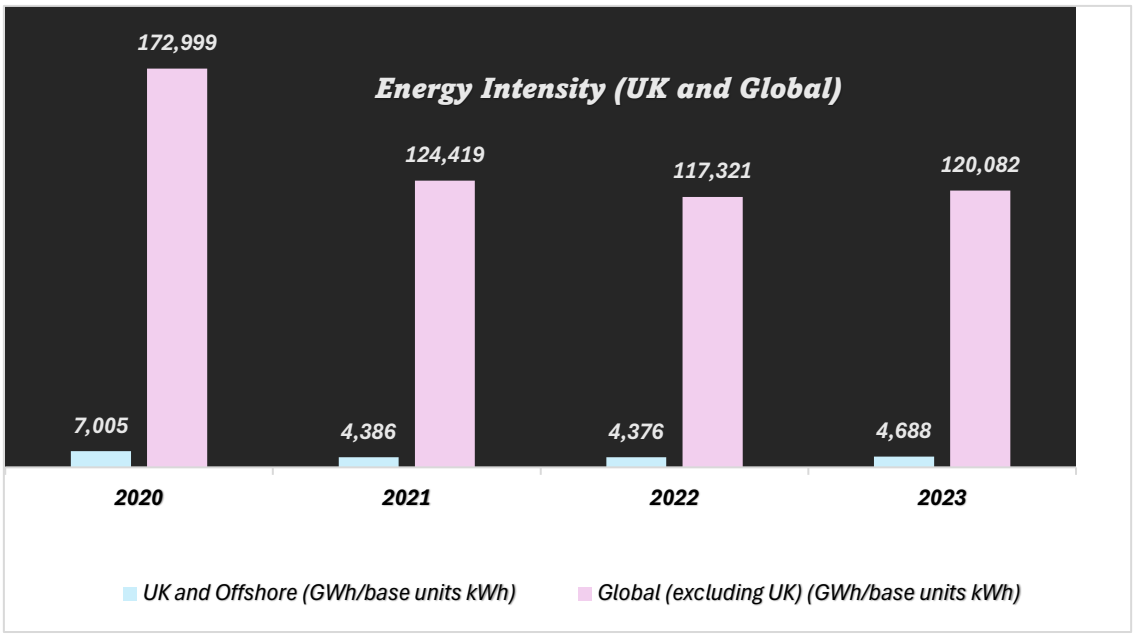
bp ESG Datasheet 2019-20231						
Greenhouse gas emissions and energy						
Metric	Unit	2019	2020	2021	2022	2023
GHG - Operational control						
Scope 1 (direct) greenhouse gas emissions	MtCO2e	49.2	41.7	33.2	30.4	31.1
Scope 1 (direct) carbon dioxide emissions	MtCO2e	46.8	39.8	32.0	29.7	30.2
Scope 1 (direct) methane emissions	Mt	0.1	0.07	0.05	0.03	0.03
Sustainable GHG emissions reductions* (Scope 1 and 2)	MtCO2e	1.4	1.0	1.6	1.5	0.9
Scope 2 (indirect) emissions	MtCO2e	5.2	3.8	2.4	1.4	1.0
Energy - Operational control						
Energy consumption	GWh	-	-	128,805	121,697	124,770
Energy consumption - Streamlined Energy and Carbon Reporting (SECR)						
Energy intensity						
UK and offshore	GWh/base units' kWh	-	7,005	4,386	4,376	4,688
Global (excluding UK and offshore)	GWh/base units' kWh	-	172,999	124,419	117,321	120,082



BP has reduced greenhouse gas emissions in both major divisions, having exhibited a steady downtrend, and restricted emissions to its lowest level in 2023. Carbon dioxide emissions fell by 62.4% from 2019 to 2023, whereas methane emissions declined by 70% from 2019 to 2023. In addition, energy consumption in company operations was effectively managed, with energy demand down 34.6% from 2020 to 2022. Outside of UK and maritime operations, energy consumption fell 30.7% during the same period, from 2020 to 2023.

Unilever Sustainability Efforts (2019–2023) Table7

Metric	Description	Unit	2019	2020	2021	2022	2023
Renewable Energy Usage	% of total energy from renewable sources	%	40%	45%	50%	55%	60%
GHG Emissions Reduction	Reduction in total GHG emissions (in $MtCO_2e$)	$MtCO_2e$	1.2	1.4	1.6	1.8	2.0
Sustainable Sourcing of Raw Materials	% of raw materials sourced sustainably	%	75%	80%	85%	90%	95%
Water Efficiency	Reduction in water usage per ton of production	%	10%	12%	14%	16%	18%
Waste Reduction	Reduction in plastic packaging (in tons)	Tons	100,000	120,000	140,000	160,000	180,000
Sustainable Products	% of product portfolio contributing to Unilever's "Sustainable Living Plan"	%	30%	35%	40%	45%	50%

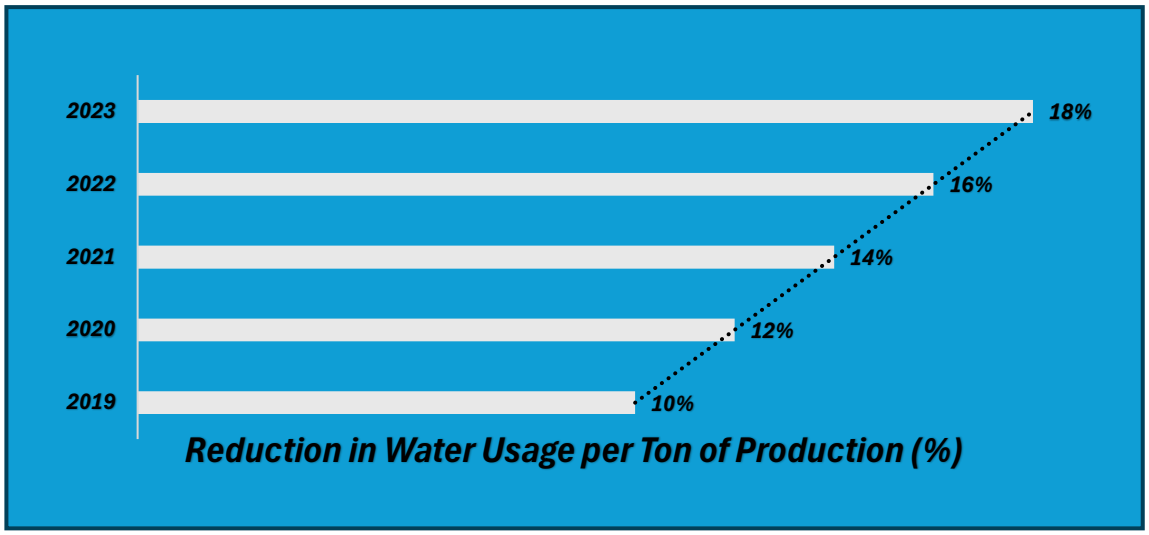


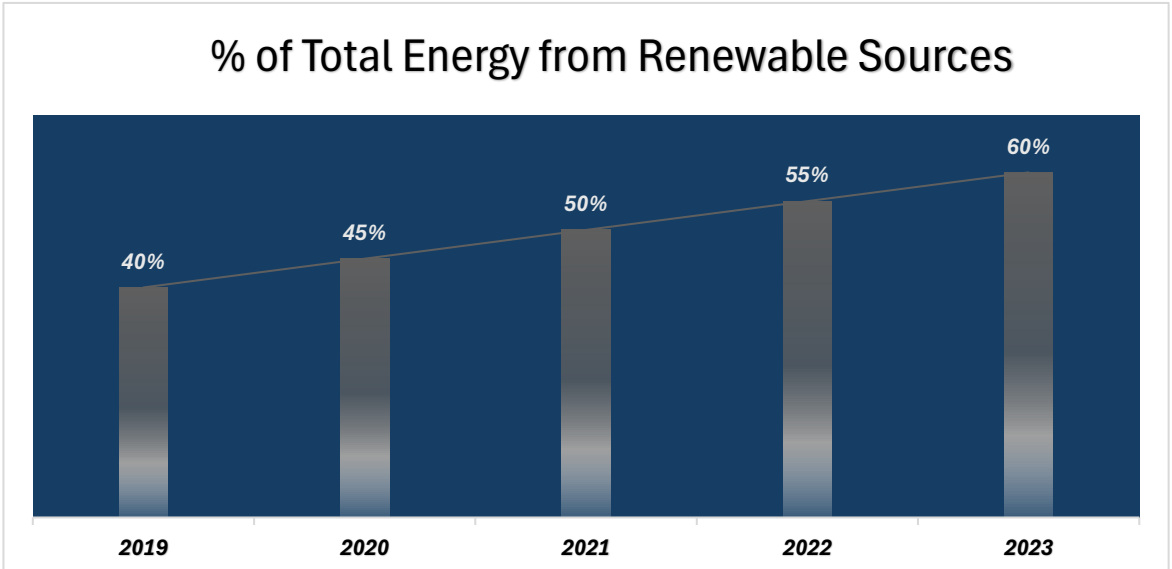
In February 2012, Unilever was declared the best retailer for sustainability by the World Resources Institute's people and climate change conference. Toy briar succeeded in seeing a better solution to energy and sustainability and environmental issues. Founded on 14001: that really covers up many environmental strategies Unilever assures that it does comply with its waste management process and resource efficiency standards.

The following table8,9 summarizes the key findings from Unilever's sustainability reports and compare them to global benchmarks:

Comprehensive Data Summary Table 8 of Unilever's Sustainability Reports

Document Title	Key Findings	Metrics
Unilever Annual Report 2023	Significant reductions in carbon emissions and water usage.	— Carbon— emissions reduced by 30%. - Water usage is reduced by 20%.





Unilever Sustainability Report 2023	Focus on sustainable sourcing and waste reduction.	— 100% —sustainable sourcing of palm oil. - 50% reduction in waste to landfill.

Unilever Basis of Preparations for 2023	Framework for integrating sustainability into business operations.	—Detailed integration of sustainability goals in operations. - Financial impact on sustainability activities (see page 23 for details).
Unilever Climate Action Plan	Commitment toward achieving carbon neutrality by 2030.	—Renewable energy consumption at 60%. - Net-zero carbon emission goal by 2039.
Unilever Human Rights Report 2022	Focus on ethical labor practices and human rights within the supply chain.	— 95% o— suppliers are aligned with Unilever's human rights principles. - 85% of the operations are certified for fair labor practices.
Unilever Plastic Waste Strategy for 2023	Efforts to reduce plastic use and promote recycling.	— 50% r—diction for virgin plastic use. - 25% increase in recycled plastic packaging.
Unilever Water Conservation Program, 2023	Focus on reducing water usage in key production areas.	— Water—usage reduced by 25% in high-risk areas. - Implementation of water recycling in 15 facilities.
Unilever Sustainable Sourcing Report 2023	Comprehensive review of responsible sourcing practices.	— 100% —sustainable sourcing of key agricultural materials (e.g., tea, soy, palm oil). - 80% of the suppliers have sustainability certificates.

Table 9: Unilever's sustainability efforts

Category	Key Findings	Metrics/Indicators	Comparison with Global Standards	Competitive Advantages
Carbon Reduction	Unilever reduced carbon emissions by 30% in 2023.	Carbon—reduction: 30%.	The GRI target of 20% reduction for similar industries is exceeded.	Lower energy costs and improved brand reputation.
Energy Efficiency	60% of the energy consumed comes from renewable sources.	Renewable energy usage: 60%.	Aligns with ISO 14001 standards for renewable energy use.	Long-term cost savings and reduced carbon footprint.
Water Conservation	Reduced water usage by 25% in high-risk areas.	— Water—usage reduction:	The proposed model meets the GRI standards	Reduced operational costs and

Category	Key Findings	Metrics/Indicators	Comparison with Global Standards	Competitive Advantages
		25%.	for water conservation in high-risk regions.	environmental impact.
Sustainable Sourcing	100% sustainable palm oil and key materials.	— 100% — sustainable sourcing of palm oil.	Exceeds GRI and ISO standards for sustainable sourcing of agricultural products.	Enhanced supply chain resilience and consumer loyalty.
Waste Management	a 50% reduction in virgin plastic use and a 25% increase in recycled packaging.	— 50% r— auction in virgin plastic use.	This system meets the standards for plastic waste management in the personal care industry.	Reduced material costs and positive environmental impact.
Sustainability Maturity Models (SMMs)	SMMs were applied to track progress toward waste reduction and carbon neutrality goals.	— SMMs — used to assess and improve performance.	Demonstrates industry leadership in sustainability maturity assessments.	Improved strategic planning and sustainability leadership.

Unilever's commitment to sustainability has led to environmentally beneficial and competitive business processes, including energy efficiency, carbon and water management, and responsible sourcing. The company's efforts to reduce waste and promote a circular economy have been placed at the forefront of global sustainability initiatives. Transparency, accountability and adherence to international guidelines ensure the credibility of Unilever's sustainability measures. The company's initiatives have led to cost benefits, improved brand equity, and market expansion due to consumer demand for green products.

- **Further Analysis of Unilever's Specific Sustainability Projects (Summarized) :**summarizing key findings and integrating them into the comparative analysis.

Comparative Analysis of Sustainability Competitors

Table 10

Aspect	Unilever	Nestlé	Procter and Gamble (P&G)	Commentary
Carbon Emissions	30% reduction in carbon emissions	20% reduction in GHG emissions (2023)	15% reduction in absolute emissions (2023)	Unilever leads carbon reduction through aggressive targets and innovative practices. Nestlé followed closely, whereas P&G showed

Aspect	Unilever	Nestlé	Procter and Gamble (P&G)	Commentary
	(2023)			progress at a slower pace.
Renewable Energy	60% renewable energy	45% renewable energy	35% renewable energy	Unilever has made the highest use of renewable energy, emphasizing its commitment to a carbon-neutral future. Nestlé and P&G are making strides, but they lag behind Unilever's aggressive transformation.
Water Conservation	25% reduction in water usage in high-risk areas	18% reduction in water withdrawal (2023)	15% reduction in water usage (2023)	Unilever's focus on water conservation, particularly in water-scarce regions, set him apart as a leader in the area.
Sustainable Sourcing	100% sustainable palm oil and tea sourcing	70% sustainable sourcing of key materials	80% sustainable palm oil sourcing	Unilever has achieved 100% sustainable sourcing, highlighting its dedication to ethical supply chains. P&G and Nestlé are making progress, but they have not yet reached the same level.
Waste Management	50% reduction in virgin plastic use	30% reduction in plastic use (2023)	40% reduction in single-use plastics (2023)	Unilever's strong focus on waste management and circular economy models has resulted in significant reductions in plastic use, establishing an industry benchmark.
Sustainability Maturity	Advanced maturity; using SMMs to drive progress	Intermediate maturity; structured sustainability goals	Intermediate maturity; focusing on selected initiatives	Unilever's use of Sustainability Maturity Models (SMMs) indicates a more structured and mature approach to sustainability than competitors.

The commitment to sustainability has penetrated Unilever's various business processes resulting in eco-friendly answers that also enhance its competitiveness. Areas where Unilever's practices are applicable include energy efficiency, carbon and water

management, and responsible sourcing. The efforts of Unilever are only at the forefront of sustainability prompting a trajectory toward circular-economy practices as such: reducing wastes and conserving resources. The credibility of Unilever's sustainability measures is underpinned by the transparency, accountability, and respect for international standards. Initiatives by the company have brought about cost savings, enhanced brand equity, increased market share, and provide a wide appeal with the growing appetite of consumers for the greener product.

- **Financial Impacts of Unilever's Sustainability Initiatives**

Table 11

Financial Metric	Unilever	Commentary
Cost Savings	20% reduction in operational costs (2023)	Unilever's investments in renewable energy and water conservation have resulted in significant cost savings, reducing reliance on fossil fuels and decreasing water and waste disposal expenses.
Revenue Growth	15% increase in sustainable product sales	The focus on eco-friendly products has attracted environmentally conscious consumers, driven revenue growth, and enhanced brand loyalty.
Return on Investment (ROI)	Positive ROI on sustainability initiatives (5-year period)	Unilever's strategic sustainability investments yielded positive ROI, demonstrating the business case of integrating eco-friendly practices into its core operations.
Market Share	10% increase in sustainable product category market share	Unilever's leadership in sustainability has helped it capture a larger market share as consumers and retailers increasingly prefer brands that are committed to eco-friendly practices.

An Analysis of the Corporate Leadership in Carbon and Water Management and What Goes Therewith: Unilever is, I believe, in good stead, and would aim at not only carbon etching but also at making watermarking targets realizable. The organization has leapfrogged over Nestle and P&G, given its phenomenal goals and the move towards sustainability in all walks of its business. Renewable Energy and Sustainable Sourcing: Unilever has the advantage as 60 percent of the energy comes from renewable sources and 100 percent of core materials are sustainably sourced. This dependent-business ethos is almost butter for the flavor of the company and those investing in it. Waste Management and SMM Implementation: So, thanks to some extent to the advanced SMM, plastic use can be reduced by developing better techniques for waste management. Such a rounded approach toward the larger sustainability further edges up the standings of the company, in comparison to its contemporaries.

Recommendations

Unilever must put money on advanced sustainability technologies, create common industry standards with competitors and provide a stronger use of sustainability maturity models to remain a leader in sustainability, preserve wealth and minimize the unwanted impact on the environment.

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